



# **Handbook of Management Accounting Research**

## **Volume 2**

Edited by

Christopher S. Chapman, University of Oxford, UK

Anthony G. Hopwood, University of Oxford, UK

Michael D. Shields, Michigan State University, USA

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# Preface

Researching the practice of management accounting is challenging and interesting, because management accounting is a set of practices that are often loosely coupled to one another and varying across both time and space. A variety of ways of researching management accounting practice also have emerged, changed over time, and have been diffused unevenly around the world. Even management accounting terminology is neither uniform nor constant, with the term “management accounting” itself seemingly appearing in the 1930s and 1940s in America after many of the individual practices had already emerged.

Focussing on facilitating economic decision-making and the wider planning and control of organizations, the practices of management accounting have tended to have separate trajectories of development and modes of organizational functioning, thus making management accounting a loosely coupled set of fragmented practices. Costing and its various derivatives, capital and operational budgeting, internal financial (and increasingly non-financial) performance measurement, transfer pricing between the subunits of an organization, and organization-wide financial planning and control systems can all be subsumed under the mantle of management accounting, although what practices are considered to be management accounting and, indeed, what other fields management accounting is considered to be related to varies around the world. In Sweden, for instance, budgeting is considered as a component of general management rather than accounting, and certainly in Japan and in some countries of Continental Europe, cost accounting is considered as having more to do with engineering than a more narrowly conceived accounting. Indeed, cost engineering is a recognized term in Japan. However, although until now these separate management accounting practices have often been loosely coupled, developments in information systems may be requiring and enabling a much greater degree of integration with other practices in and between organizations. Costing systems are increasingly a part of enterprise-wide planning and control systems. Budgeting, in turn, is increasingly a part of strategic and operational planning, thereby becoming a component in a wider complex of systems and practices geared to organizational coordination and development. Similarly, performance measurement increasingly is being expanded to include non-financial measures and integrated with strategy. But interestingly, such trends, in turn, often stimulate the development of more ad-hoc local elaborations of these practices as employees at a variety of organizational levels seek to relate their own information needs to their local circumstances and requirements. So paradoxically, processes of integration can set into motion counter processes of disintegration and fragmentation. In this way, management accounting can take on a variety of forms and produce different information as decision contexts, organizational assumptions, and time horizons that change in time and space. More informal information flows attuned to a variety of information needs can reside alongside the structures of more centralized and standardized management accounting practices.

These developments may be part of a much more general diffusion of economic calculation throughout organizations. What might in some countries have been the preserve of the accountant is increasingly becoming a significant part of the functioning of the marketing manager, the operations manager, the research manager, those responsible for strategy, for product design, and so on. Management accounting is in the process of becoming a much more dispersed practice because in organizations today economic information and calculation appear to be permeating all of their key management processes.

Faced with such changes and developments, it is hardly surprising that there is an interest in the state of systematic knowledge in the field of management accounting and in the research processes that develop this knowledge. To satisfy that interest is the aim of the *Handbook of Management Accounting Research*.

Systematic enquiries into what is now known as management accounting have a long history, particularly in Continental Europe, but by research as we now know it is largely the product of the twentieth century, particularly the latter half of it. Key pioneering enquiries were made as part of the development of economic theories of cost accounting and controllable costs in Austria, Germany, and Italy in the earlier part of the twentieth century, and the school of costing associated with the London School of Economics in the 1930s was particularly influential. In the USA there were related attempts to explore the nature of cost accounting and

controllorship practice from an economic perspective, not least with respect to understanding the design and functioning of costing in a regulatory context. However, it was largely with the growth of research-oriented business schools and departments of business administration in the 1960s that management accounting research received its greatest impetus.

Varying by country and changing over time, the business school and related departmental arrangements provided an interdisciplinary setting for the systematic analysis of management accounting. Economics and quantitative analysis provided the most influential initial frameworks for doing this but over time other disciplines represented in these academic settings were also drawn upon to investigate the nature and functioning of management accounting in organizations. In the USA, psychology was initially the most influential but organization theory also came to play a role. In Australia and Europe organizational and sociological approaches have been more prevalent, providing a basis for exploring ways in which management accounting relates to wider organizational designs and influences and shapes wider cultural and social forces.

After two initial chapters in Volume 1 of the *Handbook* which provide a bibliographic and a substantive review of the management accounting research literature, the next several chapters review research on management accounting practices that are motivated by or viewed from the lens of various theoretical perspectives. Detailed discussions are given in the ways in which theories from economics, history, organizational studies, psychology, and sociology have analysed and influenced management accounting research and our understanding of management accounting practices. Within economics, separate consideration is given to the influential role played by agency theoretic perspectives in recent times. Recognizing the wide array of perspectives available within organization theory, separate analyses are provided of contingency theories of management accounting and control systems and more recent attempts to understand the functioning of management accounting in organizations as a form of practice. At the sociological level, a separate discussion of critical theorizing is included.

The remainder of Volume 1 of the *Handbook* is devoted to a consideration of different research methods used in management accounting research. Detailed attention is given to qualitative and quantitative research approaches, cross-country comparative research, and interventionist research. Other chapters provide focussed discussions of analytical modelling, archival research, experimental research, and survey methods.

The chapters in Volume 2 provide insights into research on different management accounting practices. These practices include costing, such as activity-based costing, managing costs, and target costing, as well as practices related to organizational planning and control, including financial accountability, budgeting, transfer pricing, and performance measurement. Chapters in Volume 2 also review particular issues associated with the design and functioning of management accounting in the special contexts of health-care and manufacturing organizations. Although obviously far from comprehensive, these latter reviews nevertheless serve to alert us to the importance of designing and operating information systems in particular organizational contexts. Their partiality also reflects the limits of existing research in the area. There is a paucity of research which addresses the specialized needs of many important sectors of the economy including retail, the service sector, media and communications industries, and so on. A further chapter in this section of the *Handbook* addresses research issues associated with the functioning of management accounting in interorganizational contexts, an increasingly important topic now that there is a much more active management of supply chains.

Volume 2 of the *Handbook* concludes with a review of research on how management accounting practice and research varies around the world. Once again this is far from comprehensive, the gaps largely reflecting the limitations of existing research and literatures. Be that as it may, consideration is given to management accounting in many countries: China, Europe (Britain, Germanic, Nordic, and Latin), Japan, and the USA.

Taken as a whole, the two volumes of this *Handbook* identify the enormous scale and scope of management accounting research. A great deal has been achieved. The task of researching management accounting practices nevertheless remains challenging and interesting. Many of the chapters conclude with agendas for future research. Research on management accounting practice is a moving target as its economic, organizational, and societal contexts continues to change across space and time. New sectors emerge with new information challenges. Organizational designs and strategies continue to be modified. Technical advances in information processing provide the ever new possibilities. Regulatory agencies demand different flows of information, in different ways with different timings. Management accounting practice is increasingly dynamic, with its knowledge bases changing and seemingly remaining ever incomplete. The need for research on management accounting practices will certainly remain and continue to be challenging and interesting.

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In conclusion, we would like to thank the many researchers and chapter authors who have made this *Handbook* possible. These authors have put in an enormous amount of work despite having to operate to very tight time deadlines. We would also like to thank Takamasa Fujioka for all his help in producing the manuscript. Finally, we gratefully acknowledge the support provided by Elsevier and particularly by Sammie Haigh and Mary Malin.

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# **Management Accounting Practices**



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# Managing Costs and Cost Structure throughout the Value Chain: Research on Strategic Cost Management

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**Abstract:** Strategic cost management is deliberate decision making aimed at aligning the firm's cost structure with its strategy and optimizing the enactment of the strategy. Alignment and optimization must comprehend the full value chain and all stakeholders to ensure long-run sustainable profits for the firm. Strategic cost management takes two forms: *structural cost management*, which employs tools of organizational design, product design, and process design to build a cost structure that is coherent with strategy; and *executional cost management*, which employs various measurement and analysis tools (e.g., variance analysis and analysis of cost drivers) to evaluate cost performance. In this chapter, I develop a model that relates strategic cost management to strategy development and performance evaluation. I argue that although management accounting research has advanced our understanding of executional cost management, other management fields have done more to advance our understanding of structural cost management. I review research in a variety of management fields to illustrate this point. I conclude by proposing that management accounting researchers are uniquely qualified to create a body of strategic cost management knowledge that unifies structural and executional cost management.

## 1. Introduction

The headlines of the business press are replete with news of firms' cost management activities. Some are trimming the workforce or renegotiating wages and benefits. Others are re-engineering processes to use a more economical mix of inputs or to produce a more valued output. Still others are outsourcing work, forming strategic alliances, and partnering with customers and suppliers. What is unclear is whether this frenzy of cost management is guided by strategic intent and if it is, whether it is indicative of best practice in orchestrating organizational change.

In the popular press, "cost management" is often a euphemism for cost cutting, a common response when managers realize that the firm has ceased to be a sustainable profitable concern. However, managers' reluctance to act when uncertainty remains about the source or permanence of problems or when cost cutting is associated with adjustment costs (e.g., severance payments, job redesign, capacity rebalancing) may cause costs to exhibit a "sticky" relationship

compared with business activity (Anderson et al., 2003; Balakrishnan et al., 2004; Noreen & Soderstrom, 1997). That is, costs decrease less with declines in activity than they increase with increases in activity,<sup>1</sup> thus:

In contrast to the commonly received model of fixed and variable costs, our results are consistent with an alternative model of cost behavior that recognizes the *role of managers* in adjusting committed resources to changes in activity-based demands for those resources... sticky cost behavior reveals *deliberate decision making* by managers who weigh the economic

<sup>1</sup>Anderson et al. (2003) find this asymmetric relation between SG&A costs and revenues for a sample of more than 7,500 firms over a 20-yr period. Cross-sectional differences in the degree of stickiness are related to firm-specific measures of revenue uncertainty and adjustment costs. Although they interpret their findings as being consistent with deliberate actions of managers, they do not measure management action directly.

consequences of their actions (Anderson et al., 2003, pp. 61–62, emphasis added)

In sum, management matters; the production function and the related cost function that characterize the firm are not adequately specified without considering managers' motivations, skills, and constraints in managing costs in conjunction with demand.

Yet cost management skills are in short supply. As a recent McKinsey & Company study (Nimocks et al., 2005, pp. 107–108) reports:

[Competitive] pressures mean that many businesses desperately need a new approach to managing costs—one that reduces them over the long term... The process of lowering overhead costs sustainably is deeper and more subtle than most companies realize. The tactical margin improvements that might be enough to meet a one-off quarterly earnings gap or to compensate for a delayed product launch will not bring about deeply embedded change, while more broadly ambitious cost reduction programs often lose their impetus after the initial effort. Companies that truly transform their approach to overhead costs, by contrast, design sustainability into the heart of their programs, aligning their costs with their strategies and maintaining a strong commitment to the effort.

In this chapter, I argue that the need for firms to adopt a new approach to managing costs coincides with a need for management accounting scholars to expand the scope of cost management research. Management accounting is a body of tools and practices that facilitate deliberate decision making by informed managers who are motivated to maximize long-term profits of the firm. For purposes of this chapter, I define “strategic cost management” as deliberate decision making aimed at aligning the firm’s cost structure with its strategy and optimizing performance of the strategy.<sup>2</sup> Alignment and optimization must comprehend the full value chain and all stakeholders to ensure long-run sustainable profits for the firm. I distinguish between two forms of strategic cost management. *Structural cost management* employs tools of organizational design (e.g., determination of firm boundaries, scale, and governance structures), product design, and process design to build a cost structure that is coherent with strategy. *Executional cost*

*management* employs common management accounting tools to measure cost performance in relation to competitive benchmarks so that improvement opportunities are highlighted.<sup>3</sup>

Early papers on strategic management accounting found fault with management accounting’s disproportionate attention to executional cost management and to the production (manufacturing) portion of the value chain (e.g., Bromwich, 1988, 1990; Bromwich & Bhimani, 1989). More than 20 yr later, little has changed (Roslender & Hart, 2003), and, as this chapter illustrates, much of what constitutes advancement in our understanding of strategic cost management—particularly structural cost management—is occurring outside of accounting research journals. From my selective review of the literature, I offer three propositions and a conclusion:

1. Cost management skills are in high demand in the world economy, although they are often most evident in the work of nonaccounting managers and increasingly require a new approach as compared to cost-cutting efforts of the past (Hergert & Morris, 1989; Lord, 1996; Nimocks et al., 2005). Some of the most successful modern firms (e.g., Amazon, Dell Computer, Wal-mart, Southwest Airlines, Tesco, Zara) deliver traditional goods and services using business models with radically different cost structures from those of their competitors. Yet most management accounting educators teach the tools of executional cost management rather than the structural cost management that is associated with creating innovative business models.
2. Researchers from different management traditions have studied the performance effects of organizational design, product design, and process design in isolated parts of the organization (e.g., product development, manufacturing, marketing and sales, and logistics and distribution). Since these strategic decisions typically define the gross parameters of the firm’s cost structure, there is much to be learned about structural cost management from these studies. Other management disciplines have also been more attuned than accounting to the prevalence of new organizational forms that span firm boundaries (Hopwood, 1996; Kinney, 2001;

<sup>2</sup>Clearly *cost* management is only one piece of the complex challenge of long-term *profit* maximization. Although this chapter does not explicitly consider “strategic revenue management” (typically the domain of marketing research), at several junctures I identify important interdependencies between the cost and the revenue function that cause the literatures to converge.

<sup>3</sup>An economist might characterize structural cost management as a choice among alternative production functions that use different combinations of inputs to produce similar goods or services. In contrast, executional cost management takes as given the production function and is instead concerned with whether the firm is producing on the efficient frontier.

Otley, 1994). In that these new organizational forms are explained, in part, as a transaction cost minimizing solution (Williamson, 1985), the importance of cost management is clear. Yet management accounting texts often give only cursory consideration to strategic choices such as outsourcing or make-or-buy decisions. In sum, although many decisions that are taken to align a firm's strategy with its structure have significant implications for the level and volatility of costs, disparate studies on this phenomenon have not yielded a unified body of "strategic cost management" knowledge.

3. Management accounting researchers are well suited to the task of creating a unified body of strategic cost management knowledge. Training in the economics of the firm and the core accounting principles of measurement and management control are essential ingredients for weighing economic consequences of alternative actions. However, in spite of earlier admonitions for accounting researchers to take a more strategic view of cost management (e.g., Bromwich, 1988, 1990; Bromwich & Bhimani, 1989) and in spite of recent developments aimed at linking performance evaluation to strategy (e.g., Kaplan & Norton, 1996, 2004), cost management remains narrowly focused on executional cost management, typically within circumscribed organizational boundaries.

These propositions point to an opportunity to reinvigorate management accounting research and education around complex economic and social forces governing the practice of structural cost management rather than a narrow group of executional cost management tools. As this chapter illustrates, researchers from other traditions have made great progress in outlining the contours of structural cost management for different segments of the value chain. Management accounting researchers' challenge is to first synthesize these research findings into a coherent body of strategic cost management knowledge and to then extend the scope of research to understanding the measurement tools and practices that facilitate deliberate decision making associated with structural cost management.

The chapter is organized in seven sections. Section 2 reviews previous commentaries on the strategic management accounting literature and presents a schematic model that relates strategic cost management to strategy development and performance evaluation. The model incorporates elements from Tomkins & Carr's (1996) model of strategic investment, Shank & Govindarajan's (1994) characterization of

cost drivers, and Kaplan & Norton's (1996, 2004) multistakeholder, multiperiod perspective on performance. I structure my review of research to follow the stakeholder and value chain analysis that is central to the model. Given the breadth of material and disciplines covered in the chapter, it is important to note that this is not an exhaustive literature review. Rather, it is a selective literature review intended to illustrate and support my thesis: a significant body of research exists that warrants inclusion in a unified body of strategic cost management knowledge, and that management accounting researchers are well positioned to do the important integrative work that remains. The next two sections of the chapter correspond roughly to internal operations and operations at the boundaries of the firm. Thus, Section 3 covers research on product/service design and process development, production, and product distribution/service delivery and Section 4 covers research on strategic cost management practices in the extended value chain where cost management requires consideration of mutual advantage of self-interested trading partners (e.g., supplier and partner relations and customer interactions). Section 5 takes up dynamic issues of managing costs throughout the value chain for long-term, sustainable profits. Section 6 addresses enterprise risk management, an aspect of cost management that also spans the value chain and has become increasingly important with globalization, the emergence of hybrid organizational forms and recent corporate governance failures. Section 7 concludes with observations on the role for management accounting research in contributing to a unified body of "strategic cost management" knowledge.

## 2. Strategic Cost Management

For 25 yr, Porter's (1980, 1985) seminal work has defined how strategy is taught to management students and has shaped the way that firms evaluate competitive conditions and develop strategy. During the same period, many management accounting researchers have questioned how the source of competitive advantage relates to the decisions that managers face, and by extension, the form that management accounting takes to facilitate decisions. In a special journal issue dedicated to the subject, Tomkins & Carr (1996) concluded that strategic management accounting lacked a general conceptual framework. In a more recent survey, Roslender & Hart (2003) conclude that there is still little agreement about what constitutes "strategic management accounting"; indeed, diverse research streams that employ the term only add to the ambiguity.

Lord (1996) identifies four streams of research under the heading of “strategic management accounting.”<sup>4</sup> For purposes of this chapter on strategic cost management, the literature that she describes as studying the “... analysis of ways to decrease costs and/or enhance differentiation of a firm’s products, through exploiting linkages in the value chain and optimizing cost drivers (p. 348)” is most relevant. Lord subdivides cost management research into two streams:

1. research that examines whether and how firms configure accounting data to support the value chain analysis that Porter (1985) advocates (e.g., Hergert & Morris, 1989; Shank, 1989; Shank & Govindarajan, 1992; Tomkins & Carr, 1996), and;
2. research that attempts to derive the relations between a firm’s strategy, cost structure, and the causal relation between activity levels and the resources that are required (i.e., “cost drivers”) (e.g., Anderson, 1995; Banker & Johnston, 1993; Ittner et al., 1997; Maher & Marais, 1998).<sup>5</sup>

These research streams take as given the organization’s strategy and structure, differing only in whether they seek to *reflect* or *detect* the economics of the given strategy and structure in accounting records. In this chapter, I go further, arguing that much of what constitutes modern cost management is found in the choices about organizational strategy and structure. In agreement with Lord’s (1996) findings, I conclude that these choices, which are often taken by general managers rather than cost accountants, typically have not been studied by management accounting researchers.

I draw upon several research frameworks to define the scope of this review. Tomkins & Carr’s (1996, p. 276) model of strategic investment (which draws upon work by Shank & Govindarajan (1992, 1994)) provides an important linkage between strategy formulation, value chain analysis, and cost driver analysis. In Tomkins and Carr’s model, cost driver analysis is the catalyst for cost management and cost

management takes one of two forms: cost reduction efforts and efforts to re-engineer the value chain to produce a *different* cost structure. The two forms of cost reduction are related to Shank and Govindarajan’s contention that cost drivers are of two types: *structural cost drivers* that are determined by organizational structure and by investment decisions that define the operating leverage of the firm, and *executitional cost drivers* that are determined by the efficacy and efficiency with which the strategy is executed. Accordingly, in this chapter, I label cost management activities aimed at changing the firm’s cost structure, *structural cost management*, and cost management activities aimed at improving performance for a given strategy, *executitional cost management*.

A second framework that influences this review is Kaplan & Norton’s (1996, 2004) work that highlights how firm-level strategy and constituent business-level strategies are linked to performance measures through an integrated performance management process. Cost (and more generally, financial performance) is only one aspect of performance. Indeed an important feature of their models is the inclusion of metrics of performance as defined by multiple stakeholders (i.e., employees, suppliers, alliance partners, customers, shareholders, governments, and society at large). Although this chapter focuses on cost management activities, I consider multiple stakeholders in the value chain. Specifically, I assume that the firm cannot enjoy long-term sustainable profits unless all critical stakeholders enjoy adequate returns (financial or otherwise) while participating in the value chain as compared to their alternative opportunities. Thus strategic cost management demands that the firm spend as little as possible to achieve the desired results, but spend as much as needed to keep all key stakeholders at the table. I further assume that many opportunities for optimizing the cost structure of the enterprise lie at the boundaries of the firm. Together these propositions mean that strategic cost management must extend beyond the firm’s current chart of accounts—encompassing costs borne by all critical stakeholders and extending to more distant future periods (Hergert & Morris, 1989). Outside parties and future events interject uncontrollable and uncertain forces in the cost management process. Consequently, I highlight the need to manage both the level and the volatility of costs in an uncertain environment—one component of applied risk management (DeLoach, 2000).

In Fig. 1, I synthesize insights from these frameworks and from other writings in the strategic cost management literature to provide a schematic that relates strategic cost management to strategy

<sup>4</sup>Three research streams are not the subject of this chapter. One focuses on extending management accounting to collecting data on competitors. A second stream of research focuses on the contingent relation between the choice of particular strategies and the configuration of management accounting systems. A final research stream takes a critical perspective, positing that strategies are emergent, rather than deliberately chosen. Thus, according to this view, management accounting is unlikely to reflect a deliberate, rational effort to enact a specific strategy.

<sup>5</sup>See Banker & Johnston (2006) for a survey of this literature.

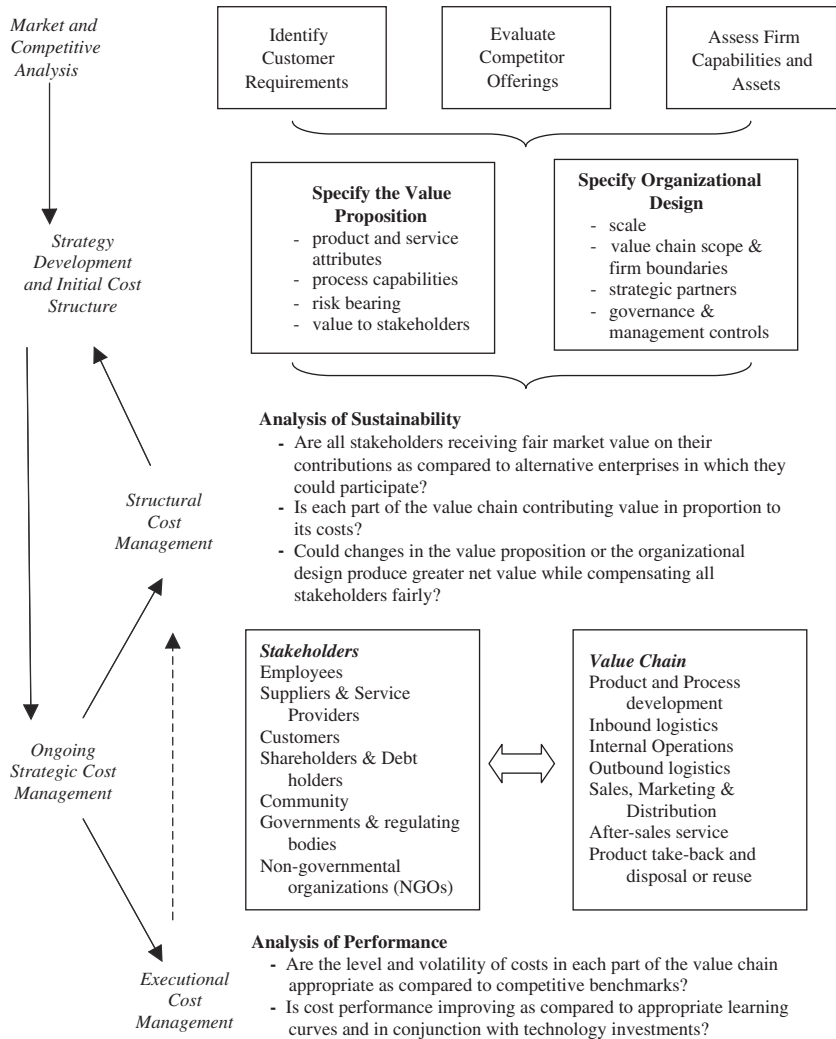


Figure 1. A schematic representation of strategy development and strategic cost management. (Tomkins & Carr (1996), Shank & Govindarajan (1992, 1994), Kaplan & Norton (1996, 2004).)

development. The upper portion of the table depicts the market and competitive analysis that informs strategy development. Strategy development has two foci, the value proposition and the organizational design. To a great degree, choices that are made in developing these elements of strategy define the long-term cost structure of the firm. My contention in this chapter is that in focusing more on these choices, research outside of management accounting provides a foundation for understanding this important part of structural cost management. Taking these choices as given in the short term, firms then engage in strategic cost management of the activated value chain with its contributing stakeholders. This requires two

levels of ongoing analysis: (1) analysis of the sustainability of the value chain, and (2) analysis of the performance of the value chain. While evidence of failure on the sustainability dimension may accompany failures of performance and require changes to either the value proposition or the organizational design, failures of performance may simply indicate inadequacies in executing the strategy rather than inadequacies of the strategy.

In the sections that follow, I use value chain activities as the primary organizing device and within each section, consider how prior research has demonstrated the use of both structural and executional cost management approaches to create an attractive

value proposition for stakeholders. I then turn to cost management for the full value chain over an extended time horizon and in the presence of uncertainty about the level or structure of future costs. Before I begin, a caveat is in order. Although the broader field of strategic management accounting clearly includes choices about governance structures and management controls (noted under “organizational design” in Fig. 1), for purposes of this review on strategic cost management I focus on cost management as primarily an informational challenge rather than an issue of motivation or incentives. Clearly this distinction becomes strained at the boundaries of the firm, and Section 4 includes more discussion on management controls that accompany cost management approaches in these settings. I do not wish to give the false impression that management controls are less important to strategic cost management within the firm. Rather, I would simply refer the reader to more comprehensive reviews of strategic management accounting such as Lord (1996) and Roslender & Hart (2003).

### 3. Cost Management Practices within the Firm’s Value Chain

In this section, I consider cost management practices in the portion of the value chain that typically falls within the boundaries of the firm. I start with product design and development as well as the related and complementary stages of process design. Then I turn to operations, including production of manufactured goods and associated logistics within the firm as well as delivery of services.

#### 3.1. Strategic Cost Management in New Product and Process Development and Design

Strategic cost management associated with new product development is a relatively new field of inquiry in management accounting. Distinctive features of this literature as compared to those related to the later stages of the value chain are the considerations of both structural and executional cost management practices and the extent to which research considers the extended value chain, including key suppliers. These distinctions probably owe much to the genesis of the area. The impetus for this research in management accounting and for parallel developments in operations management of “lean” manufacturing and innovative product development practices (Clark & Fujimoto, 1991; Cusumano, 1985; Womack et al., 1990) was the success of Japanese manufacturing firms in the 1980s. In product development, lean practices translate into key decisions about product and process design and about the organization of

product development (i.e., in Fig. 1, the value proposition and organizational design), aimed at simultaneously optimizing three dimensions of performance (e.g., Clark & Fujimoto, 1991; Cooper, 1995; Gupta et al., 1992; Wheelwright & Clark, 1992):

1. speed to market, or development time (e.g., Crawford, 1992; Millson et al., 1992; Ulrich et al., 1993);
2. quality, including both conformance to specifications and fulfillment of customer requirements (e.g., Anderson & Sedatole, 1998; Garvin, 1988; Hauser & Clausing, 1988; Srinivasan et al., 1997; Ulrich & Ellison, 1999); and,
3. productivity, the residual value created after paying for all inputs to production.<sup>6</sup>

Although costs are explicit in the latter performance dimension, the level and structure of costs are also affected by decisions taken to balance sometimes conflicting demands for quality and development speed. An oft-repeated logic clarifies the role that design and development play in structural cost management (Cooper & Chew, 1996) and the eventual commercial success of products (Hise et al., 1989):<sup>7</sup>

Experience in a variety of industries suggests that a significant fraction (as much as 80 percent in some cases) of total product cost is established during the product engineering stage of development... Pressure for continual improvements in cost and quality has led to a focus on effective management of engineering design. (Clark & Fujimoto, 1991, p. 3)

Hiromoto (1988), Cooper (1995), Cooper & Slagmulder (1997), Daniel et al. (1995), Kato (1993), Tani et al. (1994), Tani (1995), and Yoshikawa et al. (1995) are examples of early studies of Japanese management accounting practices; in particular, target costing, an approach to managing product design to

<sup>6</sup>Cooper (1995) terms this the “cost-price” dimension of a product. Ulrich & Eppinger (1995, pp. 234–252) distinguish development costs from the cost of producing the product to highlight tradeoffs that may arise when decisions taken during development may cause costs to shift between development, production, and after-sales service.

<sup>7</sup>Ulrich & Pearson (1998) provide evidence on how manufacturing product costs vary with alternative design choices for a set of functionally similar products. Browning & Eppinger (2002) model the relation between how product development is managed and the upfront cost of product development and the predictability of the duration for completing development activities. In counterpoint, Cooper & Slagmulder (2004) describe a case study that draws into question the premise that costs are determined in product design and that only cost containment and marginal efficiency are possible during production.

ensure the lowest possible product cost that is consistent with customer requirements and the target price.<sup>8</sup> Target costing relies heavily on iterative stages of value engineering, “a systematic interdisciplinary examination of the factors affecting the cost of a product in order to devise a means of achieving the required standard of quality and reliability at the target cost (Cooper, 1995 pp. 352–353).” The analysis may involve engineering and marketing techniques, such as quality function deployment or conjoint analysis to link customer requirements to specific design choices (e.g., Hauser & Clausing, 1988; Pullman et al., 2002; Tottie & Lager, 1995). Engineering cost analysis tools such as tear-down analysis (what Ulrich & Pearson (1998) term “product archaeology”), quality and reliability testing (Taguchi et al., 1989), functional analysis (Yoshikawa et al., 1995), and parametric cost estimation (e.g., Anderson & Sedatole, 1998; Boothroyd et al., 1994) may then be used to determine the lowest total cost of manufacturing and assembling a design (i.e., DFM/A). In addition to product development and production costs, total costs include costs (and foregone revenues) associated with delayed product launch and with engineering changes to fix problems that are detected in production or that arise with product use (Clark & Fujimoto, 1991, pp. 187–194; Smith & Eppinger, 1997a, 1997b; Ulrich et al., 1993; Ulrich & Eppinger, 1995).

Often, value engineering crosses organizational boundaries, as for example when suppliers collaborate with the firm to find new approaches to lowering total costs, or when “first-tier” suppliers take their assigned target cost and engage in target costing and value engineering with their suppliers (Bonaccorsi & Lipparini, 1994; Carr & Ng, 1995; Clark, 1989; Cooper & Slagmulder, 2003, 2004; Peterson et al., 2003; Ragatz et al., 1997; Tatikonda & Stock, 2003; Yoshikawa et al., 1995). And, as in the case of lean methods of production and product development, Japanese firms offered new insights in how these collaborative arrangements (i.e., keiretsu) might be structured and governed (Cooper & Slagmulder, 2004; Cusumano, 1985; Dyer, 1996; Walker, 1994; Wasti & Liker, 1997) to manage the costs of coordination that accompany collaboration (e.g., Anderson et al., 2000; Anderson & Dekker, 2005; Baiman et al., 2001; Baiman & Rajan, 2002; Dekker, 2004; Novak & Eppinger, 2001; Randall & Ulrich, 2001). Finally, creating organizational strategies for sharing relevant knowledge among related products may also

facilitate value engineering (e.g., Clark & Fujimoto, 1991; Meyer et al., 1997; Robertson & Ulrich, 1998; Thomke & Fujimoto, 2000).

The above discussions focus on opportunities for structural and executional cost management that arise in the design and development of a product or group of products. Researchers who specialize in new product development also focus on the performance of product development activities (e.g., Nixon, 1998; Ulrich & Eppinger, 1995). Speed to market is a defining performance dimension for new product development capabilities of the organization (and the value chain). However, along with project staffing levels, development duration is highly correlated with the cost of new product development. Thus, for example, while accounting research has focused on the cost of *products* that emerge from new product development work, Ulrich & Eppinger (1995) urge managers to separate production costs from costs of new product development activities so that important tradeoffs that must be managed to achieve sustainable profits for the life of a product become visible. They motivate their arguments by pointing out that the cost of product development can easily exceed the cost of production over the lifecycle of the product, that delayed development activities may both increase the cost of development and decrease the price that the product commands (if competitors’ offerings are introduced earlier), and that if products are pushed to market to meet deadlines before they meet quality requirements, the savings in development costs can easily be swamped by high costs of remediation (e.g., rework and warranty costs) and price erosion (Crawford, 1992).

The literature on managing the effectiveness of new product development activities is too extensive to review here; however, it is important to note that it includes approaches to organizational governance (e.g., heavy weight product managers, interdisciplinary platform design teams) and decision-making processes (e.g., overlapping activities, delaying decisions) that are indirectly associated with the cost of developing a portfolio of related products (Clark & Fujimoto, 1991; Davila & Wouters, 2004; Krishnan et al., 1995a, 1995b; Nixon, 1998; Robertson & Ulrich, 1998; Sanderson & Uzumeri, 1997; Song et al., 1998; Ward et al., 1995). These strategies have implications for both structural and executional cost management. Davila & Wouters (2006) review research on measuring the performance of new product development activities and approaches to managing new product development that have been linked to higher performance.

In summary, research in new product development and process development provide a strong complement

<sup>8</sup>Ansari et al. (2006) review the literature on target costing.



to the relatively small management accounting literature on cost management in new product development. At present, much of the cost management literature focuses on target costing and its affect on product costs. The literature on new product development offers more alternatives for enhancing the new product development organization to achieve better cost performance.

### 3.2. *Strategic Cost Management in Production/Assembly and Service Delivery*

As others have noted, modern cost management research has focused extensively on the “production” portion of the value chain. Although studies are predominately conducted in manufacturing settings, even studies of service firms tend to focus on the physical aspects of the delivery of service (e.g., health care management and passenger air travel).<sup>9</sup> The cost management literature developed in parallel with advances in modern manufacturing, including technological advances (e.g., flexible manufacturing systems) as well as advances in the organization and management of operations (e.g., quality management, inventory management, cell manufacturing, and team production). As in the case of product development and design, many of the latter advances accompanied the emergence of lean manufacturing in Japanese firms (e.g., Womack et al., 1990; Womack & Jones, 2003). However, even before Japanese methods revolutionized manufacturing management, researchers were troubled about the “relevance” of traditional cost accounting practices in a modern technological setting (Kaplan, 1984, 1986; Kaplan & Johnson, 1987). Advanced manufacturing technologies increased the speed of production and lowered the cost of changing between dissimilar products; thereby lowering the marginal cost of producing a mix of heterogeneous products and allowing firms to compete on economics of scope rather than on economics of scale (Marschak & Nelson, 1962; Panzar & Willig, 1977, 1981). New capabilities brought a new “hidden factory” of staff (i.e., overhead costs) who were responsible for managing the complexity of processes and products within the manufacturing facility (Miller & Vollmann, 1985).

New approaches for meeting demands for management accounting information were developed to address concerns that new technology investments obviate the assumptions of traditional product costing, variance analysis, and investment evaluation

(Cooper, 1990; Cooper & Kaplan, 1992).<sup>10</sup> The most popular of these approaches, activity-based costing (ABC) sought to better match costs of resources to the activities that consume them, and in so doing, to provide visibility for the new structure of costs that accompany high-technology investments and new modes of organizing. The premise of ABC is that costs are not strictly variable or fixed with respect to unit volume, but vary in a hierarchical fashion (e.g., batch-related costs and product-sustaining costs) with activities. Accordingly, accounting studies examined whether costs are primarily fixed and variable with unit volume (Noreen, 1991; Noreen & Soderstrom, 1994, 1997), whether cost changes are symmetric for proportional increases and decreases in activity (Anderson et al., 2003; Balakrishnan et al., 2004), and whether measures of activity other than unit volume have incremental explanatory power for the level and structure of costs (e.g., Anderson, 1995; Banker & Johnston, 1993; Banker et al., 1995; Cooper et al., 1995; Datar et al., 1993; Fisher & Ittner, 1999; Foster & Gupta, 1990; Ittner & MacDuffie, 1995; Ittner et al., 1997; Karmarkar & Kekre, 1987; MacArthur & Stranahan, 1998; MacDuffie et al., 1996; Raffi & Swamidass, 1987). ABC is intended to facilitate both structural and executional cost management. For example, after the cost per unit of cost driver (e.g., cost per machine setup) is determined, managers are expected to engage in “activity based management” (ABM)—taking action to either reduce consumption of the activity or to become more efficient in executing the activity.

The above studies focus on whether cost accounting accurately reflects the new economics of the firm. Another research stream focuses on examining how specific features of the new manufacturing management approach are related to cost and to other performance measures. Thus for example, a central premise of Japanese manufacturing methods is to reduce variability and waste of resources throughout the value chain (Womack & Jones, 2003). In manufacturing, this translates into intense pressure to improve quality (conformance to specifications) and eliminate inventory (wasted movement and storage time), often facilitated by the use of self-managed, multiskilled work teams (Kaynak, 2003; Womack et al., 1990). In the cost management literature, interest in quality management resulted in research on the relation between cost, quality performance, and the use of alternative work practices (Foster & Sjoblom, 1996; Ittner, 1996;

<sup>9</sup>See Eldenburg & Krishnan (2006) for a review of economics-based studies in the hospital setting.

<sup>10</sup>Davila & Wouters (2006) review the literature on technology investments for modern manufacturing.

Ittner & MacDuffie, 1995; Nagar & Rajan, 2001; Sedatole, 2003). These studies are informed by theory from the quality management literature on “costs of quality” and quality-based learning<sup>11</sup> as well as theory from organizational behavior on the performance effects of team production. Inventory reduction and just-in-time production gained prominence in cost management studies that examine costs associated with inventory holding (Callioni et al., 2005) as well as in studies based on the “theory of constraints” (TOC)<sup>12</sup> that assigns a high cost to congestion and variability of processing times (e.g., Banker et al., 1988; Maher & Marais, 1998).

A final aspect of the cost management literature that deserves special mention is that associated with learning and improvement. Economists first documented the relation between repetitive activities and costs in wartime production of airplanes.<sup>13</sup> Both the economics and the business strategy literature have provided empirical evidence on determinants of learning in production settings (Ghemawat, 1986; Jovanovic & Nyarko, 1995). However, in spite of this lengthy history, learning and learning curve analysis has not had a prominent role in the management accounting literature.<sup>14</sup> With the emergence of the “knowledge economy,” researchers became interested in how firms manage, protect, and when appropriate, transfer the knowledge assets of the firm (e.g., Lapre & Van Wassenhove, 2003). However, in the management accounting literature, the focus has been on valuing and “capitalizing” the intangible assets associated with human capital. This is somewhat different from the focus of Japanese manufacturing methods on learning and “continuous improvement” (i.e., kaizen) to enhance performance. Learning has only recently emerged as a performance objective in management accounting measurement systems (Kaplan & Norton, 1996) and more work is needed to understand how learning performance objectives translate into cost management activities of either the structural or executional variety.

In sum, research in cost management practices has paralleled developments in the operations literature

and has provided insights into how changes in the way that manufacturing is organized affect the structure of costs. Moreover, new cost management techniques such as ABC and ABM that emerged in conjunction with modern manufacturing support both structural and executional cost management. Thus, I agree with others that strategic cost management is probably better understood in the production portion of the value chain than in any other segment. However, this is not to say that we have a full understanding of cost management in operations. Two aspects of cost management in operations seem to me to be underexplored.

First, we do not have a clear understanding of what information (or inspiration) leads firms to discover low-cost alternatives to organizing operations. Although we have case studies of exemplar organizations (e.g., Southwest Airlines, Toyota, Wal-mart, and Dell Computer) and recognize revolutionary cost management approaches when we see them, we do not understand the genesis of these practices. This first point concerns decisions that accompany strategy development and the establishment of the initial cost structure. A second area that requires development relates to the determination that a strategy is failing and the conclusion that a revision to strategy—and the cost structure—is warranted. The strategy literature discusses “exit” strategies for declining industries as well as strategies for “harvesting” profits from aging products. And the organizational behavior literature studies “downsizing” and its effects on both those whose jobs are eliminated and those who remain (e.g., Cameron et al., 1991). However, the cost management literature is virtually silent on how cost information is implicated in enacting cost reductions. Although the rhetoric of “continuous improvement” suggests that cost information facilitates selective revision of the value proposition and the organizational design, the popular press headlines suggest that across-the-board cuts are pervasive. Thus it appears that cost cutting takes a variety of forms and each form may be optimal in some sense.<sup>15</sup>

<sup>11</sup>See Anderson & Sedatole (1998) for a nontechnical review of the quality literature.

<sup>12</sup>TOC systems, which became popular through the writings of Goldratt & Cox (1992), assign costs to products based on the use of bottleneck resources.

<sup>13</sup>See Berndt (1991, pp. 66–80) for an overview of the economics literature on learning curves.

<sup>14</sup>Exceptions include Anderson & Lanen’s (2002) investigation of the impact of learning on the effectiveness of a technology investment that was intended to reduce costs of transactions between a firm and its allied dealers, and evidence in Anderson (1995) of the impact on overhead costs of experience producing a complex mix of products.

<sup>15</sup>Aghion & Stein (2004) offer a provocative model of how capital markets may influence managers’ decisions on cost cutting. They postulate a two-way interaction model in which shareholders reward growth or cost cutting depending on their understanding of a firm’s strategy, and managers, knowing this, persist in a particular strategy longer than would otherwise be optimal given their private information about the firm’s best strategy. The model produces excess volatility in real variables, offering a provocative story for why cost cutting seems often to be of the “slash and burn” variety rather than a smooth transition between equilibrium states.

These are but a few of the questions that remain for management accounting researchers who seek to extend the understanding of strategic cost management in operations.

#### 4. Strategic Cost Management Practices at the Boundary of the Firm

In this section, I review research on cost management for the extended value chain. I first consider relations between the firm and its value chain partners, including upstream suppliers as well as other strategic alliance partners. I then turn to relations between the firm and its customers.

##### 4.1. Strategic Cost Management in Supplier and Alliance Partner Relations

Management accounting research has only recently begun to consider issues that arise when firms transact. Until recently, market transactions (also referred to as “arms-length” transactions) held little interest for management accounting researchers because prices for inputs simply flowed through the firm’s accounts and there was no need or opportunity for exercising “management control” beyond the legal boundaries of the firm. Procurement was simply a matter of negotiating the best price and management accountants were only responsible for providing internal product costs to be compared against external prices in the make-or-buy decision. As noted in Section 3, with the advent of lean manufacturing, firms began to see the wisdom of collaborating with key suppliers as a means of enhancing new product development (e.g., Carr & Ng, 1995), controlling what for many firms was a very large share of total costs (Seal et al., 1999), and increasing the quality and reliability of production (Clark & Fujimoto, 1991; Womack et al., 1990). Moreover, as cost accounting systems began to support analysis of different cost objects, it became clear that the “price” paid to suppliers was often only a portion of the total cost of doing business with a particular firm. Finally, with advances in information technology, firms have replaced manual paper processes with electronic processes that provide new opportunities to economically integrate information exchange between firms (e.g., Anderson & Lanen, 2002; Kulp, 2002; Kulp et al., 2004). These developments have thrust interorganizational transactions to the forefront of current management accounting and control research (Anderson & Sedatole, 2003; Hopwood, 1996; Kinney, 2001; Mouritsen et al., 2001; Otley, 1994).

A unique challenge of managing costs at the boundaries of the firm is motivating value chain participants to enhance their own returns in ways that

increase rather than diminish returns for the entire value chain. In colloquial terms, participants must focus on growing the size of the pie, not simply growing their share of the pie. Coase (1937) argued that the boundaries of the firm are defined by cost-minimizing configurations of technical capabilities and inputs. However, conditions that preclude complete contracts from being written may lead firms to adopt second-best solutions. Williamson (1975, 1985) argued that in typical settings that accompany negotiations between firms (i.e., information asymmetry, significant upfront investments that have little or no value outside of the transaction, and various transaction uncertainties (technological, market, and performance measurement)), firms may retain activities within the firm to avoid opportunistic behavior at a later date by self-interested transaction partners. Thus, transaction costs—the costs of transacting with another business partner—are yet another cost to be minimized in the determination of firm boundaries.<sup>16</sup>

While transaction costs were originally posited to explain the dividing lines between transacting organizations, this line has become increasingly blurred as firms adopt hybrid organizational forms such as joint ventures, franchise and licensing arrangements, strategic alliances, supplier networks, and various other collaborative forms (Adler, 2001; Williamson, 1991). Transaction cost theory continues to be an important theory for identifying transaction risks; however, in the strategy literature, the resource-based view of the firm posits that opportunities that are only obtainable through collaboration may more than offset these hazards (e.g., Dyer, 2000; Gulati & Singh, 1998; Poppo & Zenger, 1998; Ring & Van de Ven, 1992, 1994). On closer investigation, hybrid organizational arrangements often employ innovative approaches to structuring their relations that reduce transaction costs.<sup>17</sup> For example, Anderson et al. (2000), Anderson & Lanen (2002), Baiman et al. (2001), Baiman & Rajan (2002), Cachon & Fisher (2000), Cachon & Zipkin (1999), Gietzmann (1996), and Novak & Eppinger (2001) provide examples of structural cost management, with firms adopting innovative approaches to product and process development, inventory ownership and management, and information sharing. In many cases, these new approaches are

<sup>16</sup>Extensive research in economics and business strategy tests the relation between transaction costs and firm boundaries. See Shelanski & Klein (1995) and Anderson & Sedatole (2003) for comprehensive reviews.

<sup>17</sup>See Anderson & Sedatole (2003) for a review of management control practices in strategic alliances.

made possible by new technologies for monitoring or measuring partner performance or for reducing uncertainties or informational asymmetries that create opportunistic hazards (e.g., Anderson & Lanen, 2002; Kulp et al., 2004; Seal et al., 1999). Studies that focus on how internal management accounting and control practices are structured in interorganizational transactions include: Anderson & Dekker (2005), Kajuter & Kulmala (2005), Kulp (2002), Seal et al. (1999), Gietzmann (1996), and Van der Meer-Kooistra & Vosselman (2000).

Although transaction costs have a direct bearing on the firm's value proposition and organizational design, the transaction costs that accompany the chosen organizational design—whether costs of dealing with an external supplier, or costs of retaining activities within the firm that could be better performed by another firm—are, on the whole, invisible to management accountants. In part, this is due to opportunity costs falling outside the purview of accounting records; however, it is also related to arguments about the appropriate object of cost analysis (Hergert & Morris, 1989). Transaction costs include costs of writing (albeit incomplete) contracts, costs of coordination, costs of management control practices aimed at mitigating opportunistic behavior, and costs associated with any subsequent opportunism that emerges. However, as Tirole (1999, pp. 772–773) remarks, “While there is no arguing that writing down detailed contracts is very costly, we have no good paradigm in which to apprehend such costs.” He suggests that field-based research may be required to better understand the relation between costs and the mechanisms of management control that firms employ. A recent field-based study that examines interorganizational cost management in a setting other than new product development is Dekker (2003). Dekker studies a retailer that uses ABC to assign “costs of ownership” to its suppliers, thereby explicitly assigning costs associated with poor supplier performance as an additional cost that is added to the price of goods procured from the supplier (Carr & Ittner, 1992). In a classic example of executional cost management, the cost system is used to diagnose problems and improve performance in the supply chain.

In summary, management accounting has only recently awakened to the cost management and management control issues that emerge when self-interested trading partners collaborate for mutual advantage. Inevitably, the partners face difficult choices in apportioning rights and responsibilities (and associated costs and revenues) among value chain participants. Ideally, firms identify mutually

beneficial opportunities for enhancing the value proposition of the entire value chain. However, competition, technological change, or new strategies may at times require an adjustment to the value proposition or to the organizational design that diminishes the scale or scope of value-added activities for a given partner or that reduce the return that a given partner should receive for their contributions. Researchers in economics, strategy, and operations have made significant advances in exploring the forces that affect alternative organizational configurations and governance structures. And recent management accounting research on innovative control practices have contributed to this literature. However, although transaction costs play a major role in these explanations, research on strategic cost management in the accounting literature provides little understanding of how firms account for these costs in their decisions.

#### 4.2. Strategic Cost Management in Customer Relations

Even more so than upstream relationships, management accounting research is virtually silent on managing costs in the portion of the value chain connecting the firm to the end customer. As Johnson & Kaplan (1987, p. 244) note:

We [researchers] have been as guilty as conventional product cost systems in focusing narrowly on costs incurred only in the factory. Manufacturing costs may be important, but they are only a portion of the total costs of producing a product and delivering it to a customer. Many costs are incurred “below the line” (the gross margin line), particularly marketing, distribution, and service expenses.

Research on using ABC to assign costs in the firm's accounting system to customers has sought to remedy this shortcoming. Paralleling the analysis of “costs of ownership” for suppliers, these studies suggest treating the customer as the object of cost analysis (e.g., Foster & Gupta, 1994; Foster et al., 1996; Kaplan & Narayanan, 2001; Narayanan & Sarkar, 2002; Niraj et al., 2001). A common conclusion is that a small group of customers who demand a disproportionate amount of “free” support resources (e.g., after-sales service, customized products or shipping, and credit terms) and order small volume or low-margin products are unprofitable. “Hidden loss” customers subsidize “hidden profit” customers and present an opportunity for firms to develop customized pricing that better reflects resource usage by individual customers (Kaplan, 1997; Shapiro et al., 1987). Customer cost analysis supports executional cost

management by allowing firms to align their strategy to a particular set of target customers while dissuading other customers who are not part of the target audience for the firm's products or services.

One structural cost management approach that is often used to try to shift customers from unprofitable to profitable status is the introduction of lower cost-per-use channels of distribution (e.g., web-based services instead of in-store service for banking customers) (e.g., [Chen & Hitt, 2002](#); [Hitt & Frei, 2002](#)). However, this assumes that customers can be shifted to lower cost channels with no impact on revenues. In a recent paper, [Campbell \(2003\)](#) finds evidence to the contrary. Evidence of interactions between the cost and revenue function highlights the dangers of accounting and marketing researchers working in isolation to understand the drivers of customer profitability.

Although the focus of this chapter is strategic cost management, it is important to note that research on customer-specific costs has strong synergies with research in marketing that uses new sources of customer-level data to predict customer revenue streams (e.g., [Berger & Nasr, 1998](#); [Blattberg et al., 2001](#); [Dwyer, 1997](#); [Rust et al., 2000](#)). Advances in information technology (e.g., bar coding and internet sales) and statistical analysis (e.g., data mining) enable companies to know their customers better and to use customer relationship management to customize the marketing and sales investments ([Hitt & Frei, 2002](#); [Pine et al., 1995](#); [Schmittlein et al., 1987](#)). Marrying customer-level costs and revenues with assumptions about repurchase frequency and customer loyalty allows marketing researchers to quantify lifetime customer profitability (see [Ofek \(2002\)](#) for a detailed example) and manage marketing and sales campaigns to affect the equation ([Dwyer, 1997](#); [Schnaars, 1991](#)).

A weakness of the literature on customer-specific costs as compared to the supply chain management literature is that there is little consideration of costs that fall outside the boundaries of the firm or its accounting system. Thus, while interorganizational cost management is typically described as jointly optimizing all supply chain members' or alliance partners' costs for the good of the full value chain, the literature on customer costing and customer profitability typically do not consider costs to the customer of doing business with the firm.<sup>18</sup> This is in

counterpoint to [Hotelling's \(1929\)](#) classic model of competition between firms that sell identical products (i.e., same cost) from different store locations. In this model, customers pay for goods, but they also incur transaction costs in obtaining the goods from the firm (i.e., transportation costs incurred in traveling to and from the store). In equilibrium, each firm's price is determined by both the cost of the product and by the transaction costs borne by customers.

If economic theory suggests that costs borne by customers are optimally included in pricing strategy, it seems only reasonable to expect strategic cost analysis to comprehend these costs as well. Indeed, this is what [Womack & Jones \(2005a, 2005b\)](#) propose; that "lean consumption" processes should be developed to do for the final stage of the value chain what "lean production" did for upstream manufacturing and supply processes. As information technology blurs the distinction between consumption and production, firms increasingly adopt cost savings approaches that off-load work to customers (e.g., entering data in web-based order forms, checking in for air travel, and tracking progress of their orders) ([Womack & Jones, 2005b, p. 60](#)). However, in treating customers' time as a "free resource," firms may unwittingly increase the customer's total cost of ownership of their product.<sup>19</sup> Another way to look at this is that the customer is incurring the full cost of ownership, but only a portion of that is remitted to the firm. Thus, the firm that can design better processes to connect production and consumption can charge more without alienating customers. [Womack & Jones \(2005a, 2005b\)](#) decompose the consumption experience into six components: search, obtaining, installing, integrating, maintaining, and disposing of the product and provide examples of firms that structure operations to reduce customers' costs in each activity.

Another research stream that speaks of structural cost management opportunities for designing operations to enhance customer interactions and firm profitability is that of service operations management and, closely related, research on services marketing. Both of these fields have contributed to our understanding of causal models that relate operational performance to customer satisfaction and financial performance. [Sasser et al.'s \(1978\)](#) pioneering work

<sup>18</sup>1995; [Keaveney, 1995](#)). In an industrial setting (i.e., original equipment manufacturer (OEM) purchasing), [Cannon & Homburg \(2001\)](#) examine the relation between characteristics of the supplier-buyer relationship and buyer's direct product costs, acquisition costs, and costs of operations.

<sup>19</sup>The issue of how firms account for free use of resources in strategic cost management is revisited in the next section.

<sup>18</sup>An exception is research in marketing on how customer switching costs cause past purchase behaviors to influence future purchases (e.g., [Chen & Hitt, 2002](#); [Heide & Weiss,](#)

on the differences between manufacturing and services launched this research. More recently, researchers take, as their point of departure, the service value profit chain model of Heskett et al. (1997, 2003) (e.g., Anderson et al., 2006b; Goldstein et al., 2002; Roth & Menor, 2003). Performance of service operations is posited to depend critically on employees delivering high-quality service that leads to satisfied customers (Anderson et al., 2006a; Chase, 1978, 1981). Satisfied customers deliver financial performance as a result of a more resilient stream of revenues (i.e., due to customer loyalty and positive word of mouth) and lower costs of service (i.e., fixed acquisition costs are spread over more purchases and customers need less support in subsequent purchases) (e.g., Bitner, 1990; Goldstein, 2003; Heskett et al., 2003; Parasuraman et al., 1985; Rust & Zahorik, 1993; Rust et al., 2000; Schneider et al., 2003; Soteriou & Chase, 1998).

Accounting researchers have focused on developing measurement systems that support assessment of these causal models; specifically a measurement system that embodies a multidisciplinary, multistakeholder, dynamic view of performance and is linked to firm strategy (Kaplan & Norton, 1996, 2004). These parallel developments reveal an increased appreciation for “systems thinking” as a necessary starting point for effective design and execution of service operations. As these measurement systems mature and are used for both structural and executional cost management, it may become more common for management accounting researchers to consider both approaches to strategic cost management. Continuing the theme of “systems thinking,” I turn now to costs that must be managed to ensure sustainable profits for the firm as it participates in the broader economic system.

### 5. Sustainable Cost Structures and Management of Sustainability

“Sustainability” has been defined in both broad and narrow terms to suit various needs. While broad definitions (e.g., “sustainable development ‘meets the needs of the present without compromising the ability of future generations to meet their own needs’ (World Trade Commission on Environment and Development (1987, p. 8))” have intuitive appeal, they are difficult to translate into performance measures and thus difficult to incorporate in government or organizational policy (Reinhardt, 2000, p. 26). Instead, Reinhardt (2000) offers a two-part definition in which a sustainable firm maintains on its balance sheet an undiminished level of total net assets, measured at both social costs and prevailing private costs. The first condition ensures that firms

“internalize” external impacts on society and the second condition ensures that the firm can pay input suppliers today without jeopardizing future revenue streams.

The “sustainable enterprise” label is often associated with the environmental or “green” movement; however, there are many other contemporary examples of firms failing to internalize and account for the full impact (both present and future) of their products and services on society. Moreover, social responsibility often extends beyond stewardship of natural resources. As forces for globalization yield value chains that traverse national boundaries, firms increasingly confront challenges of defining ethical business practices in settings where local governments impose few constraints or protections for their citizenry. In a survey of annual reports, Elias & Epstein (1975) found that the most commonly mentioned elements of social responsibility were environmental impact, equal employment opportunities, product safety, educational aid, charitable donations, industrial safety, employee benefits, and community support programs. In the interest of space, this section discusses environmental issues as one example of a sustainable cost management issue; however, I provide references to studies that examine other aspects of social responsibility.

Market failures arise when the price of a good fails to represent the full cost to society of producing the good. When firms employ or impair nonrenewable community resources at little or no cost, the price of goods in a competitive market will be too low (and conversely the consumption too high) as compared to the optimal solution for societal welfare to be maximized. Governments counter market failures with a variety of responses ranging from banning certain activities, to creating markets by pricing (or taxing) resource usage (or, as in the case of pollution credits, creating markets for the right to deplete or diminish resources (Annala & Howe, 2004)), to allowing firms free rein and implicitly transferring societal wealth to the firm’s stakeholders (e.g., Corson, 2002). These alternatives are important because they define the costs (present and future) that do and do not appear in firms’ accounting records and they interject uncertainty about costs that may appear in future accounting records if policies for addressing market failures change. Concern for sustainable profits demands that managers be aware of these costs and manage as if they are (or will be) attributed to the firm by some, if not all, stakeholders.

Much of the literature on sustainability concludes that a necessary condition for strategic management of environmental and social costs is increased visibility of

the full costs (and benefits) of a firm's operations.<sup>20</sup> Joshi et al. (2001) provide evidence on the degree to which cost accounting systems obfuscate the magnitude of costs associated with environmental compliance. After the full costs are identified, two mechanisms are commonly suggested for increasing the visibility of the costs and supporting decisions related to the best use of resources. First, ABC or cost allocation approaches are employed to attribute costs to the activities, products, and services that consume societal resources (Bleil et al., 2004; Hamner & Stinson, 1995; Kite, 1995; Miettinen & Hamalainen, 1997; Quarles & Stratton, 1998). These studies fit within the research stream that Lord (1996) identifies as examining whether and how firms configure accounting data to support value chain analysis.

Presumably, cost attributions are the precursors to setting prices that compensate the firm and society for resources used in the product or service. However, often these attributions are not enough. Studies also recommend that new monitoring and reward/punishment mechanisms be adopted to align managers' interests with economizing on all costs, including the newly "internalized" societal costs associated with firm operations (Aggarwal et al., 1995; Baber et al., 2002; Bloom & Scott Morton, 1991). Lanen (1999) describes such a program of cost attribution, environmental performance measurement, and incentives at a major chemical firm. Avila & Whitehead (1993) provide a fascinating interview with top executives about the evolution and components of Dow Chemical Company's environmental strategy. According to these managers, cost management, control systems, and organizational structure are central to ensuring that sustainability defines firm performance. This is consistent with Christmann's (2000) large sample evidence that capabilities for process innovation and implementation are complementary assets that moderate the relationship between best practices in environmental management and subsequent cost performance.

Perhaps less visible to management accounting researchers is a significant body of research that has emerged on the use of structural cost management to redesign the organization, its products, and its processes so that environmental and societal impacts are

minimized. These efforts begin in the design and development of products and processes. For example, texts on product design and development (e.g., Ulrich & Eppinger, 1995; Wheelwright & Clark, 1992) treat environmental impact or work-place practices that promote safety as additional constraints that define the set of feasible design options (e.g., Brink, 2003; Hughes & Willis, 1995; Miettinen & Hamalainen, 1997). Once quantified, these costs may be incorporated in target costing, value engineering, and process re-engineering processes to ensure that the design of the product and the organizational delivery systems provide the lowest *total* cost solution (Kumaran et al., 2001). Costs are also used to assess alternative operational strategies (e.g., end-of-pipeline, process improvement, and pollution prevention) for managing environmental impact (Boer et al., 1998). Consistent with Sections 3.1 and 4.1, suppliers are often important collaborators in designing products and processes for low societal impact (Walton et al., 1998).

In the particular case of environmental costs, product and process designers are often required to explicitly design for product take-back and remanufacture or disassembly and disposal (Epstein, 1996; Fleischmann et al., 2001; Jayaraman et al., 1999; Thierry et al., 1995). As firms internalize responsibility for the full product lifecycle, a new process is added to the value chain—the reverse supply chain (Daniel et al., 2002). Like the supply chains that produce and deliver products to end customers, opportunities for optimizing the reverse supply chain exist (Bloemhofruwaard et al., 1995; Kulp et al., 2004). And like the forward supply chain, the greatest opportunities for structural cost management may be realized when the product and the reverse supply chain process are jointly optimized (Krikke et al., 2003). While the reverse supply chain may involve a similar set of suppliers as the forward supply chain, it is also common for a new set of disassembly and disposal specialists to join the value chain (Fleischmann et al., 2001). Corporate environmental and social responsibility may introduce environmental and social welfare interest groups to the set of stakeholders that the firm must consider (Rondinelli & London, 2003). New suppliers and special interest groups present further opportunities for collaboration and strategic cost management as discussed in Section 4.1.

Although the focus of this chapter is on cost management, as we have already noted it is often inappropriate to treat costs and revenues as if they can be optimized in isolation. This is particularly true for costs associated with environmental, social, and

<sup>20</sup>Argandona (2004) considers internal management systems needed to support ethical, social, and environmental management. Epstein (1994), Hamner & Stinson (1995), Parker (1996), Boer et al. (1998), Lander & Reinstein (2000), Bansal (2002), and Pearce (2003) focus specifically on environmental costs. Zetlin (1990), Stern (2004), and Elias & Epstein (1975) provide examples of social costs.

ethical business practices. A sizeable literature examines the impact on customers, employees, and shareholders of firms adopting a progressive stance on corporate social responsibility (e.g., Alcorn & Smith, 1991; Barth & McNichols, 1994; Berry & Rondinelli, 1998; Bloemers et al., 2001; Clarkson et al., 2004; Ferrell, 2004; Hughes, 2000; Kassinis & Soteriou, 2003; Li et al., 1997; Owen & Scherner, 1993; Russo & Fouts, 1997; Schuler & Cording, 2006; Yue et al., 1997). Hart & Milstein (2003) explicitly recognize multiple stakeholder perspective in their framework that links sustainable practices to shareholder value. Thus, while sustainability is certainly a strategic cost management issue, its implications for attracting and retaining employees, capital, and customers means that managing for sustainability demands a strategic *profit* management orientation.

### 6. Strategic Cost Management and Enterprise Risk Management

The recent financial distress of several large firms and the attendant effects on employees, debt holders, and shareholders have caused those responsible for ensuring the smooth functioning of capital markets to question firms' risk management practices. More generally, there is a sense that: "Risk is on the rise as the boundaries of traditional business expand to include intangible 'new economy assets' or sources of value that are neither owned nor ownable (customer and supplier relationships, for example)" (DeLoach, 2000, p. 9) and that accounting practices have not kept up with these changes (Kinney, 2001). Risk management has been focused on discrete transactions and tangible assets and has tended to be functionally managed with a view toward simply reducing risk rather than exploiting it for the firm's advantage. Firms have failed to recognize that risk is inherent in most business models and can be managed in a structured, disciplined manner that "...aligns strategy, processes, people, technology and knowledge with the purpose of evaluating and managing the uncertainties the enterprise faces as it creates value" (DeLoach, 2000, p. 5).

A key thrust of policymakers has been to enact legislation that locates responsibility for risk management with the firm's top executives and Board of Directors. Coincident with legislative action, accountants and standard setters have developed frameworks and internal control guidelines to support management efforts at enacting appropriate enterprise-wide risk management practices.<sup>21</sup> One such

framework presented in *The Enterprise Risk Management Framework* (Committee of Sponsoring Organizations of the Treadway Commission, 2004) identifies three dimensions of enterprise risk management: (1) objectives of risk management (i.e., strategic, operations, reporting, and compliance), (2) organizational units that influence and are involved in risk management (e.g., firm, division, and strategic business unit (SBU)), and (3) the activities that comprise risk management. The eight activities of risk management are:

1. establishing an appropriate risk management culture within the firm,
2. establishing the strategic objectives of the firm and its appetite for risk,
3. identifying events that are associated with risk and determining whether these events are interdependent,
4. assessing the firm's exposure to its full portfolio of risks (e.g., measuring and "pricing" risk to ensure that adequate returns are realized on risky activities),
5. developing appropriate responses (e.g., avoid, insure, hedge, monitor, and control) to risk,
6. enacting processes for controlling risks,
7. enacting processes for communicating and informing key personnel about risks, and
8. continually monitoring the effectiveness of risk management practices.

Kinney (2000, 2003, p. 135) and DeLoach (2000, pp. 53–55) present business risk models that describe many types of risk, all of which are categorized according to three broad components: (1) environmental uncertainty, which is associated with the viability of the firm's strategy and value proposition, (2) process uncertainty, which is associated with the proper execution of strategy, and (3) information uncertainty, which is associated with unreliable data leading to poor management decisions. Risks within all three categories may lead to uncertainties about the level or volatility of costs. Thus, for example, environmental uncertainty associated with technological innovation may demand unexpected capital investment requirements and catastrophic losses that are not fully insured may be associated with lost or impaired assets that require replacement or repair.

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et al. (1994), McNamee & Selim (1998), Miccolis et al. (2000), Shaw (2003), Tillinghast-Towers Perrin Study (2001), Committee of Sponsoring Organizations of the Treadway Commission (2004), Walker et al. (2002), and Bailey et al. (2003).

<sup>21</sup>Overviews of modern risk management and associated internal control practices are found in DeLoach (2000), Froot



Similarly, process uncertainty associated with risks of product or service failures, supplier or partner failures, business interruptions, or health and safety violations may be associated with costs of remediation. Finally, information uncertainty can contribute to flawed decisions in the management of costs, as for example, when budgeting and planning systems or performance measurement systems do not provide managers with timely, reliable information.

DeLoach (2000, p. 48) defines risk as "... the distribution of possible outcomes in a firm's performance over a given time horizon due to changes in key underlying variables. The greater the dispersion of possible outcomes, the higher the firm's level of exposure to uncertain returns." A firm's exposure to risk is defined by the likelihood and severity of impact on the key underlying variables that affect performance. So although it will not be true for every firm, to the degree that uncertainties about costs or cost structure expose the firm to a significantly greater dispersion of financial outcomes, strategic cost management demands a risk management perspective. Recent examples include fuel price surges that have disrupted airline profits, reduced stock market valuations that have affected pension costs for firms in industries that employ defined contribution plans, and disruptive technologies (e.g., digital cameras) that make earlier generation technologies obsolete. In sum, when risks are defined as internal and external events that may materially affect profits, modern finance theory on risk management demands that we also consider uncertainty surrounding costs as part of strategic cost management.

Accounting scholars have contributed extensively to the theory and practice of internal control (e.g., Kinney, 2000). More recently, risk management has attracted the attention of management accounting researchers, with performance measurement models including risk as another facet of performance to be managed (e.g., DeLoach, 2000, p. 16; Epstein & Rejc, 2005; Kaplan & Norton, 2004, pp. 73–76). These authors posit that quantifying and communicating the firm's financial exposure to risk and continually monitoring risk management capabilities promote alignment between the risks that are inherent to the value proposition and the organizational design choices that emerge during strategy development (Fig. 1). These studies reflect executional cost management activities associated with improving the existing practices to diminish the firm's risk exposure. Although arguments for promoting performance with better performance measures are familiar, the specific application to risk measurement and risk management

practices is new to management accounting research and requires further study.

Turning to structural cost management, we find much more research that examines how risk management activities are implicated in the firm's cost structure. Three bodies of research are relevant. First, in the area of operations and service management, the concepts of reducing process variability and enhancing process flexibility are pervasive themes of lean manufacturing (e.g., Womack et al., 1990). These strategies offer cost savings from eliminating safety stocks and work-in-process (WIP) inventories that support process variability rather than exogenous demand variability. In the service sector, Weiss & Maher (2005) find that passenger airlines hedge risks associated with demand shocks through their operational and technological choices. Research on product design has also promoted concepts such as modular design (Baldwin & Clark, 1999, 2000; Krishnan & Gupta, 2001), platform architecture and part commonality (Desai et al., 2001), and postponement of product differentiation (Fisher et al., 1999; Lee & Billington, 1995; Lee & Tang, 1997) as strategies for reducing process variability and WIP inventory needs, lowering upfront costs of new products, and leveraging design capabilities. Section 3 discusses product and process design as they relate to managing the level and structure of costs. The unique observation for this section is that process and product design choices also have implications for the volatility of costs.

The strategy and economics literature on determinants of the boundaries of the firm that was discussed in Section 4 also deserves further mention. Transaction costs associated with uncertainty have long been implicated in firm boundaries and organizational design choices (e.g., Milgrom & Roberts, 1992; Williamson, 1975, 1985, 1991). Indeed, strategic alliances and other forms of interorganizational collaboration are often discussed as a means of transferring or sharing some forms of risk (Das & Teng, 1996, 1998, 1999, 2001a, 2001b); albeit, with the coincident introduction of new counterparty risks (Kinney, 2003) and coordination costs (Gulati & Singh, 1998; Lorenzoni & Baden-Fuller, 1995). Rather than repeat the discussion of Section 4, we simply note that managing risk (and cost volatility) is one motivation for the structural cost management that is manifest when firm's take decisions about transactions with suppliers and other value chain partners.

A third body of research that has bearing on the choices reflected in the above literature is the finance and economics literature on real options. A "real option," so called because it is associated with physical assets rather than financial instruments, is an

alternative or opportunity that accompanies an up-front investment. Thus, for example, the purchase of property that is adjacent to an existing establishment leaves open the opportunity of future expansion without committing the buyer to such expansion at the time of property purchase. The value of the real option that the property provides is related to the uncertain nonzero probability that the firm may wish to expand in the future as well as the possibility of deferring the decision to expand to a later date.<sup>22</sup> The opportunity to incur variable costs in the future is a real option, as is the chance to postpone fixed investments to a later date.

Real options are implicated in strategic cost management because the real option in question often has direct bearing on the firm's future cost structure or the level or volatility of future costs. For example, Kallapur & Eldenburg (2005) provide evidence that a change in hospital reimbursements that increased uncertainty about revenues was accompanied by a shift in investment strategy to technologies with low fixed investment costs and high variable costs of operation—evidence supporting real options theory. Similarly, Moel & Tufano (2002) provide data from mining firms on mine closure, shutdown, and reopening decisions that are consistent with the level and volatility of metal prices and the level of fixed and variable costs affecting the decisions. More generally, Anderson et al. (2003) and Balakrishnan et al. (2004) find that uncertainty and volatility of revenues is associated with the degree to which costs respond proportionately to changes in activity. They further find that real options such as excess capacity, fixed assets, employee intensity, and inventory intensity are associated with different cost levels in conjunction with changes in activity. Bloom (2000) provides further evidence that relates short-run investment and employee hiring responses to demand shocks.

In summary, as firm boundaries become blurred and assets that are not recorded on the balance sheet become increasingly important to the value proposition, strategic cost management must expand to include managing uncertainties in the level, volatility, and structure of costs.

## 7. Concluding Remarks

In this chapter, I present strategic cost management as deliberate decision making that is aimed at aligning the firm's cost structure with its strategy and evaluating the efficacy of the organization in delivering the

strategy. To that end, I posit that strategic cost management takes two forms: structural cost management that is focused on establishing a competitive cost structure and executional cost management that is focused on cost effective execution of the strategy. Although both forms of cost management are essential, in recent years, structural cost management has been the hallmark of exceptional firms that employ business models with radically different cost structures to deliver traditional products or services. We do not have a good understanding of the cost management practices that accompany the creation of these innovative cost structures (Nimocks et al., 2005) and, to date, management accounting research has not played a particularly significant role in addressing this concern. As Lord (1996), Hergert & Morris (1989), Roslender & Hart (2003), and Shank (1989) have observed that management accounting research has tended to focus on executional cost management and on the production (manufacturing) portion of the value chain. However, rather than simply exhort management accounting researchers to extend their boundaries, in this chapter I argue that research in other disciplines has already laid the groundwork for understanding strategic cost management—in particular, structural cost management—in other parts of the value chain. Thus, while I share some concerns raised by others who find strategic cost management research wanting and have questioned whether firms actually practice strategic management accounting,<sup>23</sup> when the management literature is considered more broadly, I am optimistic.

I present selected studies from marketing, operations management, business strategy, finance and economics, to illustrate my point. Although these studies generally are not intended as studies of cost management practices, innovative cost structures often accompany the practices that are studied. Moreover, rather than confining their inquiry to a single firm (and its cost accounts), these studies often explicitly recognize the mutual advantage that must obtain for two parties to remain in a relationship of repeated transactions. Thus these studies typically span organizational boundaries and consider performance from the perspective of several stakeholders. In sum, although like management accounting, these studies often constrain their inquiry to a particular part of the value chain (e.g., product development, inbound logistics, supplier relations,

<sup>22</sup>See Merton (1998) and Dixit & Pindyck (1994) for a review of the literature on options and further examples of real options.

<sup>23</sup>Lord (1996, p. 364) muses that strategic management accounting may be a little more than “figment of academic imagination.”

outbound logistics, and customer relations), they have much to offer as we attempt to better understand strategic cost management practices.

Like earlier researchers, I am ambivalent about the need for specially trained practitioners who work in accounting departments and employ a narrow set of management accounting tools to analyze data that reside in the company cost accounts. A review of both the research literature and the popular business press provides overwhelming evidence that cost management permeates the practice of management and finds expression in the line functions of procurement, operations, distribution and sales, as well as in staff functions associated with product development, supplier and partner management, human resource management, and marketing. That said I am not ambivalent about the role of management accounting researchers in developing a unified body of knowledge around strategic cost management and in educating management students in related theory and practical tools of cost analysis. Perhaps paradoxically, while I view the success of strategic cost management to be evident in the degree to which it permeates the research and teachings of virtually all of the management disciplines, I do not see this as a signal that strategic cost management has become obsolete as a separate field of inquiry. Rather, I conclude that the new challenge for cost management research is to engage with diverse research streams, which tend to present a circumscribed view of cost management in a narrow portion of the value chain, and to integrate what has been learned in other disciplines with management accounting theory. If we incorporate these findings into a broader notion of strategic cost management, we see that management accounting has a natural role in both the strategic decisions that define the cost structure for the long term as well as the effective execution of these strategies in the short term. I believe that this approach offers the greatest potential for developing a unified body of knowledge that can truly be termed, “strategic cost management” and with it, a resurgence of interest among managers and students in acquiring cost management skills.

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# Target Costing: Uncharted Research Territory

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**Abstract:** Target costing is a strategic weapon that is being increasingly adopted by a number of leading firms across the world. What first captured the attention of managers is the competitive advantage that target costing has given to the Japanese auto companies—the longest and most consistent users of target costing. Ironically, as Japan exported the technique to South Korea, a number of leading Korean firms such as Samsung and Hyundai have been gaining ground over their Japanese counterparts. In the US, Chrysler and Caterpillar attribute their financial turn-arounds in the mid-1990s to the adoption of target costing. Despite a proven record of success, many managers often underestimate the power of target costing as a serious competitive tool. When general managers read the word “costing,” they naturally assume that it is a topic for their finance or accounting staff. They miss the fact that target costing is really a systematic profit planning process. Rather than the inward orientation of traditional cost methods, target costing is externally focused taking its cue from the market and customers. It is market-driven costing that develops new products that meet customer price and quality requirements as opposed to cost-driven development of products that are then pushed on to customers in the hope that they will buy the products. This chapter provides a review and analysis of the target costing literature produced in the last decade. It includes more than 80 major publications written in English and more than 100 publications written in Japanese. The review builds on a comprehensive bibliography of both the English and Japanese literature contained in Ansari et al. (1997). The history of Japanese target costing efforts is discussed in a separate chapter of this handbook.<sup>1</sup> To organize the literature and make sense of it for the novice reader, we use the life cycle of management practice as a framework. The framework equates the maturity of knowledge in a practice-based discipline with the various stages in the life of that practice. The discipline maturity framework is used to synthesize and organize the literature as well as develop areas for future academic research on target costing. For organization and synthesis, we populated a database with target costing literature coded by five stages of our knowledge progression or life cycle approach. In addition, we also coded the database on three additional taxonomic dimensions: intended audience, nature of study, and research method used. We used the knowledge progression framework to identify gaps in existing knowledge and new research topics in the area of target costing. We use the taxonomic approach to identify areas that can benefit from replication, corroboration, and further testing.

## 1. Overview of Target Costing

Target costing is a system of profit planning and cost management that ensures that new products and

services meet market determined price and financial return. This idea is expressed in the following simple equation:

$$\text{Target Cost} = \text{Target price} - \text{Target profit}$$

The independent variables in this equation are market price and profit. Both price and profit are

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<sup>1</sup>On the historical review of target costing in Japanese companies, refer to the history chapter (Okano & Suzuki) of this Handbook.

treated as exogenous variables determined by competitive forces in the product and capital markets. Prices are determined by what customers are willing to pay, and profit is determined by what financial markets expect as a return from that particular industry. The dependent variable is cost, which implies that a firm has to manage its cost to meet the external constraints imposed by the product and financial markets in which it operates.

Target costing, as we will elaborate upon later in this chapter, is a very strategic approach to profit planning and not simply a cost-reduction method. Most companies in competitive industries have used some elements of target costing since the 1970s. In fact, value engineering, a key component of target costing was born in General Electric during World War II. It was Japanese auto industry, particularly Toyota that put together the various elements of target costing as we know today and elevated it from a simple cost-reduction exercise to a strategic profit planning model (Cooper, 1992). The Japanese auto industry took the bits and pieces of target costing that other companies were using on and off, and turned it into a holistic system of profit and cost management. (See our later discussion of the boundary conditions for an explanation of the critical components of target costing.)

Target costing today is fairly mature in the Japanese assembly industries. The practice has migrated out of the auto industry in Japan to other Japanese assembly industries and even some process industries. It is, however, fairly young in the US and Europe and has traveled to the US and European auto and assembly industries. Most US and European firms still do cost driven pricing rather than price-driven costing.

In the last 20 yr, it has caught the attention of both Japanese and western academics who have begun to study the subject in earnest. This is consistent with a long and rich tradition in management accounting of nurturing and formalizing ideas that have their origins in practice. In the past, management accounting literature has developed frameworks to account for, develop, synthesize, and guide research in areas such as budgeting and divisional performance measurement, particularly the use of return on assets (ROA) and residual income. Both of these areas started as innovative corporate practices that were later adopted by academics as genuine areas for further research and development. Like the early days in the development of literature on budgeting and divisional performance measurement, academic research on target costing lags practice.

The rest of this chapter is divided into five parts. Section 2 presents a five-part knowledge maturity (life

cycle) framework for organizing the literature on any management practice. Section 3 uses this framework to organize the existing literature on target costing. Section 4 looks at the literature from a taxonomical perspective and gives readers an opportunity to see the types of methodologies, intended audiences, and nature of studies that exist thus far. Finally, the last part of the chapter presents a proposed research agenda for target costing by analyzing the gaps in research that emerge from the literature review. We use our conceptual framework of knowledge maturity to develop a research program in this newly emerging area of management accounting.

## 2. Conceptual Approach

New research in any area typically takes on one of two forms. It either creates conceptual explanations that fill gaps in our knowledge and practices, or replicates, corroborates, and tests existing knowledge and practice techniques. A literature review organizes extant literature so that readers can understand what has been accomplished already. It also provides a way to identify opportunities to fill knowledge gaps and highlight areas that need further replication or testing. We use a knowledge progression framework to identify knowledge gaps and new research topics in the area of target costing. We then use a taxonomic approach to the literature to identify areas that can benefit from replication, corroboration, and further testing.

### 2.1. Knowledge Progression Framework

The knowledge progression framework recognizes that opportunities to create new knowledge vary by the maturity of a topic. When a topic is relatively young, researchers focus on developing its conceptual framework, foundation, and boundaries and generating hypotheses about them. Opportunities abound to publish literature that develops the new concept. Then as a topic moves from youth to maturity, the type of research questions and issues change. As the topic matures, hypothesis generation gets less attention and testing constructs and relationships become more salient.

The knowledge progression framework also has implications for the role of a literature review. As Salipante et al. (1982) point out, for mature or well-established topics where there is a great deal of extant research, a literature review organizes and makes sense of the research results by examining the validity of the constructs presented in the various studies. On the other hand, they recommend that when the topic is new and fragmented, “the reviewer will probably wish to emphasize the formulating function of the

review: raising hypotheses and tentative constructs rather than testing or screening them.” (Salipante et al., 1982, p. 343).

Table 1 depicts the knowledge progression framework. Assume that topic variety in a research area can be represented as a progression from A, conceptualizing and hypothesizing about the construct, to Z, testing the construct and its variables. The dark area of Table 1 represents topics closer to the “A” variety while the cross-hatched area represents topics closer to the “Z” variety. Together the cross-hatched area represents the totality of research on a topic over its life. Table 1 shows that during the birth stage, only a small portion of the dark area and none of the cross-hatched area would exist. The blank or empty space in the graph would represent areas for further research. As the topic matures, more of the area gets covered but the share of topic type “A” decreases and the share of topic type “Z” increases.

Because target costing is a new and fragmented topic, the formulating function of a literature review focusing on the empty spaces seems appropriate. How does the knowledge progression framework apply to target costing?

We postulate that any new management practice goes through five stages in its life cycle. The five stages are (1) development and advocacy, (2) technical refinement, (3) situating the practice in its organizational context, (4) linkage to other processes and tools, and (5) institutionalization and diffusion. Each stage is briefly described below. We use the DuPont version of the ROA formula as an example to illustrate each of these stages.

2.1.1. Development and Advocacy

A new management practice is typically a solution to a practical problem facing industry. If the solution is successful, the practice is further developed, documented, advocated, and passed on to others within and outside the originating organization’s boundaries.

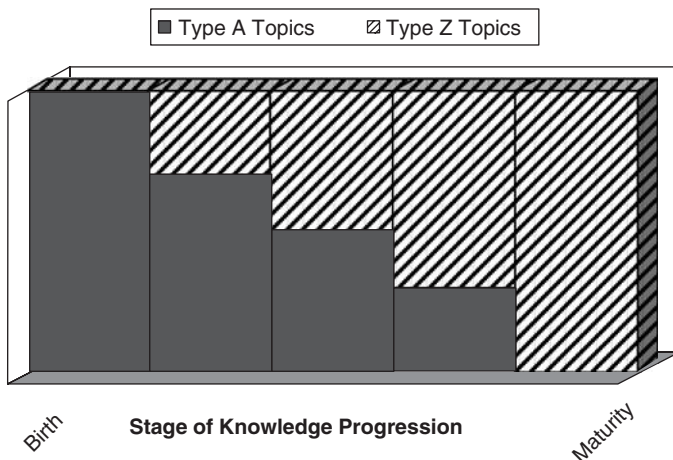
For example, the DuPont version of ROA formula came out of General Motors as a practical solution for managing large decentralized corporations that emerged during the early part of the twentieth century. After Sloan documented the practice, it was adopted by companies facing a similar problem.

During the development stage, the focus is on describing the practice, making a case for when to use it, and the likely benefits that will accrue to an organization from adopting the practice. If we look at the early literature on ROA, we find that it deals primarily with why the DuPont formula is more than a ratio and how it is a complete business model to guide management action.

2.1.2. Technical Refinement

Once a practice passes the initial test of usefulness, it generates interest from others outside the organization who would like to adopt the practice. However, this interest also brings greater scrutiny about the applicability of the technique to the particular circumstances facing different organizations. Things that proponents may have taken for granted or may not have thought about are looked at more closely, and the practice enters a technical refinement phase.

Table 1. The knowledge progression framework.



For example, much of the earlier ROA literature deals with technical issues such as what assets to use in the denominator, how to compute income used in the numerator, and the impact of different valuation rules such as replacement cost accounting. The result was a technical refinement that gave rise to different versions of ROA—for example, ROA using only working capital assets in the denominator or RONA (return on net assets).

### 2.1.3. *Organizational Context of the Practice*

As more organizations adopt the practice, there is a greater appreciation for the organizational context of the practice. The focus shifts from technical discussions to the behavioral and cultural implications of the practice. How the practice affects behavior, what behaviors it rewards, what cultural values it reinforces, and how it can be used to support organizational culture come to the forefront.

In the case of ROA, the initial technical discussions were replaced by a discussion of the possible dysfunctional effects of ROA on resource allocation decisions (Hayes & Garvin, 1982) and incentives for managers to massage data when ROA was used to measure performance (Hayes & Abernathy, 1980).

### 2.1.4. *Links with Other Processes and Tools*

As a practice matures, it becomes part of an organization's processes and tool kit. This raises issues about how it fits in with an organization's existing processes and tools. The research focus shifts to possible conflicts with or support needed from other processes and tools.

In the case of ROA, this line of research is exemplified by the literature that incorporates ROA into balanced scorecard measures (Kaplan & Norton, 1996), connecting it to the strategic planning process (Arzac, 1986), and using it as a business model to identify critical activities and goals (Wagner, 1984).

### 2.1.5. *Institutionalization and Diffusion*

As management practices become embedded in the fabric of an organization, they take on a life of their own or what Giddens (1991) calls the structuration or the ways in which social systems are produced and reproduced in social interaction. The reproduction process legitimizes the practice such that it becomes a ritual. As the ritual takes hold, it creates a discrepancy between “espoused” and “actual” practice (Argyris, 1990).

Perhaps this is why ROA continues to be a popular measure of performance despite the volumes written on its shortcomings. Maturity also brings diffusion as

the practice starts to spread across industry and national lines. This creates its own set of issues around whether the practice can be translated across these boundaries. The literature on how to do foreign currency translations of financial statements of overseas subsidiaries is an example of this type of discussion in the case of ROA.

While the life cycle approach implies a chronological sequence, we do not intend it to be a surrogate for a chronological ordering of the literature. It is quite possible to have a more mature research topic show up early in the development stages of a practice. What we hope to show is that the preponderance of literature for a relatively young practice such as target costing will be in the earlier stages of the life cycle framework with less literature addressing issues in the later stages. We believe that the life cycle framework is a useful organizational scheme for the literature because it gives a rich picture of discipline maturity.

We also hope to show that the life cycle approach is consistent with a methodological approach to literature reviews by showing that the type and sophistication of research methods vary by the life cycle stage of a new practice. Specifically, we will show that early in the life of a new practice such as target costing, the dominant research methods tend to be prescriptive and descriptive. Prescriptive studies tend to be more conceptual and use analytical model building; descriptive studies tend to case studies grounded in field data.

## 2.2. *Taxonomic Approach*

While the knowledge progression framework focuses on the quantity and type of research questions available to future researchers, the taxonomic approach supplements the life cycle approach by looking at other dimensions such as intended audience for the research, the nature of the study, and the research method used.

In the case of target costing literature, these dimensions apply as follows:

*The intended audience* dimension differentiates research publications intended primarily for a practitioner audience as opposed to an academic audience. Publications targeted for practitioners may be valid and useful, but typically they have not been subject to the same rigor as academic research.

*The nature of study* dimension captures whether research is primarily *prescriptive* (designed to tell readers what should be done); *descriptive* (simply describing what firms do); and *hypothesis testing* in which a formal hypothesis is tested.

*The research method* dimension captures the experimental design of a study. For target costing

literature, we identify 10 different research methods: (1) description based on secondary sources; (2) theoretical or conceptual arguments; (3) single-site case study; (4) multisite case study; (5) written or interview-based survey; (6) lab experiment; (7) analytical modeling; (8) analysis using archival data; (9) simulation; and (10) ethnographic field studies.

**3. Literature Organized by Stage of Knowledge**

Our first sort of the database was by life cycle stage of knowledge. Table 2 shows 87 research publications in English and 90 research publications in Japanese from 1995 to mid-2005 classified by stage of knowledge. Table 3 presents this data in graphical form. We have used the dominant theme in each article or paper to guide our classification. When an item covered more than one dimension in the life cycle framework, we classified it in both places.

The knowledge progression framework in Table 1 postulates that a new practice should have a downward slope to the right. This is because most of the literature should deal with developing, explaining, and making a case for the use of a new technique. As Tables 2 and 3 show, with the exception of linkages to other tools and processes, most of the literature in

English seems to be predominantly skewed in the direction of the early stages of the life cycle approach—that is, development, advocacy, and technical issues. The relatively larger proportion of publications devoted to “linkages” is not surprising as target costing is a process that is intimately linked to total quality management tools such as quality function development. It also requires a close link to supply chain management. This may be the reason why the literature is higher than expected in this area.

The story is slightly different for the Japanese literature. Japan has led the practice of target costing since the 1970s, thus it is not surprising to see fewer descriptive and advocacy pieces in the Japanese literature for the 1995–2005 time period. However, what is surprising is that there is still a large body of literature dealing with technical issues in target costing and relatively fewer dealing with the behavioral and cultural issues. The proportions for behavioral articles and linkages to other tools and processes are nearly the same for both the English and the Japanese literature.

*3.1. Target Costing—Description and Advocacy*

Most early literature on target costing primarily deals with describing and advocating the use of target costing. This literature can be grouped into three categories:

- Description of target costing as a practice
- The environment in which target costing provides the greatest benefits
- The benefits from using target costing

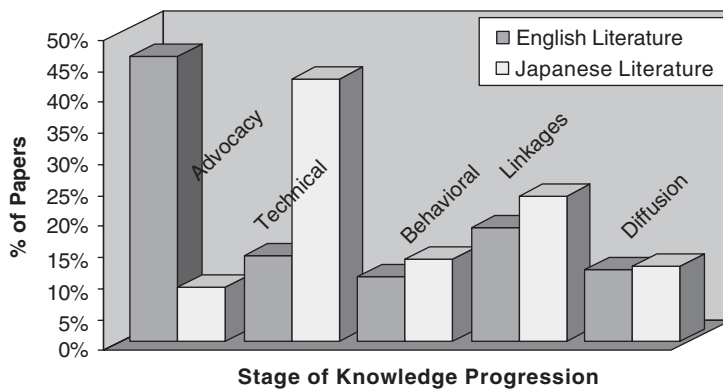
*3.1.1. What is Target Costing?*

While there is broad agreement on the key elements of target costing, there are some subtle differences.

Table 2. Classification of literature by stage of knowledge.

Primary Focus on	English (%)	Japanese (%)
Development and advocacy	46	9
Technical refinement	14	42
Behavioral and cultural context	10	13
Linkage with other tools/processes	18	23
Institutionalization and diffusion	11	12
Total	100	100

Table 3. Classification of literature by stage of knowledge.





Some authors, such as Japan Accounting Association (1996), Kato (1993), and Okano (1995, 2002, 2003) in Japan and Ansari et al. (1997, 2005), Cooper (1992), Cooper & Slagmulder (1997b, 2002), Partridge & Perren (1997), take a broad view of target costing as a proactive strategic profit planning system. In their view, target costing both influences and is influenced by organizational strategy and is a system for implementing the multiyear profit plans that emerge from an organization's strategy. Cost reduction becomes a means to achieving profit goals. This is a holistic view that sees target costing as the bridge connecting strategy formulation with strategy execution and profit generation. Within this holistic, strategic view, some authors such as Ansari et al. (2005) see value engineering as an integral part of target costing while others such as Cooper & Slagmulder (1997a) see target costing and value engineering as two separate disciplines.

The other view of target costing is exemplified by writers such as Bayou & Reinstein (1997), Dekker & Smidt (2003), and Laseter (1998a,b). These authors view target costing primarily as a cost-reduction technique (Tanaka, 1977). Bayou & Reinstein (1998) even cite total cost management, cost cutting, and cost shifting as the three routes for target costing. They suggest that target costing managers should improve, cut, or shift costs, but that they must consider the potential pitfalls in doing so. All these authors emphasize the cost-reduction part of target costing as opposed to its value management part.

### 3.1.2. *Environment in which Target Costing is Beneficial*

A major theme in the advocacy literature is the environment in which target costing is particularly useful. Ansari et al. (1997), Baker (1995), Butscher & Laker (2000), and Gagne & Discenza (1995) see target costing as a critical system for companies that are operating in competitive environments and have short product life cycles. Cooper & Slagmulder (1997a,b) cite five factors that influence the adoption and benefits from using target costing. These are intensity of competition, nature of customer, product characteristics, product strategy, and supplier-base strategy. Jackson (2003) studied the factors responsible for the success of target costing. They assert that the length of product life cycles, level of competition, and customer needs and requirements determine how successful target costing is in any organization. Hibbets et al. (2003), based on their interviews of managers, conclude that organizations which face intense rivalry among competitors, high supplier power, and

that use product differentiation are more likely to use and to benefit from target costing.

### 3.1.3. *Benefits of Target Costing*

The final theme in the advocacy literature on target costing is based on case studies that document the success of target costing in industry. The Japanese literature has several case studies that describe the successful implementation and positive results achieved from the application of target costing. Some of the more prominent companies written about include Daihatsu, Toyota, Nissan, Denso, Panasonic, Canon, Kubota Steel, and Olympus (Japan Accounting Association, 1996).

As the practice becomes established in the US and Europe, there are similar reports describing successful applications and results from the use of target costing. For example, Ansari et al. (1997) is based on the experience of Boeing, Chrysler, and Eastman Kodak. Ansari et al. (1999a) is a study of six major Japanese manufacturers and Ansari et al. (2002) and Swenson et al. (2003) is a survey of best practices in target costing in five major US corporations. Cooper (1992) cites target costing as a key tool used by Japanese companies as part of a review of 22 case studies of Japanese firms. Cooper & Chew (1996) use the experience of Komatsu and Olympus Optical Company to describe how these companies use the discipline of target costing to scuttle product launch if the target cannot be achieved. Cooper & Slagmulder (1997a,b, 1999), based on their field research of Japanese manufacturing firms, report that the use of market-driven costing, product-level target costing, and component-level costing helps to ensure that only profitable products are launched. The study reports that firms experience a reduction in product development time, a reduction in cost, and that they develop products that are more customer-focused. Gagne & Discenza (1993) reports that automobile companies that have used target costing have reaped the benefits of reduced cost and additional profits.

There have been several case studies of firms that document and describe the practice of target costing. Albright & Davis (1998) reports the use of target costing in the development of the Mercedes C class automobiles. Amara (1998) reports how Caterpillar successfully integrated target costing with the development of the D-10 tractors. Brausch (1994) describes the implementation of target costing in Culp, Inc. That study found that the use of target costing increased the profitability of products. Bhimani & Neike (1999) describes the application of target costing in Siemens, Germany. Based on their case study,

Butscher & Laker (2000) conclude that the only way to survive in today's environment is to introduce products that meet customer needs. This is only possible if the market drives product development and pricing, and the internal processes are adapted accordingly. Leahy (1998) states that the use of target costing leads to lower costs, higher profits, greater competitiveness, increased customer satisfaction, and better worker interactions. He reports 10–20% cost reductions from using target costing. Schmelze et al. (1996) describe the use of target costing at ITT automotive brake division—a leading supplier to automobile companies. They state that ITT used target costing to maintain profitability and increase market share during extremely competitive times. Fischer (1996) describes how target costing has become a critical tool for purchasing at HP's Vancouver plant. Among other benefits, it is helping the facility and its suppliers move from an industrial to a consumer-oriented product development and pricing strategy.

One of the few surveys on the use of target costing comes from Japan. Tani et al. (1994) found 109 corporations (out of 180 surveyed) implemented target costing. In the US, Boer & Ettl (1999) surveyed 126 corporations. Their major findings were that many US companies now estimate costs in the design stage. There is more cooperation between product engineers and cost accountants—often the two share the same database. Finally they concluded that world-class manufacturers have a market orientation to product development.

Most of the advocacy literature is based on secondary information about the use and advantages of target costing from self reports of adopters (Partridge & Perren, 1997; Personen, 2001; Pierce, 2002). Since most corporations are loath to admit failures in public, there is little research to counter the glowing stories about target costing success. Still, Koga (1999), Koga & Monden (2000) provides a counterpoint. His study reports that only 17% of camera manufacturers achieved cost targets. Koga & Davila (1999) report that while performance goals in product development are associated with organizational learning, they are not associated with agency and coordination perspectives.

### 3.2. Technical Refinement of Target Costing

The reported success of a new idea convinces others to adopt it. The adoption, however, raises questions about the boundaries and the technical issues related to the practice. New adopters need to understand the idea, how it differs from other practices, what its key variables are, and what relationships exist between key variables.

In the case of target costing, the early literature was not very precise about practice boundaries nor did it differentiate the practice from existing practices such as budgets and cost plus pricing systems. For example, Booth (1995), while recognizing that target costing was different from traditional product costing, seemed to equate target costing with quality function deployment (QFD). Similarly, Hales & Staley (1995) see target costing and QFD as two separate tools as opposed to a single profit planning process. The fact that many companies referred to budgeted costs as “cost targets” and cost plus price as the “target price” did not help matters. Many companies reacted to target costing as “what we have always done around here.”<sup>2</sup>

The first comprehensive statement of target costing boundaries was established by CAM-I (Ansari et al., 1997). The CAM-I model established six key principles for target costing. These are as follows:

1. *Price Led Costing.* Cost is a function of a market determined price.
2. *Customer Focus.* Product design is shaped continuously by the voice of the customer. Enhancements of product features take place only when they meet customer requirements and customers are willing to pay for them.
3. *Design Centered.* The key to cost management is to design costs out of a product before committing to production as opposed to relying on economies of scale, learning curves, waste reduction, and yield improvement to reduce costs.
4. *Cross-functional teams.* Cost management requires a cross-functional team that includes design and manufacturing engineering, production, sales and marketing, material procurement, cost accounting, and service and support. Involvement of downstream functions during design helps to avoid problems that might occur later.
5. *TC has a Life Cycle Orientation.* Target costing typically models the costs of owning a product over its entire life. It considers purchase price, operating costs, maintenance and repairs, and disposition costs with a view to minimizing life cycle costs.
6. *Value Chain Involvement.* Significant members of the value chain, such as suppliers, dealers,

<sup>2</sup>As we discussed earlier, elements of target costing have been around many companies for a number of years. However, it has been fragmented, piecemeal, or in some instances misunderstood. The boundary conditions are meant as an internal test of whether companies are practicing target costing or simply some part of it.

distributors, and service providers, participate in the target costing process. A target costing system relies on its value chain to participate as an extended enterprise to create customer value and minimize costs.

These six principles not only are meant to establish a boundary for target costing but are also intended to distinguish target costing from traditional cost management methods such as budgeting and cost plus pricing. In addition to these principles the CAM-I model also contains a detailed process description and it recognizes value engineering as a critical tool for target costing. Others, such as Cooper (1992) and Cooper & Slagmulder (1999) separate value engineering and target costing as two distinct tools that are part of Japanese cost management practice.

Laseter (1998a,b) talks about three different approaches to target costing. His three approaches are Price-based targeting—in which a firm sets a target cost through simple comparison with competitive offerings. Cost-based targeting—in which cost-plus contracts are used to ensure that contractors achieve an acceptable but not exorbitant profit margin. Value-based targeting—in which consumer requirements are matched with willingness to pay thereby ensuring that new designs provide the right value proposition.

While Laseter (1998a,b) considers cost plus pricing as a form of target costing, Ansari et al. (1997) takes great pains to exclude cost plus as a form of target costing. This is because, in competitive markets (which is true for most products in a global economy), cost plus is not an option and using a broad umbrella dilutes the power of target costing as a tool for value management. This does not mean that some of the principles and tools of target costing cannot be used by nonprofit organizations. A new Department of Defense initiative called cost as independent variable (CAIV) is an effort to tailor the target costing process for the needs of the defense sector. The CAIV initiative is an application of value-based target costing in the defense environment in which competitive market prices do not exist. It is, however, not a cost plus exercise (Ansari et al., 1999b; Bley, 1997; Mandelbaum & Pallas, 2001).

Besides establishing boundaries, the second stage of development also focuses on refining the technical aspects of the practice. Since there has to be some degree of acceptance and diffusion before refinement, it is not surprising that most of the research dealing with technical issues is in the Japanese literature. There are five themes in the practice refinement category.

The first theme focuses on the two independent variables in the target costing equation—price and rate of return. Price is determined by the competitive marketplace while return is determined by the financial markets. A typical example is Newman & McKeller (1995) who talk about “target pricing” as a companion to target costing. According to them, “in determining the target price, marketing computes the price . . . necessary to achieve their desired share of the market. That price becomes the target. Once the target price is set, the normal operating profit for the item is subtracted from the target price. This remainder becomes the target cost.”

Most discussions of price are prescriptive with little empirical or analytical work to support the discussion. The one exception is analytical research that models the relationship between product attributes and prices (Monden, 1995; Tanaka, 1995). This research uses regression analysis to see if there is a systematic relationship between attributes such as horsepower and market price. The other line of price research focuses on decomposing the product-level price into the features that customers want. This is consistent with the design focus of target costing since new features can be designed only if customers are willing to pay for them. Authors such as Tanaka (1995) advocate the use of conjoint analysis for separating a product-level price into features customers are willing to purchase.

The second theme deals with the cost side of the target cost equation. This requires examining the target rate of return and ways to achieve target costs. There is very little research on the subject of the target rate of return. Following established Japanese practice, Ansari et al. (1997) advocate the use of return on sales to establish target profit. Woodlock (1999) discusses how to identify the most appropriate action to take in achieving target costs. This is because actions taken to achieve targets can have dissimilar effects on target costs.

The third theme deals with how to capture and translate customer features into functional weights. Most of the research and prescription on this topic comes from the Japanese literature. The literature applies established marketing research techniques such as the use of Likert scales, conjoint analysis, and trade-off analysis to establish the relative importance customers place on various features.

For example, automobile companies first try to establish how much value customers place on features such as safety, comfort, and performance. They next translate the importance customers place on a feature to the component and parts that contribute to this feature. For example, conjoint analysis or Likert

scales might establish that 25% of a car's value to a customer comes from safety. However, since there are several components such as brakes, seat belts, and tires that contribute to safety, the challenge is to decompose the 25% and assign it to these individual components.

This last part is discussed as the art of capturing the expert judgment of engineers. There is, however, very little formal modeling of the expert judgment of engineers. *Martyniuk & Zablocka (1998)* illustrate a mathematical model of calculating higher level costs of functions fulfilled by a whole product such as a roof. However, how engineers or product designers distribute the relative importance that a customer places on a feature such as safety into product components such as brakes or seat belts is still largely judgmental.

The fourth theme in the technical area deals with supplier involvement in target costing. There is broad agreement in the target costing literature that supplier involvement in cost reduction is the key to achieving target costs. Most of the research describes good practices used by leading target costing practitioners. The Japanese literature describes how leading companies such as Toyota deal with suppliers (*Monden, 1995; Okano, 1995, 2003*). *Kim et al. (2002)* describe results of field visits with Japanese and US companies. Their major findings are that leading practitioners involve key suppliers early in the product design process, treat suppliers as partners, and maintain an open book relationship in which cost and profit data is shared.

For example, in the case of Chrysler, suppliers come on board 2 yr before the launch of a new model, maintain open books, and participate in Chrysler's SCORE (supplier cost-reduction efforts) program. Key suppliers are on long-term contracts. There are also formal metrics to measure supplier performance. Despite many descriptions, there is little formal research on what works best with suppliers and how issues of trust and open sharing of books and data are resolved.

The final theme in the technical area deals with the development of appropriate financial metrics and cost estimation models for target costing. *Modarres et al. (2005)* discuss the development of financial metrics for target costing in Boeing's Interior Responsibility Center as part of lean production in manufacturing. The Japanese literature describes the use of cost tables (*Monden, 1995; Tanaka, 1995*) as the primary tool for cost estimating. The English literature has focused predominantly on the use of activity-based costing (ABC) for understanding cost driver analysis. *Cokins (2002)* deals with the possibility of combining ABC with target costing.

### 3.3. *Situating the Practice in Its Organizational Context*

As a practice matures, the emphasis shifts to the organizational context of the practice. The research themes address the behavioral and cultural impacts of the practice on the host organization. Compared to mature topics such as budgeting, there is very little research on target costing that explores how the adoption of target costing changes behaviors or cultural values, or what behaviors or cultural values support target costing. Much of this discussion comes from reports of corporate practice or implementations of target costing.

For example, *Ansari et al. (1997)* cite a list of behaviors that Chrysler Corporation endorses and requires from members of its target costing teams. The list includes behaviors such as not being discipline champions, sharing knowledge with team members, and having respect for suppliers. *Bhimani & Neike (1999)* report that the use of target costing at Siemens Corporation resulted in greater employee empowerment, more quality planning, and better product and process redesign decisions. *Bonzemba & Okano (1998)* report on the French auto maker Renault's implementation of target costing. Their study documents the changes in the internal organization and the relationships with external suppliers that followed the implementation of target costing.

In an experimental study, *Choe (2002)* studied the impact of information on performance in a target cost setting. The study found that information affects performance through organizational learning. For learning to occur, a target costing system must provide information frequently and quickly. *Everaert & Bruggerman (2002)* conducted an experimental study of cost targets on the behavior of design engineers. They found that having cost targets, as opposed to a general expectation to minimize costs, led to lower cost products without impairing design quality or development time when there was low time pressure. When time pressure was high, engineers tended to work longer on designs. *Monden et al. (1997a,b)* studied the motivational impact of participation in target setting. They concluded that cost-reduction performance of product designers is improved if the designers can participate in target setting and are held accountable for items under their control.

*Koga (1999)* studied the impact of leadership and target costing activities as they relate to product manufacturing costs. He found two behavioral variables that lower product manufacturing cost—(1) frequent interactions between product designers and process engineers and (2) the project manager's leadership in the early product development stage.

There are very few studies that deal with cultural and mindset issues in target costing. Brausch (1994) describes strategies used at Culp, Inc. to change corporate mindset. Leahy (1999) theorizes that deeply embedded cultural values in an organization can derail a target costing implementation.

Yoshida (2003), one of the few empirical studies, investigated the impact of target costing on the morale of the product designers. His study found that product designers felt undue pressure for cost reduction.

### 3.4. Linkage with Established Processes and Tools

New practices often rely on existing organizational tools and work with the existing processes of an organization. As a profit planning process, target costing is closely linked with many existing tools and processes in an organization.

Many early writers such as Booth (1995) and Hales & Staley (1995) saw an intimate relationship between target costing and quality management tools such as QFD. Ansari et al. (1997) were the first to provide a detailed description of the target costing process and the various tools needed for target costing. Ansari et al. (2005) provide a list of core tools that an implementer of target costing needs to have in place. Their process model describes in detail the various tools and support processes that a target costing implementer needs to consider. The major processes listed in their book include customer requirements analysis, target cost decomposition, cost estimation, cost trade-off analysis, and target cost status tracking.

The Institute of Management Accountants (IMA) has added six tools to their list. The IMA list includes QFD, analytic hierarchy process, voice of the customer analysis, component cost analysis, cost tables, and value engineering. Dutton (1998) expands the scope of target costing by linking it to a firm's strategic multiyear product and profit plan.

Since target costing originated in the automobile and assembly industries where a major portion of the costs comes from suppliers, the process of involving suppliers in target costing efforts is a major topic of interest. Cooper & Slagmulder (2002) view supplier selection and chained target costing (where cost targets are cascaded down to suppliers) as a key to cost reduction throughout the supply chain. Bozdogan et al. (1998) list enablers and contributing factors for integrating suppliers in target costing. They advocate matching product features with the specialized technical skills of suppliers.

In two different case studies (eight firms in one and ten in the other), Ellram (2000, 2002a,b) studied the relationship between supply chain management and

target costing. According to Ellram, supply chain management plays a significant role in target costing, particularly during the initial stages of developing component-level target costs. Supply chain management also plays a role in managing, monitoring, and improving costs. Ellram found that giving a target price to suppliers encourages them to be more competitive. Early supplier involvement is also important because changes in specifications can have a big impact on a supplier's price. Supplier involvement also reinforces the purchasing organization's seriousness in achieving target costs. Laseter (1998a) describes a five-step process for involving suppliers in target costing. His conclusions are based on a case study of the Swiss watch maker Swatch.

Lockamy & Smith (2000) see target costing as a means for integrating customer feedback in the supply chain through the development of a total cost structure reflective of current customer requirements. Cooper & Yoshikawa (1994) report a case study of how Japanese manufacturers maintain cost pressure on their supply chain. They attribute the sharing of R&D, placing an employee in another organization, target costing, and use of QFD as means of cascading downward cost pressure.

Besides supply chain management, a few other processes and tools have been linked to target costing. Chen & Chung (2002) link target costing with cause and effect analysis. Their approach, however, is very reminiscent of the use of fish bone diagrams to study cost variances. While cause-effect analysis is helpful, target costing is primarily a design focused cost-reduction process. Booth (1995) and Cokins (2002) describe how ABC is a useful support tool not only as a methodology for cost assignment, but also by helping management understand the cost and profit margin impact of suppliers' services or products. Mills (1999) differentiates ABC and target costing. While he sees ABC as a useful tool, he considers target costing more appropriate for cost commitment decisions that are made during the planning and design stages of a product. In a case study of a US auto parts supplier, Horvath et al. (1998) come to similar conclusion. They state that target costing combined with ABC results in the more accurate calculations of costs.

### 3.5. Diffusion and Institutionalization

The last stage in the life of a practice is diffusion and institutionalization. The research shifts from describing and debating boundary conditions and tools to applying the practice across different industries, different types of organizations (public, private, not-for-profit), and different countries or cultures.

It also starts to look at the mechanisms such as organizational routines and rituals that enable the practice to continually reproduce and legitimate itself.

In the area of diffusion to other industries, the English literature on diffusion is primarily speculative. For example, Brausch (1994) and Hergeth (2002) look at the use of target costing in the textile industry. Van Merode (2004) concludes that the use of target costing will ensure that the delivery of health care will be better adapted to the needs of the patients. Nicolini et al. (2000) report two pilot projects applying target costing in the British construction industry. Clifton et al.'s (2003) book on target costing is based largely on the application of target costing at Lucent Technologies. Shank & Fisher (1999) describe the use of target costing in a paper mill.

The same is true for diffusion across countries and cultures. Very few studies address this issue. Bonzema & Okano (1998) deal with the effect of target costing on organizational culture in France. Okano (1995, 2002, 2003) examined the four aspects of target costing: (1) cross-functional and policy management, (2) *genba* and *genbutsu* principles, (3) emphasis on voluntarism, (4) built-in quality, costs, delivery, as well as other key success factors. They show how these principles were transferred from the parent Toyota to NUMMI (a joint venture between GM and Toyota), Toyota Motor Manufacturing, Kentucky, USA (TMMK) and Toyota Motor UK (Bhimani & Okano, 1995). Kato (1999b), Okano (1999), Ito (1999) and Shimizu (1999) discuss the conditions and variables that matter in transferring target costing to an Italian automotive supplier. Ito & Souissi (1999) performed a case study of a Japanese automobile supplier company examining the target costing relationship between a parent company and its subsidiary. They report that the home company is responsible for the basic customer-focused product design, while the foreign subsidiary does the application or design development. Omar (1997) states that most UK-based car manufacturers employ the logic of target costing as a marketing management tool to determine the prices of new car models. Bellis et al. (1999) report on Toyota in North America. They find that US-based Japanese firms are similar to Japanese domestic firms in their use of target costing. However, they report that Japanese affiliates are also influenced by US practices in their implementation of target costing.

**4. Literature Organized by Taxonomic Variables**

Our second look at the literature was to sort it on three taxonomic variables: intended audience for the

research, the nature of the study, and the research method used.

*4.1. Intended Audience*

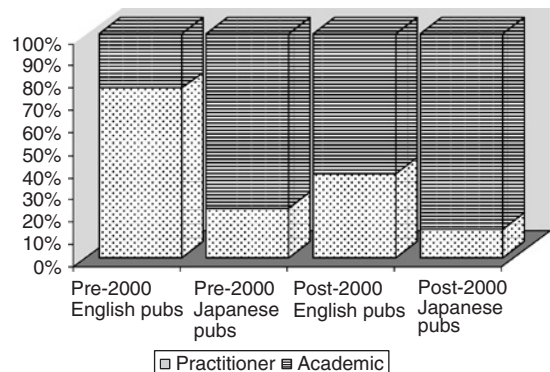
The intended audience dimension captures whether the publication is meant for practitioners or academicians. Table 4 takes the 10 yr of literature and splits it into two categories—pre-2000 and post-2000. The Table shows the research publications in English and Japanese classified by their primary research focus. Table 5 presents this data in a graphical form.

Consistent with the previous result that most papers were largely in the development and technical refinement area, it is not surprising to find that the majority of the papers in English during pre-2000 are written for practitioner audiences. As the practice has matured in the post-2000 period, the proportion of literature written for the practitioner has decreased from ~80% to 40%. This indicates greater interest by the academicians in developing a more rigorous academic base for the practice. For the Japanese literature, the percentage of the practitioner-oriented publications is relatively small in both post- and pre-2000 periods, but still has shown a decrease consistent with a knowledge progression framework.

Table 4. Classification of literature by intended audience.

Intended Audience	Pre-2000 English	Pre-2000 Japanese	Post-2000 English	Post-2000 Japanese
Practitioner	31	11	12	7
Academic	10	39	20	48
Total	41	50	32	55

Table 5. Classification of literature by intended audience.



4.2. Nature of Study

Since most of the reviewed literature was skewed toward practice, we also expected to find most studies to be either prescriptive or descriptive. A prescriptive study, as stated above, typically employs “should use” logic for advocating the use of target costing. The argument is based on pure business logic or on secondary data sources dealing with target cost success stories.

Table 6 shows the research publications in English and Japanese since 1995, classified by the nature of the study. The data is again split into pre- and post-2000. Table 7 presents this data in a graphical form.

Once again, consistent with the previous results that most papers were largely in the development and technical refinement area and intended for practitioner audiences, we found that an overwhelming majority of the papers in English during the 1990s are either prescriptive or descriptive studies based on case studies of early target costing adopters. Even though published in English, the only paper that attempted to formulate and test hypothesis prior to 2000 is by Japanese authors. None of the other studies

attempted to test hypotheses. Even though the practice has been accepted, the proportion has not changed significantly. In the post-2000 period, there are still only 10% of the studies that attempt to develop theory and test formal hypotheses related to target costing. This presents many opportunities for academic researchers. Turning to the Japanese literature we find that the quantity of prescriptive articles has decreased by one third, and there has been slight increase in hypothesis testing research. This is consistent with TC knowledge maturity in Japan compared to the US knowledge maturity. Still, there are many opportunities for academic researchers to perform hypothesis testing research.

4.3. Research Method

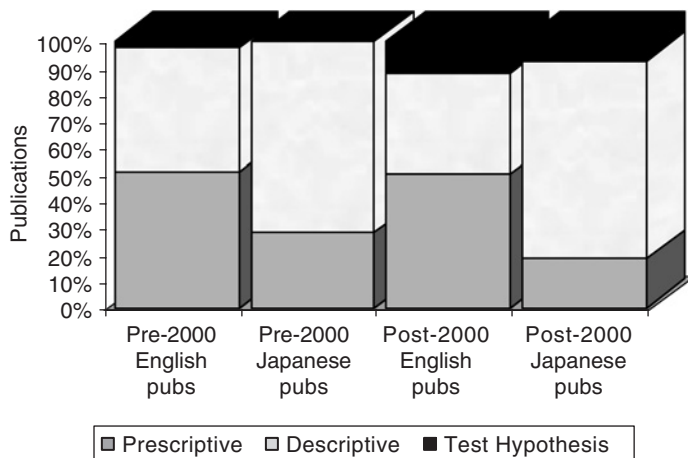
Our final look at the literature was to sort it by the research methods used. We counted each paper only once using the primary research method employed. Table 8 shows the research publications in English and Japanese, classified by their primary research method. Most studies employed one method. There are a couple of exceptions. For example, Koga (1999) combines archival data and questionnaire survey. Table 9 presents this data in a graphical form.

Consistent with the early stage of development of this field, nearly half the papers in English are non-empirical. That is, they are based on either secondary accounts of corporate practices or are conceptual in nature developing a theoretical case for target costing. Of the half that use empirical data, the majority are single-site case studies of Japanese or US corporations that use target costing. Most multisite case studies are by Robin Cooper and his coauthors

Table 6. Classification of literature by nature of study.

Intended Audience	Pre-2000 English	Pre-2000 Japanese	Post-2000 Japanese	Post-2000 English
Prescriptive	21	14	17	10
Descriptive	19	36	13	41
Test hypothesis	1	0	4	4
Total	41	50	34	55

Table 7. Classification of literature by nature of study.



(Slagmulder and Chew). These cases are part of a broader study of Japanese cost management practices for the Harvard Business school conducted in the mid to late 1990s. On the Japanese side, more articles focus on theoretical/conceptual research.

**5. Areas for Future Research**

As stated earlier, new research in any area either fills existing knowledge gaps or it replicates, corroborates, and tests existing research findings using the same or different research methods.

Our two-dimensional view of the literature on target costing is helpful in identifying knowledge gaps as well as areas that need further replication and testing. We organize our discussion around the five categories of the knowledge progression framework.

Table 8. Classification of literature by research method used.

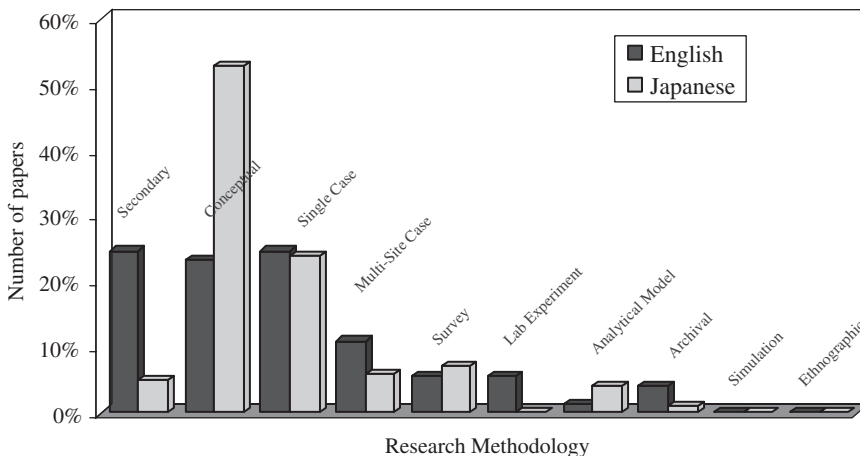
Research Method	English (%)	Japanese (%)
Secondary description	25	5
Theoretical/conceptual	23	53
Single-site case study	25	24
Multisite case study	11	6
Survey	5	7
Lab experiment	5	0
Analytical modeling	1	4
Archival	4	1
Simulation	0	0
Ethnographic field studies	0	0
Total	100	100

5.1. Future Research—Description and Advocacy

The data presented in the prior section show that most of the research to date focuses on describing and advocating the use of target costing. This research is predominantly aimed at practitioner audiences, is descriptive in nature, and uses case-based (often of one site) or survey-based research methods. Researchers will probably find little to add to existing descriptions of target costing, what environments it is best suited for, and what benefits it will produce for its adopters. There are two major exceptions.

The first has to do with the long-term effects of target costing. Some writers have asserted that the use of target costing will lead to reduced product differentiation. This hypothesis is based on the use of standardized parts across different models of a product to reduce costs—a practice common in the automobile industry. The counterview comes from authors such as Ansari et al. (1997) who view the use of value analysis by target costing as a way to identify gaps in existing product space to achieve low cost and differentiation simultaneously. Support for this view is provided by Kim & Mauborgne (2004) who discuss how companies create “blue ocean strategies” (their term for uncontested market space). These authors use the Cirque du Soleil as an example of how value analysis (a la target costing) leads to a strategic redefinition of the competitive space. As they point out, Cirque discovered that animal performances and three ring circuses were costly but added little value to circus audiences. On the other hand, Cirque found audiences were more receptive to a theater style experience. The analysis led the Cirque to combine the most valued elements of a circus, clowns, tent, and acrobatic acts

Table 9. Classification of literature by research method used.





with a Broadway musical and ballet performance to create a new uncontested space for itself. A longitudinal study that can test whether product differentiation decreases or increases with target costing can be extremely useful to help fill a major gap in the conceptual foundations of target costing.

The other gap is to rigorously examine how target costing benefits organizations. There are three possible benefits, and each could be subject to systematic development and testing. The first is that the benefits of target costing flow from early cost planning—the traditional rationale cited for the use of target costing. However, if, as Koga (2000) suggests, cost targets are often missed in practice, then cost reduction could not be the source of the reported benefits of using target costing. An alternative explanation or hypothesis is to test whether the real contribution of target costing is the cost culture and cost consciousness it creates, rather than the actual targets it achieves. This line of research would be similar to research on strategic planning that argues that the benefits of planning lie in the process itself and not in the achievement of plans. Finally, the benefits of target costing could be from its impact on related factors such as decrease in production time, producing products that are more responsive to the marketplace, and creating effective product/process teams. Ansari et al.'s (1999a) best practice survey suggests that these benefits are an important byproduct of target costing. More complex research designs could incorporate these as intervening or independent variables and examine interaction effects to better understand how target costing actually benefits an organization.

While there may be fewer conceptual gaps to fill, there is a great deal of opportunity to move the area beyond self-reported survey results and single-site case studies. For example, in defining target costing, Ansari et al. (1997) use six principles as key differentiators between those who use target costing and those who say they use it. It would be useful to test whether the six principles provide discriminant ability and can effectively separate effective and ineffective practitioners of target costing. On environmental conditions, Cooper & Slagmulder (1997a) hypothesize that the usefulness of target costing will vary depending upon intensity of competition, nature of customer, product characteristics, product strategy, and supplier-base strategy. It would be helpful to test these variables using regression analysis or discriminant analysis in which the environmental variables serve as independent variables and use of target costing is the dependent variable.

The area of reported benefits of target costing can use some replication as well. A good example to follow is Koga (1999) who used archival data to examine if targets are actually achieved in the Japanese camera industry. Another promising methodology is the use of paired samples (one firm using and the other not using target costing) to study whether the use of target costing is indeed beneficial.

### 5.2. Future Research—Technical Refinement of Target Costing

Most of the publications in Japanese and a significant portion in English are heavily focused on the technical aspects of target costing. They focus on variables such as determining product prices, profit margins, decomposing costs, performing value analysis, estimating costs, involving suppliers, and developing metrics for target costing. Despite the attention paid to these issues, there are still a number of issues that have to be addressed or require more testing and replication.

Ironically, the determination of target price and target rate of return, the two key variables in the target costing equation, has not been subjected to rigorous scrutiny. There are several unanswered research questions that could be examined in future research:

- The English literature is not clear whether the target price should be the price charged when a new product is introduced or if it should be an average price over the life of a product. The Japanese literature suggests that it should be the price charged when a new product is introduced (Tanaka, 1995). Which method is best?
- When a new product is part of a portfolio (e.g., different car models), how should the price be decomposed to various products in the portfolio?
- The common way to determine a target return is to use accounting return on sales. Is it better to use ROA or use some variant of economic value added metrics that include the cost of capital?
- If the cost of capital is included in computing the desired return, should it be the same (weighted average cost of capital) for all products or should it be adjusted for the riskiness of an individual product within a firm's portfolio?
- While there is some research in Japan, there is little published research in English that documents the relationship between physical attributes of products such as horsepower of an engine or speed of a CPU and the price customers are willing to

pay for the product. The presence of stable coefficients can greatly help in the determination of target prices.

A second black box technical area is customer value determination and decomposition. Target costing relies on decomposing the overall value from a product into various features that customers want and then assigning that value to individual parts and functions of a product. For example, if an automobile customer says safety is important, then target costing has to first determine what the relative value of safety is compared to other features. After determining the value of safety, that value must be assigned to the components that lead to safety. For example, if safety provides 30% of the value to customers and brakes provide 50% of safety, then brakes are said to provide 15% (50% of 30%) of customer value and their cost should not exceed 15% of the total target cost for the product.

While customer value determination and decomposition has been extensively studied in marketing, the second step, translating feature (safety) value to component (safety) value is regarded as an art or an engineering judgment. There is an opportunity to research this area using methodologies such as expert judgment modeling used in the information processing literature. In addition, information processing models used in auditing research to look at auditor judgments could be used to see how engineers come up with their judgments in translating feature value to function value.

The area of functional value determination also can be studied using probability modeling. For example, the probability of failure of a component or part could be used as a surrogate for value. For example, both a brake failure and a tire failure will compromise safety. However, if the probability of a brake failure is twice as much as tire failure, then spending twice as much on the brake may be justified.

A third major technical research area is how to manage market and technology risks during product development. In the current literature, there is an assumption that initial cost targets remain valid—that is, there is no change in market conditions or technology. In the real world, both of these variables are changing continuously, and target or design parameters may become obsolete during the product development process. This raises two broad research issues:

- What risk management strategies are best suited for dealing with changes in market profile or technology?

- When is it appropriate to work with targets that remain relatively fixed throughout the product development process, and when is it better to have more fluid targets?

### 5.3. Future Research—Organizational Context of Target Costing

Since the prime focus of both the English and the Japanese literature is on the first two stages of the knowledge progression framework, the research opportunities increase dramatically as we move to the later three stages of the framework. The research issues that arise from viewing target costing as an organizational practice can be grouped into three areas: research dealing with behavioral issues at the individual level, behavioral issues at the team level, and behavioral and cultural issues at the organizational level.

At the *individual* level, the behavioral issues are quite similar to the behavioral issues in budgeting. The budgeting literature has examined the effect of budgets on individual aspiration levels and how achievement of budgets affects morale and behavior. There is also a great deal of research that deals with the effect of participation on satisfaction and acceptance of budget targets. This line of research can be adapted to target costing. Some of it has already been done as evidenced by Japanese studies such as [Monden et al. \(1997\)](#), which document the motivational impact of participation in target setting. Others such as [Kato \(1993\)](#) have looked at the impact of target costing on the morale of product design engineers. Japanese studies report dysfunctional effects including burnout syndrome ([Kato, 1993](#)).

One of the problems faced by budgeting studies is tying the impact of satisfaction or improved morale to concrete performance goals. There is an implication that higher morale or acceptance of budget targets will lead to higher performance. Because target costing is intimately linked to new product development, it has some very concrete and measurable performance metrics that are built into the target cost. The product development time, the product development budget, the customer features, profit target, and cost target are prespecified. Behavioral research, therefore, can use these outcomes as dependent variables, and use participation in target setting, the use of extrinsic and intrinsic rewards, performance measurement schemes (e.g., balanced scorecard), and leadership styles as independent variables. The specific nature of these goals also allows researchers to test general theories of goal setting ([Locke & Latham, 1990, 2002](#)) that suggest that

specific goals lead to higher performance than general goals that simply ask people to do their best.

At the *organizational* level, future research can clarify what types of organizational dynamics and cultural factors support target costing and what factors inhibit its use or effectiveness. An obvious research area is team dynamics. Cross-functional teams are at the heart of target costing; yet there is little research on how team dynamics lead to achieving cost, quality, or time targets. This research area is particularly suited for experiments that can test whether individuals working in a “linear mode” can outperform a “concurrent” cross-functional team.<sup>3</sup> The dependent variables in such studies can be achievement of cost, quality, and time targets. An intermediate variable could be the number of design changes during the development process. The hypothesis is that cross-functional teams will have fewer design changes.

In the area of team dynamics, another open research area is the issue of how to effectively manage the tension between the demands placed on individuals as members of cross-functional teams and their functional allegiances. It would be both interesting and useful to practitioners to understand how organizational variables such as performance measurements, reward systems, and leadership styles enhance or reduce the effectiveness of cross-functional teams.

Target costing decomposes and assigns each team a unique cost target. For example, in an auto company, the overall cost of the new car model is broken into individual targets for the engine team, chassis team, brake team, and so on. Within the engine, each major component has its own target. An open research issue related to team dynamics is whether it is desirable to subsidize cost targets across teams. For example, assume the engine team will exceed its target by \$1,000 but the chassis team may come under their target by \$1,000. At the product level, the two amounts will wash and the automobile will meet its overall target cost. However, how do we deal with the two teams? Under what circumstances is it acceptable to let one team subsidize another team, and when might this practice lead to detrimental morale and performance effects?

Organizational culture is an important variable in supporting target costing. In addition to teams, target

costing requires openness, inclusion of suppliers as partners, sharing information between and across organizational boundaries, and taking and sharing risks. These are variables that comprise a portion of an organization’s culture. These cultural variables are hypothesized to be important to TC, but they are untested. Research can shed light on the cultural values that best support target costing. If two organizations with very different cultures can implement target costing successfully, then culture may not be important. If organizational culture plays a significant role in implementing target costing, then what are the variables that mediate this relationship?

Finally, as Argyris (1990) has pointed out, there is a difference between espoused theories and theories in use in organizations. A number of self-reported case studies raise this as a valid research question for target costing. Is it possible that firms only pay lip service to target costing and do business the old fashioned way—that is, use cost plus with all functions working in their silos? As the practice matures, it can and should withstand the type of scrutiny that independent researchers bring.

#### 5.4. Future Research—Linkage with Processes and Tools

The fourth stage in the life cycle of any management practice is establishing links to other support processes and tools. Other processes and tools are necessary to further the emerging practice. Additionally, the interaction between the emerging practice and existing support tools and processes is important to understand and model. For target costing, there are four main interactions that are important. Each is discussed briefly in this section.

The first important interaction area for target costing is *supplier involvement*. Target costing requires major suppliers to get on board early, participate in the product development process, and provide useful market and technological information. While there is a large body of literature in the supply chain and logistics area that deals with how to involve suppliers, build trust, and get them to participate as partners, very little is focused on target costing. For target costing, the interaction effects that matter the most are (i) how to assign targets and make them credible for suppliers; and (ii) how to create a partnering arrangement that extends beyond the product design phase to the maintenance and support phase.

The area of supplier involvement is an area where the espoused and actual practice may be different. Research can document whether target costing practitioners treat their suppliers as partners or simply push cost targets down to them. While this question is

<sup>3</sup>Linear product development is sequential; it begins with design that is then given to manufacturing to produce, suppliers to bid on, and marketing to sell or push. Concurrent development uses a cross-functional team that designs the product and process on the basis of customer input and early supplier involvement.

best studied using field research, the topic can be supplemented with experimental research. The latter method can be used to isolate independent and intervening variables that cause pressure to push targets down the line. Ansari et al. (1999c) found *market power* to be an intervening variable in how firms deal with their suppliers. Another intervening variable may be the presence of *dual suppliers* and suppliers' unwillingness to share data with competing suppliers.

In many industries, the customer–supplier relationships extend beyond the product design phase to the support and maintenance phase. For example, suppliers to defense contractors, aircraft manufacturers, and major construction projects often involve suppliers in not just designing and building a product, but also maintaining and supporting it. This research area needs a framework that can address changing risk profiles for a project over time and how to devise the optimal risk and profit sharing structures. This issue may be best addressed initially with analytical modeling of the type used by agency theory and information economics.

The second interaction effect important for target costing is the link between target costing and *performance measurement* systems such as a balanced scorecard. In some ways both the balanced scorecard and target costing do similar things. They start with the voice of the customer and the demands of the shareholder, they use these demands to streamline the internal organizational structure and processes, and they translate the final outcomes into profits and costs. A good research issue is whether the introduction of a balanced scorecard for a firm using target costing will reinforce or detract from the focus on profitability. They may detract if having two systems that focus on profitability creates information overload and distracts rather than focuses organizational efforts.

The third important area is the interaction between target costing and *other cost management techniques* such as ABC and resource consumption accounting (RCA). Since ABC is popular in the US, and RCA in Germany, it seems logical to conduct a cross-sectional study of target cost adopters in these two countries to see if and how the two systems support target costing. Another interesting research area might be to test whether the usefulness of the two techniques varies for product versus process design. Since ABC is based on process understanding, it is likely to help target costing in the area of process redesign. On the other hand, since RCA focuses on resource consumptions, it might be more useful for product design.

The final area is the interaction between target costing and value engineering. Value engineering is critical for cost-reduction efforts. What is not known

is how the frequency of value engineering benefits target costing. Frequency has to do with how many times value engineering is performed during the product development phase. Many Japanese firms use three rounds of value engineering: at the concept stage, at the initial design stage, and at the design development stage. A good research question is: how does the effectiveness of target costing increase with the increase in the frequency of value engineering?

### 5.5. Future Research—Diffusion and Institutionalization of Target Costing

Target costing is gaining popularity across the globe including in less-developed industrial countries such as India and Malaysia (Sulaiman et al., 2004). With this diffusion, a research opportunity arises to determine how national cultures influence target costing. Do all the components of target costing, such as cross-functional teaming and customer focus, translate the same way across countries? Researchers can use cultural variables such as power-distance first popularized by Hofstede (2001) as independent variables in studies that examine questions such as:

- Does the use of cross-functional teams vary across cultures? Do traditional authoritarian cultures make use of cross-functional teaming difficult?
- How will supplier participation be guaranteed in cultures that rely on trust rather than formal contracting? Will supplier involvement be easier or more difficult?
- Does the use and amount of intrinsic or extrinsic rewards to promote target achievement vary across national cultures? Do cultures high on authoritarianism rely more on extrinsic rewards? Are the rewards larger or smaller than in cultures low on authoritarianism?
- When multinational companies set up operations in other countries, do they export the system “as is” from their home operations or do they modify it? If they modify, what variables account for the modification?
- What is the relative weight of national versus company culture when exporting a practice such as target costing?
- How will target costing evolve (or how is TC evolving) as firms become increasingly global?

There is another side to diffusion that has to do with target costing moving from assembly industries to process, service, and the not-for-profit sectors. The big research question here is how target costing will adapt as it moves into these industries. Some possible hypotheses to test include:

- Target costing in process industries will be characterized by heavier focus on process design and ABC.
- Target costing in service industries will be characterized by heavier focus on value index computations and rethinking strategy.
- Target costing in not-for-profit industries will be characterized by use of surrogates such as budget for price and functional design for value index.

Some preliminary research along these lines has begun to emerge. For example, Kim & Mauborgne's (2004) research on blue ocean strategy suggests that target costing can be a good way to rethink a firm's product strategy and help it to focus on empty value spaces. Ansari et al. (1999b) have looked at how target costing principles are being used by the Department of Defense. They report that the initiative called CAIV applies target costing to products such as fighter aircraft. Congressional budget limits represent the target cost and fighter preferences for safety and maneuverability, and bomb payloads serve as customer requirements to guide product design.

Finally, as the practice matures, it will offer research opportunities related to institutionalization. While testing hypotheses in the field will be difficult until the field matures, it is possible to theorize that like other practices such as operational and capital budgeting, target costing may become an organizational symbol of rationality (a ceremony or ritual) rather than a serious cost management practice. Another theoretical dimension is Giddens's work on how social practices tend to reproduce themselves.

Currently, opportunities to research institutionalization are more promising in Japan because Japanese firms have used the practice for quite some time now. Indeed this type of research has begun to emerge in Japan (Okano, 1999; Yoshida, 2003). Research along these lines in the West is likely to emerge as firms practice target costing for a longer time period.

## 6. Conclusion

The overall conclusion from this brief look at the target costing literature is that the topic offers researchers many opportunities to undertake new research. We used a two-dimensional organizing scheme for the literature.

The first dimension was a knowledge progression framework that is based on the life cycle of management practices from birth to maturity. The use of this framework shows that the discipline is fairly young. The primary opportunities for identifying knowledge gaps and building novel research hypotheses,

therefore, are in the later stages of the life cycle. In the case of target costing these later stages translate into looking at the practice within its organizational context, linking it to other tools and processes, and its diffusion and institutionalization. This research should begin to appear in Japan first, since target costing has been practiced longer in that country.

The other dimension was a taxonomic look with a primary emphasis on research methodology. The research method dimension shows that most existing research uses survey or single-site case studies. It also shows that while the first two stages of practice maturity—development and technical refinement—may not have as many interesting research issues, they do offer researchers an opportunity to replicate and corroborate existing findings and results using different methods such as experiments, analytical modeling, and simulation.

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# Cost and Profit Driver Research

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**Abstract:** This paper summarizes the development of theoretical and empirical management accounting research regarding relationships between costs, customer value, revenues, profitability, and their drivers; reviews the research from a strategic management accounting perspective; and discusses needs for future research. The extant frameworks regarding cost driver relationships exhibit descriptive validity and generalizability. However, there is a need for more theoretical and empirical research regarding value, cost, revenue, and profitability drivers. Future researchers should draw more fully and tightly upon economic, strategic management, and behavioral theories, incorporate variables capturing customer value more explicitly, and develop and estimate models that reflect endogeneity and simultaneity.

## 1. Introduction

During the 1980s, management accounting researchers began to recognize that variables other than production volume, the primary variable underlying theoretical models of cost behavior in both economics and accounting, could drive costs, and that these variables were of fundamental and increasing strategic importance to managers and the design of management accounting information systems (Kaplan, 1983, 1984; Shank, 1989; Shank & Govindarajan, 1989, 1993). These variables include, for example, what have since become known as structural and executional cost drivers (Shank & Govindarajan, 1993) and as unit-level, batch-related, product-sustaining, production-facilities-level, customer-sustaining, production-line-sustaining, brand-sustaining, channel-sustaining, vendor-sustaining, and corporate-sustaining cost drivers (Cooper, 1990; Cooper & Kaplan, 1991a, 1991b, 1998; Kaplan & Cooper, 1998). These variables and their relationships to customer value, costs, revenues, and profitability are strategically important to firms because their nature and values stem from managers' most fundamental, strategic decisions and choices (such as product differentiation or low cost leadership strategic emphasis (Porter, 1980, 1985), product markets and product design, and operating strategies and related technology/process decisions). All else held constant, armed with more clearly structured and accurate understandings of these cause-and-effect business model relationships, managers should be

able to make decisions and to engage in planning and control efforts which promote the achievement of their organizations' strategic goals and objectives more successfully (effectively and efficiently) than would otherwise be the case.

Although the arguments being made were quite interesting and compelling, at the time there was little formal empirical evidence to support the emerging theory and researchers were debating the need for more empirical management accounting research (for example, Kaplan, 1986). Since then researchers have addressed a number of the modeling issues involved and accumulated empirical evidence that indicates that some of these variables drive costs in a variety of organizational and industrial contexts and some of these variables also drive customer value, revenues, and profitability. Cost driver analysis and strategic cost management have become fruitful, though somewhat controversial, fields of academic research, activity-based costing (ABC) systems have been and continue to be widely adopted in practice, and a number of follow-on tools and concepts such as target costing, life-cycle costing, and customer profitability analysis have been developed and applied. The purposes of this chapter are to provide a critical review of extant research regarding cost, value, revenue, and profit driver relationships, modeling and estimation efforts and empirical findings, and to identify and discuss promising directions for future research.

### 1.1. Overview of Findings and Conclusions

We find that there is evidence that variables other than volume (variables that economists and accounting researchers have held constant or assumed were not materially important in deriving production and cost functions) drive costs, particularly over the long run. More importantly, from a fundamental strategic management, economic, business model oriented perspective, there is at least some empirical evidence that such variables drive customer value, and so revenues and profitability, which encompasses shareholder value. These results call into question fundamental simplifying assumptions upon which many long-standing accounting techniques, as well as more recently developed ABC and management systems, are based.

The findings regarding cost, value, revenue, and profit driver relationships rest upon a theoretical base that requires more development and the results of a relatively small number of empirical studies. The literature regarding cost driver relationships demonstrates that the frameworks advanced exhibit a considerable amount of descriptive validity and generalizability. The literature regarding cost, value, revenue, and profit driver relationships provides additional evidence regarding descriptive validity, particularly with respect to trade-offs between product line variety and associated costs of operating complexities. However these results are based on just three empirical studies and production contexts, and none of these models contains a measure of customer value. Also there is no single, widely accepted, unifying theory or taxonomy of cost, value, revenue, and profit drivers and their underlying relationships. Thus there is a need for management accounting researchers to draw upon the strategic management literature, economic theory regarding the specification and estimation of production, cost and revenue functions, and other behavioral theories: (i) to continue to develop the underlying theory, including driver relationships which entail endogeneity and simultaneity, (ii) to conduct empirical studies that establish the causality inherent in the underlying theory, and (iii) to resolve the disparities between the sophistication and complexities of academic research and practically applicable models.

### 1.2. Organization

The paper has two main sections, directly related to each of the chapter objectives. The first section provides a summary and critical review of the extant literature, including subsections discussing: (i) early efforts to model cost driver relationships, to understand the economic and managerial significance of these relationships, and to provide empirical evidence regarding the statistical significance of these

relationships; (ii) subsequent efforts to improve the modeling and estimation of these relationships; and (iii) theoretical and empirical research regarding costs, value, revenue, and profit drivers. The second section builds upon this foundation to identify and discuss further research needed.

## 2. Review of Extant Literature

### 2.1. Early Arguments and Evidence

The early publications in the management accounting research literature making the case for understanding cost driver relationships in greater detail and complexity, from both theoretical and empirical perspectives, included Kaplan (1983, 1984), Miller & Vollmann (1985), Cooper & Kaplan (1987), Shank (1989), and Shank & Govindarajan (1989) who drew particularly upon Porter's (1985) strategic cost analysis and management framework. These researchers recognized that, in increasingly competitive economic environments, costly information regarding product costs, particularly the shares of overhead costs attributable to products and the variables that drive the consumption of underlying resources, was becoming increasingly valuable to managers. The value was arising from managers' needs to make decisions regarding strategy, product markets, product design and mix, operating strategies, and related investments, with respect to markets and products with increasingly thin profit margins and increasingly dynamic and fast-paced competition.

Kaplan (1983, 1984) was one of the first to articulate the need for change, to characterize the problems with a number of traditional management and cost accounting practices and contemporaneous approaches to research, and to begin to anticipate solutions. Kaplan's (1983) focus was on the need to develop measures of nonfinancial performance and long-term competitiveness and profitability, to complement widely used aggregate, short-term financial measures. However, Kaplan's arguments were based on the recognition that the cost accounting model underlying research during the previous few decades had been "based on the mass production of a mature product with known characteristics and a stable technology" (Kaplan, 1983, p. 688), and in which the underlying cost structure and uncertainties in demand, actual costs, and delivery times were all taken as exogenous. Kaplan argued that such a production function was "misspecified" for emerging manufacturing environments, that managers must not take the current production environment as given and implement policies that were "optimal" given that environment. (Kaplan considered this approach to be characteristic of much recent management accounting research.)

Kaplan argued that, to the contrary, managers should “intervene actively in the production process to improve quality, reduce set-up times, increase manufacturing flexibility, overcome restrictive workforce rules, and reduce randomness caused by uncertain supply, poor quality, and erratic machine performance” (Kaplan, 1983, p. 688). Thus Kaplan (1983) was implicitly arguing that (decision) variables other than volume drive costs, as well as long-run manufacturing profitability, and therefore management accounting research should be based on models of cost structures which *incorporate variables representing product and process design characteristics* (and should do so in a manner which treats them as endogenous rather than exogenous).

Kaplan (1984) argued that traditional management accounting and control systems might produce distorted estimates of their products’ costs (by allocating overhead costs to products on the basis of direct labor hours or volumes) and did not produce key nonfinancial measures required for effective and efficient operations. Kaplan (1984) recognized that (i) in the emerging manufacturing environments, variable labor costs would decrease as a proportion of total costs and most labor costs would become fixed or capacity costs; (ii) the costs of computed-based manufacturing equipment would be independent of the number of units produced (fixed, sunk costs), and, as a result, managers would have to learn new ways for understanding and measuring product costs and product profitability; and (iii) management accounting researchers and practitioners would need to be more thoughtful about the use of measures of cost

efficiency and take into account the firm’s business strategy. For firms competing on the basis of innovative products, customization, and timely delivery, attempts to impose cost minimization and efficiency criteria could be counterproductive; and cost accounting systems rarely distinguish between products that compete on the basis of cost and those that compete on the basis of unique characteristics valued by customers (Kaplan, 1984, p. 98).

At about the same time, Porter (1985), articulating a strategic management framework grounded in industrial economics theory, was one of the first to use the concept of *cost drivers*, defined as the structural determinants of the costs of activities, to describe and analyze cost behavior (Porter, 1985, p. 63) and to stress the importance of analyzing costs across a firm’s entire value chain. In so doing, Porter argued that activities and their costs should be segregated and analyzed separately if they constituted a large and growing percentage of operating costs, had different drivers, and/or constituted value-creating activities that competitors perform differently (Porter, 1985, pp. 64–65). Porter defined 10 major categories of cost drivers, as summarized in Table 1: scale, learning and spillovers, capacity utilization, linkages between activities within the firm’s value chain and with the value chains of suppliers and distribution channels, relationships with other business units within the firm, timing (for example, for first or late movers), policy choices (related, for example, to product design and mix (scope), service levels, investments, delivery times, distribution channels, technology, and materials quality), geographic locations, and institutional factors

Table 1. Comparison of cost driver taxonomies.

Porter (1985)	Riley (1987)	Cooper & Kaplan (1998)
Scale	<i>Structural drivers</i>	<i>Manufacturing stage of value chain</i>
Learning and spillovers	Scale	Unit-level
Capacity utilization	Scope	Batch-level
Linkages between activities across value chain (within firm, across extended value chain)	Experience	Product-sustaining
Linkages with business units within the firm	Production technology, across the value chain	Facilities-sustaining
Timing (first/late movers)	Product line complexity	<i>Rest of firm value chain</i>
Policy choices (product design and mix (scope), service levels, investments, delivery times, distribution channels technology, materials quality)	<i>Executional drivers</i>	Customer-sustaining
	Workforce commitment to continuous improvement	Product-line-sustaining
	Quality management	Brand-sustaining
	Capacity utilization	Channel-sustaining
	Plant layout efficiency	Location-sustaining
Geographic locations	Product design configuration	Corporate-sustaining
Institutional factors (regulation, tariffs, unionization)	Linkages with suppliers and customers (extended value/supply chain)	<i>Extended value/supply chain</i>
		Vendor-sustaining

(related, for example, to government regulation, tariffs, and unionization)—a considerably more complex array of fundamental decision variables than production and sales volumes. Porter argued that the costs of activities in turn determined the business unit's cost position and ability to pursue successfully a low-cost leadership or product-differentiation strategy. Porter also argued that an understanding of cost structure with this level of complexity is necessary regardless of which strategy an organization chooses to pursue, as costs must be managed for a successful low-cost leadership strategy but costs must also be managed to provide adequate margins for a successful differentiation strategy.

Also at about the same time, Miller & Vollmann (1985), operations management researchers, were the first to focus exclusively on manufacturing overhead costs and the need to understand what drives them. Miller and Vollmann found that managers were increasingly concerned about the growth of manufacturing overhead costs as a percentage of total manufacturing costs, corresponding increases in manufacturing overhead burden rates, and the need to manage overhead costs more effectively. They argued, "Most production managers understand what it is that drives direct labor and materials costs, but they are much less aware of what drives overhead costs" (Miller & Vollmann, 1985, p. 143) and the models that accountants were using at the time (engineering standards, and burden rates based on direct labor, materials, or machine hours) "... do not so much *explain* overhead costs as *allocate* them" (Miller & Vollmann, 1985, p. 143). They also argued, "Overhead costs do usually correlate with unit outputs, but that does not mean that unit outputs 'cause' overhead costs ... [the] real driving force comes from transactions"<sup>1</sup> (Miller & Vollmann, 1985, p. 144), including logistical, balancing, quality, and change transactions.

Subsequently, three parallel, mutually reinforcing streams of management accounting research emerged: (i) one clearly set in strategic contexts but primarily oriented around *transactions* or *activities* as cost and profit drivers; (ii) one grounded tightly in Porter's (1980, 1985) strategic management framework and oriented around *strategic cost analysis and management* and structural and executional cost drivers; and (iii) one focused on the development and empirical estimation of models of cost, revenue, and profit driver relationships.

## 2.2. The Activity-Based Costing Model

Building upon their own observations, as well as those of Miller & Vollmann (1985), Cooper & Kaplan (1987) began to build a model in which the characteristics of products and production processes, especially *product line diversity* and *production process complexity*, instead of, or in addition to, output volumes, cause transactions or activities, which in turn cause or drive manufacturing overhead costs. They also provided some of the first clearly articulated arguments that product-costing systems that use volume-related bases to allocate manufacturing overhead costs to products systematically distort product cost estimates. Cooper & Kaplan (1987) believed that, as manufacturing overhead costs increased as a proportion of total costs and product line diversity increased, the assumptions of the traditional academic model were being violated. They argued that, although support department costs had typically been treated as fixed, they actually varied and were being driven by the diversity of product lines (defined as differences in product volumes) and the complexity of operating activities such as set-ups, inspections, materials handling, and scheduling. Since low-volume products involve more of these kinds of transactions per unit than high-volume products, allocating overhead costs to products on basis of volume could result in *cross-subsidization*; high-volume products may be allocated too much overhead and therefore subsidize low-volume products. Cooper and Kaplan concluded that traditional product costing systems that used volume-related bases to allocate manufacturing overhead systematically and materially misreported product costs. They argued that, instead, firms should use multiple cost pools with allocation bases that capture the complexities of production processes and "allocations of costs from pools should be achieved using bases that reflect cost drivers" (Cooper & Kaplan, 1987, p. 225), that is, transactions derived from those complexities. Many of their early research findings were documented in Harvard Business School case studies (for example, John Deere Component Works (A), (B) (Kaplan & March, 1987a, 1987b), Mayers Tap (A), (B), (C) (Cooper, 1984a, 1984b, 1984c), and Schrader Bellows (Cooper, 1986)) and disseminated in textbook form (Cooper & Kaplan, 1991a).

Cooper & Kaplan (1987) and Johnson & Kaplan (1987) also argued that the decision to manufacture a product constitutes a long-term commitment and, therefore, estimates of products' long-term variable costs, as opposed to short-term variable costs, are required to support product design, introduction, support, discontinuance, and pricing decisions.

<sup>1</sup>Johnson & Kaplan (1987) discussed earlier arguments by Vatter (1950) and Drucker (1963) that overhead costs vary with numbers of transactions rather than production volumes.

Reinforcing Cooper & Kaplan's (1987) arguments, Shank & Govindarajan (1988, 1989, Chapter 4) discussed the strategic importance of full product lines in attracting and keeping customers and the importance of accurate estimates of product costs for managers who must evaluate and manage the trade-offs between the "value of variety" in the marketplace and the "costs of complexity" in their factories and/or distribution channels. Shank & Govindarajan (1988) also discussed the importance of understanding potential cross-subsidization, and the ways that, when managers are unaware of the existence and extent of such cross-subsidization, high-volume products may become vulnerable to lower priced products from focused competitors and managers may choose strategies which emphasize low-volume niche products which are not as profitable as their costing systems suggest and lead to increases in overhead costs and a downward spiral in profitability.

Cooper & Kaplan (1988) introduced *ABC* with an example and logical arguments. Consistent with their (1987) arguments for long-run variable product costs, Cooper & Kaplan (1988) argued that almost all firm activities exist to support the production and delivery of products and therefore should all be considered product costs (as opposed to just manufacturing costs, as underlying traditional accounting models). These costs would include the costs of logistics, production, marketing and sales, distribution, service, technology, financial administration, information resources, and general administration (costs across the entire value chain) but exclude the costs of excess capacity and of research and development for new products. They maintained that most companies *traced* and/or *allocated*<sup>2</sup> costs from producing/operating departments to products on the basis of direct labor hours or costs, materials costs or machine hours, all volume-related application bases, and therefore generated biased product cost estimates that could lead managers to make poor strategic decisions. With more accurate estimates of product costs and profitability, managers could then consider a range of strategic alternatives and make better decisions regarding pricing, marketing, product design, and product mix.

Cooper (1988a, 1988b, 1989a, 1989b, 1990, 1995), Cooper & Kaplan (1991a, 1991b, 1992, 1998), and

Kaplan & Cooper (1998) continued to develop and advocate the basic framework for ABC. In particular:

- Cooper (1990) introduced a hierarchy of manufacturing activities and overhead costs which reflected the differences in the demands that different products place on organizational resources: unit-level, batch-level, product-sustaining, and facilities-sustaining activities and costs. Cooper & Kaplan (1991b) argued that this hierarchy provided managers with a structured way to think about the relationships between activities and resource consumption, the selection of cost pools and drivers, and ways to recognize that batch-level and product-sustaining costs can only be controlled by modifying batch- and product-level activities (Cooper & Kaplan, 1991b, p. 132). Kaplan (1998) considered this hierarchy to be "a powerful taxonomy for classifying the different types of cost drivers used in activity-based costing models" (Kaplan, 1998, p. 105) and an important step in the development of new theory, as opposed to continued description of observed phenomenon.
- Cooper & Kaplan (1991a) began to extend ABC to stages of the value chain other than manufacturing such as marketing, selling, distribution, research and development, technology development, and customer service, as well as to service organizations. In so doing, they added customer-sustaining and channel-sustaining costs to their hierarchy and began to develop *customer profitability analysis* (for individual customers as well as specific customer segments, brands, product lines, distribution channels, and geographic locations).
- Cooper & Kaplan (1991b) argued that, although ABC systems had originally been developed as a tool for computing more accurate estimates of product costs, the information that ABC systems provided regarding the linkages between activities and the demands of activities on resource consumption made them powerful tools for understanding "how products, brands, customers, facilities, regions, or distribution channels both generate revenues and consume resources" (Cooper & Kaplan, 1991b, p. 130) and therefore identifying ways to create value and improve profitability.
- Cooper & Kaplan (1992) refined the ABC model to incorporate the amounts and costs of used and unused capacities for each cost pool. They argued that committed/fixed costs are incurred to provide the capacity to conduct activities and ABC systems, by using overhead application rates based on *practical*

<sup>2</sup>Some authors use the terms *trace* and *allocate* differently. We use trace to indicate that it is economically feasible to attribute costs directly to an object and allocate to indicate that it is not and therefore an *allocation* scheme is required.



capacity<sup>3</sup> rather than budgeted or actual utilization, separate practical capacity into the amounts actually used and the amounts not used and the costs of the capacity into the costs of the used and unused capacities. Properly executed, this approach provides more stable estimates of product costs than would be the case if a denominator volume based on demand were used. It also ensures that product costs are not burdened with costs of unused capacity, placing the firm at a competitive disadvantage, and highlights the costs of unused capacities so managers can manage capacity more knowledgeably.<sup>4</sup>

By the end of the 1990s, Cooper and Kaplan (Cooper & Kaplan, 1998; Kaplan & Cooper, 1998) had fully developed the ABC model, treating the characteristics of products and production processes as *activity drivers* and activities in turn as *resource consumption drivers* and including flexible, committed fixed and committed step function costs. They had also continued to extend their cost hierarchy to more stages of the value chain and supply chain by adding vendor-sustaining costs, brand-, product-line-, channel-, and country-sustaining costs, and corporate-sustaining costs. (The completed hierarchy is summarized in Table 1.) Finally, Cooper and Kaplan (Cooper & Kaplan, 1998; Kaplan & Cooper, 1998) organized the applications of activity-based management into two groups. *Strategic activity-based management* included activities related to effectiveness and “doing the right things,” such as making product pricing, mix, introduction, and continuation decisions, managing customer relationships, managing supplier relationships, and designing and developing new products. *Operational activity-based management* included activities related to efficiency and “doing things right,” such as ongoing efforts to manage and reduce costs and to use assets more efficiently.

This has been a very influential line of research. ABC and management systems have been adopted by firms in a wide variety of industries and services, as

well as some nonprofit and governmental organizations, and are now widely discussed in management and cost accounting textbooks and courses. However, some researchers have seriously questioned the assumptions underlying the design of ABC systems. Noreen (1991) questioned the use of a single driver for each cost pool, the assumption of continuous linear relationships between drivers and costs (as opposed to potentially discontinuous nonlinear relationships), and the assumption that there are no interdependencies between products and their production processes. Noreen & Soderstrom (1994, 1997) and Anderson et al. (2003) have provided empirical evidence that suggests that the second concern is warranted. Others have also questioned the assumptions of linearity and independence (see, for example, Datar et al., 1993; Ittner & MacDuffie, 1995; Ittner et al., 1997; MacArthur & Stranahan, 1998). These arguments and findings raise serious questions regarding the contemporary design of ABC and management systems for practice and for future management accounting research.

### 2.3. Strategic Cost Analysis and Management

While Cooper & Kaplan (1987, 1988) and Johnson & Kaplan (1987) considered value chain and strategic issues, discussed Porter’s (1980, 1985) low-cost leadership and product-differentiation strategies, and related these business strategies to cost driver analysis and product decisions, Shank (1989) and Shank & Govindarajan (1989, 1993) explicitly organized their *strategic cost analysis and management* arguments, framework and analyses around Porter’s (1985) strategic management framework. Shank & Govindarajan (1989, 1993) in particular made arguments regarding the importance of incorporating information regarding senior managers’ vision, competitive/business strategy and positioning, cost driver analysis, and value chain analysis into the design and use of management accounting information systems.

Following Porter (1985), Shank & Govindarajan (1989) defined *strategic cost analysis* as the process of (i) defining a firm’s value chain and assigning costs and assets to its value-creating activities, (ii) investigating the cost drivers “regulating” each activity, and (iii) using cost behavior information to analyze alternative means for achieving competitive advantage, by either controlling cost drivers or reconfiguring the value chain (Shank & Govindarajan, 1989, pp. 40–41). Shank & Govindarajan (1989) argued that the management accounting decision analytic framework that replaced traditional cost accounting during the 1950s and 1960s should be replaced by a strategic cost analysis framework, to provide managers with

<sup>3</sup>Cooper & Kaplan (1991a) defined *practical capacity* as theoretical or maximum rated capacity less allowances for activities such as preventative maintenance and repairs, set-ups and changeovers, and fluctuations in the arrival of orders and scheduling.

<sup>4</sup>Although Cooper and Kaplan have settled on *practical capacity* as the most useful denominator volume, other researchers have built capacity cost management frameworks around *theoretical capacity* (see, for example, Klammer et al., 1996). The discrepancies between the two approaches have not yet been fully resolved.

information to use as a basis for evaluating strategic alternatives, reporting critical success factor measures, choosing tactics most likely to be effective in implementing desired strategies, and measuring and evaluating performance. Using this framework, then, Shank & Govindarajan (1989) analyzed several widely used management accounting cases and showed how traditional analyses could lead managers to make poor, even counterproductive decisions and how their strategic framework should lead managers to make better decisions regarding the formulation and implementation of strategy.

Shank (1989) and Shank & Govindarajan (1993) included *cost driver analysis*, along with *value chain analysis* and *strategic positioning analysis*, among three themes underlying the emerging field of *strategic cost management*. Shank (1989) and Shank & Govindarajan (1993) argued that facilitating the development and implementation of business strategies is an important function of management accounting. They argued that, from this perspective, management involves a four-stage process of formulating strategy, communicating strategy, developing and implementing related tactics, and developing and implementing controls required to monitor progress toward strategic goals and objectives; and then defined *strategic cost management* as “the managerial use of cost information explicitly directed at one or more of the four stages of the strategic management cycle” (Shank, 1989, p. 50).

Specifically with respect to cost driver analysis, Shank (1989) and Shank & Govindarajan (1993) argued that understanding cost behavior implies understanding “the complex interplay of the set of ‘cost drivers’ at work in any given situation” (Shank, 1989, p. 55)—as opposed to the independence and mutually exclusive partitioning reflected in traditional cost accounting systems and the design of ABC systems emerging at the time. Shank (1989) and Shank & Govindarajan (1993) noted Porter’s (1985) list of cost drivers but found Riley’s (1987) categorization more useful (see Table 1). Riley (1987) categorized cost drivers into two broad categories, structural and executional. *Structural cost drivers* reflect five strategic choices regarding the underlying economic structure of costs that drive the firm’s cost position for each product group (Shank, 1989, p. 56): scale, scope, experience, production technologies for each stage of the value chain, and the complexity of the firm’s product line, where each can involve economies or diseconomies. *Executional cost drivers* capture the ability of the firm’s managers to execute the chosen strategy as reflected in work force commitment to continual improvement, quality management, capacity utilization,

plant layout efficiency, product design configuration, and linkages with suppliers and customers in the context of the firm’s value chain, where “more is always better” (Shank, 1989, p. 57).<sup>5</sup> Shank (1989) noted that, as of that point in time, there was no clear agreement on a list of fundamental cost drivers. There is still no agreement.

Shank (1989) concluded by arguing that strategic cost management constituted a paradigm shift, that (i) the most useful way to analyze costs should be in terms of the extended value chain, as opposed to in terms of products, customers, functions, and value-added; (ii) the objective of cost analysis should be tightly related to the firm’s strategic positioning, as opposed to or in addition to attention-directing, scorekeeping, and problem-solving; and (iii) *cost behavior* should be understood as a function of *strategic choices* about how to compete and managers’ skill in executing strategic choices, that is, structural and executional cost drivers, as opposed to as a function of primarily output volume (Shank, 1989, p. 62).

Shank & Govindarajan (1993, Chapter 11) discussed three potential problems with ABC systems that reflected the maturing and evolution in their thinking: (i) only the costs of activities that add value to products and are performed efficiently should be attributed to products (Shank & Govindarajan, 1993, p. 182); (ii) *product costs* along the entire value chain, not just manufacturing costs, should be attributed to products, because many strategically important costs such as research and development, marketing, distribution, and customer service costs occur outside manufacturing (Shank & Govindarajan, 1993, p. 183); and (iii) existing ABC systems reflect *existing business strategies* but much strategic analysis involves the *re-evaluation and reformulation of strategy*; therefore, as strategies change, accounting systems must change accordingly (Shank & Govindarajan, 1993, p. 184). Cooper & Kaplan (1991a, 1992) had begun to address the first concern in terms of their treatment of the costs of unused capacity, but Cooper & Kaplan (1998) and Kaplan & Cooper (1998) later criticized the value-added versus nonvalue-added approach to managing costs. Cooper & Kaplan’s (1991a) addition of customer- and channel-sustaining costs to their cost hierarchy had begun to address the second concern, and Cooper and Kaplan subsequently continued to extend ABC and their cost hierarchy to other stages of the

<sup>5</sup>Nonetheless, it would seem that executional drivers would entail *diminishing marginal returns*, all else held constant, such that there is some point beyond which marginal benefits are less than marginal costs.

value chain (Cooper & Kaplan, 1998; Kaplan & Cooper 1998). Cooper & Kaplan (1998) and Kaplan & Cooper (1998) discussed the use of ABC systems to support the formulation and implementation of strategies and incorporated a number of strategic activity-based management tools and concepts into their framework. However, Shank & Govindarajan's (1993) third concern is still valid.

#### 2.4. Formal Mathematical Models of Cost Driver Relationships

The early arguments regarding the role of transactions or activities as cost drivers were based on field study evidence and hypothetical, illustrative examples. Only a few researchers developed formal mathematical models which specified assumptions regarding the underlying cost driver relationships and derived logical conclusions from those assumptions:

- Noreen (1991) developed a model of a “well-specified” ABC system and derived a set of necessary and sufficient conditions for such a system to provide relevant costs for product drop and design decisions.
- Babad & Balachandran (1993) developed an optimization model for selecting the number of cost pools and drivers and which cost drivers to be used in a manner that balanced savings in information processing costs with losses due to inaccuracy.
- Banker & Potter (1993) developed models in which rational, profit-maximizing decision-makers in monopolistic and oligopolistic industries base product mix decisions on product cost estimates reported by single cost driver systems, multiple driver systems which contain errors, and multiple driver systems which do not contain errors, and concluded that monopolists would always be strictly better off by using estimates generated by multiple driver systems which do not contain error but oligopolists would not.
- Gupta (1993) developed measures of heterogeneity for products, allocation measures, and products' resource usages, across activities, and analyzed the ways in which the degrees of heterogeneity across these dimensions affected costs allocated to products at different levels of aggregation.
- Hwang et al. (1993) developed a model in which the economic loss from employing distorted estimates of product costs was a function of each product's cost estimate bias, product market competition, and heterogeneity in production technology, input costs, and product mix.
- Datar & Gupta (1994) developed a model that incorporated expressions for specification error,

aggregation error, errors in the measurement of overhead costs, and errors in the measurement of product-specific allocation bases. Their results showed that partially improving the specification of bases and increasing the number of cost pools could actually increase specification and aggregation errors rather than reduce them and there were trade-offs between reducing specification and aggregation errors and increasing measurement errors (Datar & Gupta, 1994, p. 567).

- Hwang & Kirby (1994) developed a stylized, two hospital, two cost driver (numbers of patients and patient days) model to show how cross-subsidization would occur.

None of these models incorporated customer value, revenue or profit driver relationships, and none has been extended for use in further research.

#### 2.5. Early Model-Based Empirical Evidence Regarding Cost Driver Relationships

To determine whether the notions of transactions, activities, and/or structural and executional cost drivers have descriptive validity, and how broadly they might apply, empirical researchers began to develop and estimate formal models of cost driver relationships using cross-sectional and/or time-series data. Comments regarding the motivations and findings of these studies are provided below, and details regarding the endogenous and exogenous variables, data and statistical findings, which can be tabulated, are provided in Table 2, panel 1.

Foster & Gupta (1990) provided some of the first statistical evidence regarding correlations between manufacturing overhead costs, output volumes, and measures reflecting the characteristics of a manufacturing process. Defining a *cost driver* broadly, as “any activity that results in costs being incurred” (Foster & Gupta, 1990, p. 309), and drawing upon the accounting, manufacturing, and strategy literatures, Foster & Gupta (1990) defined three categories of cost drivers: *volume-*, *complexity-*, and *efficiency-based cost drivers*. Using simple and partial correlation coefficients, Foster & Gupta (1990) found that (i) high, significant correlations between volume-based variables and manufacturing overhead costs, and (ii) considerably fewer high, significant correlations between complexity- and efficiency-based drivers and manufacturing overhead costs, particularly after controlling for scale differences. (Banker et al. (1995) subsequently argued that the partial correlation test statistics used by Foster & Gupta (1990) were most likely biased downward.)

Table 2. Empirical cost driver research.

Study	Endogenous variables	Exogenous variables			$R^2$ Statistics	Data
		Cost drivers	Hypothesized <sup>a</sup>	Significant <sup>b</sup>		
Panel 1						
Foster & Gupta (1990)	Plant-wide manufacturing overhead costs (three categories)	Volume-based	6	3–6		Cross-sectional (37 electronics manufacturing plants) (1 yr; 1986)
		Operational complexities	19	5–10		
		Operational efficiencies	9	2–5		
Banker et al. (1990)	Product-specific manufacturing overhead costs (six categories)	Product and process design characteristics	4–6	1–3	0.34–0.97	Cross-sectional (automobile/truck lamps) (1 yr; 1988)
Greer & Moses (1992)	New product: development time, development costs, production costs	Structural (technological characteristics)	1–4	0–4	0.56–0.81	Cross-sectional (18 satellite development programs) (1 yr)
Banker & Johnston (1993)	Firm-wide direct and indirect inputs/costs (ten categories)	Volume-based; batch-related	8; 2	6–8; 2	0.24	Pooled cross-sectional, timeseries (28 airlines; 20 quarters; 1981–1985)
		Network structure	2	0–2	0.87–0.99	
		Densities	1	0–1		
		Stage lengths	1	1		
Datar et al. (1993)	Product-specific manufacturing overhead costs (four categories)	Product and process design characteristics	7–8	6–8		Cross-sectional (121 automobile and truck lamps)
Panel 2						
Banker et al. (1995)	Plant-wide manufacturing overhead costs	Volume-based	1	1	0.83	Cross-sectional (32 manufacturing plants)
		Transactions	4	3		
		Activity-based hierarchy	4	3		
Ittner & MacDuffie (1995)	Plant-wide manufacturing overhead labor hours	Structural	6	2–4	0.55	Cross-sectional (62 automobile assembly plants)
		Executorial	5	1–2		
Anderson (1995)	Plant-wide variable manufacturing overhead costs	Product mix heterogeneity	7	1–2 (2–7 <sup>c</sup> )	0.17–0.39 (0.56–0.80 <sup>c</sup> )	Time-series (three weaving plants) (13 4-week periods; 1986–1990)
		Capacity utilization	1	0–1		
		Operational complexities	2	1–2		
Anderson (2001)	Product quality	Product mix heterogeneity	7	2–6	0.41–0.90	

Table 2. (Continued)

Balakrishnan et al. (1996)	Production efficiency	Capacity utilization	1	1	0.50–0.99	Cross-sectional (154 hospitals) (1 yr; 1986)
	Operations management	Operational complexities	2	1		
	Hospital-wide mission and support	Volume-based	1	1		
	department costs	Structural (scale)	1	0–1		
MacArthur & Stranahan (1998)	(1,3,18 categories)	Patient-mix complexities	1	0–1	0.91	Cross-sectional (5,306 hospitals) (1 yr; 1988–1989)
	Hospital-wide support	Activity-based	2	2		
	department costs	Volume-based	2	2		
	Service breadth	Capacity	1	1		
Evans et al. (2001)	Service depth	Service/operating complexities	2	2	0.87	Time series (one hospital) (40 months; August 1990–November 1993)
	Hospital-wide revenue-generating department costs	Operational transactions	2	1		
		Volume-based	1	0–1		
	Lengths of stay	Capacity	1	0–1		
	Procedures per patient	Service/operating complexities	4	1		
Executorial (performance measurement system)		1	1			

<sup>a</sup>Number of drivers hypothesized in each driver category, in one or more equations.

<sup>b</sup>Number of coefficient estimates in each driver category with significant *t*-statistics ( $p < 0.10$ ), per equation.

<sup>c</sup>Results when time-series were not prewhitened.

Other researchers were able to draw stronger conclusions. Banker et al. (1990), Greer & Moses (1992), Banker & Johnston (1993), and Datar et al. (1993) developed and estimated the first multivariate equation models of cost driver systems and provided some of the first empirical evidence regarding the extent to which strategic decision variables involving product and process designs drive costs, instead of or in addition to output volumes. As they developed their models, they extended theory in ways that focused on product and process design variables as critical decision variables and the importance of understanding the underlying cause-and-effect relationships between drivers and costs for cost management purposes as well as product-related decision-making purposes. Their models essentially by-passed activities and instead captured relationships between underlying activity drivers and costs.

Banker et al. (1990) focused on (i) the role of product designs in determining life cycle costs and (ii) the emerging realization that allocations of supervisory, quality control, inspection, equipment maintenance, and production control costs to products based on direct labor and machine hours were unlikely to reflect accurately the differential demands on resources of more or less difficult-to-manufacture products and therefore were likely to result in distorted product cost estimates and biased analyses of design-for-manufacturability, product profitability, outsourcing, and make-or-buy decisions (Banker et al., 1990, p. 270). They also focused on the resulting need for not only accurate product cost estimates as being discussed in the ABC literature but also models regarding the impacts of product design engineering factors on costs. (Understanding the effects of product and process complexity on costs was strategically important for the firm because the firm had to innovate and improve its product designs continually in order to attract and retain customers and to reduce costs in response to overseas low-cost competitors.) Banker et al. (1990) regressed the costs per unit (lamp) for lens molding supervision, lens quality control, lens tooling maintenance, housing molding supervision, housing quality control, and housing tooling maintenance on variables that the plant's managers believed influenced costs, including the number of moving parts in molds, numbers of lamp functions, the need for multicolor molding, numbers of molding process rejects, and the lengths of parts. The regressions explained 34–97% of the variation in the overhead costs and revealed significant positive associations for some but not all of the hypothesized product and process design drivers.

Also recognizing that a large proportion of a product's life cycle costs are committed by the time that production actually begins, Greer & Moses (1992) focused on the role of technology as a (structural) driver of new product development costs as well as production costs. They discussed issues involved in developing measures of technology and used the regression-based year-of-technology method to create three measures: (i) the predicted year-of-technology, a summary measure of the degree of technology embodied in a system (Greer & Moses, 1992, p. 46), (ii) the extent to which a system was "ahead of" or "behind its time," and (iii) the overall complexity of the development task. Greer and Moses used US Air Force data for 18 high-technology satellite development and principal components analysis to reduce 18 technical attributes of satellites to 4 factors representing mission requirement, orbital, electrical power, and environmental dimensions, which they used, in turn, as explanatory variables in the year-of-technology model. All four dimensions were statistically significant and the model explained 73% of the variation in year-of-technology. Greer & Moses' (1992) regressions revealed that technological complexity explained very little of the variation in development costs but had significant positive coefficients and explained 75% of the variation in development time. Predicted and residual development time, in turn, had significant positive coefficients and explain 56% of the variation in development costs. When Greer & Moses (1992) regressed the logarithms of production costs per unit on the logarithms of actual development costs and production runs, they found that the two variables explained 81% of the variation in production costs, the coefficient estimate for development costs was significantly positive, and there were significant cost savings associated with the number of production runs.

Banker & Johnston (1993) extended this body of research to a capital-intensive service, airline transportation. They drew upon the economics literature regarding airline production and cost functions, as well as the emerging management accounting research, to specify and estimate a multivariate system of linear cost driver equations for the airline industry. The model included 10 equations, one for each of 10 categories of endogenous input quantities, including hours of flight crew labor; gallons of fuels and oils; hours of ground personnel labor, promotions and sales labor, and maintenance labor; maintenance materials and overhead costs; values of aircraft and ground property and equipment; and general administrative overhead costs. They modeled each input quantity as a function of multiple input/resource usage drivers that captured the design characteristics of

the airlines' networks and operations. The cost drivers treated as exogenous included: (i) capacity seat miles for eight categories of aircraft (volume-based drivers which collectively capture product diversity and are batch related in the sense that different aircraft can carry different numbers of passengers per flight and require different numbers of pilots, flight engineers, attendants, and quantities of fuel per seat mile); (ii) passengers enplaned; (iii) the concentration of flights through competitive and dominated hubs (structural operations-based cost drivers which reflect the airlines' network configurations, related economies and diseconomies, process flow control, and fundamental choices regarding business and operating strategies and abilities to set fares); (iv) the density with which the airlines served their networks (which also entails economies and diseconomies and captures flight frequency, a strategic choice variable and revenue driver); and (v) average stage length (which also involves economies and diseconomies and relates to batch size). Using Civil Aeronautics Board and Department of Transportation data to estimate the model, they found that the hypothesized drivers explained high proportions of the variation in input usage, and output volumes were the strongest drivers in terms of both statistical and managerial significance. Moreover, most of the drivers reflecting product diversity and process complexity were both managerially and statistically significant. Banker and Johnston concluded that models based on volume alone would be misspecified and entail omitted variable bias.

Datar et al. (1993) recognized that (i) managers often choose levels of activities and therefore expenditures *simultaneously* rather than sequentially or independently, and (ii) the ABC approaches then emerging would *not* take these simultaneous effects into account. Using data for the manufacture of automobile and truck lamps, Datar et al. specified and estimated a simultaneous equations model for four major categories of overhead costs. The four categories of costs considered to be determined endogenously and simultaneously were supervision, tool maintenance, quality control and inspection, and scrap costs. Eight cost drivers related to the complexity of the lamps' product and process designs (moving part complexity, multicolor molding complexity, thermal stability factors, component depths, functionality, and machine complexity) were treated as *exogenous*. The results enabled the authors to examine the direct effects of the exogenous drivers on each endogenous category of costs and their indirect effects through the other endogenous variables and yielded interesting insights which made sense in terms of cost of quality

trade-offs and demonstrated empirically that failing to model simultaneity and to estimate models using appropriate econometric techniques can lead to inaccurate estimates of the effects of cost drivers (Datar et al., 1993, p. 613).

### 2.6. Accumulating Model-Based Empirical Evidence Regarding Cost Driver Relationships

During the next several years, empirical researchers continued to develop and estimate models that tested emerging theory regarding cost driver relationships and to accumulate evidence that variables other than volume drive costs. Banker et al. (1995) focused on the relationships between transactions resulting from production complexity (Miller & Vollmann, 1985) and manufacturing overhead costs. Their measures could also be related to Cooper and Kaplan's (Cooper, 1990; Cooper & Kaplan, 1991a, 1991b) cost hierarchy. Ittner & MacDuffie (1995) focused on the indirect, as well as direct, effects of a set of structural and executional cost drivers on manufacturing overhead labor hours. Anderson (1995) focused on measurement issues and the relationships between product mix heterogeneity and manufacturing overhead costs, and Anderson (2001) considered the indirect effects of product mix heterogeneity, through managerial decisions regarding plant capacity utilization and machine scheduling, as well as the direct effects on product quality and production efficiency. Balakrishnan et al. (1996), MacArthur & Stranahan (1998), and Evans et al. (2001) extended the body of research estimating cost driver models to the context of hospital services. Comments regarding the motivations and findings of these studies are provided below, and details that can be tabulated are provided in Table 2, panel 2.

Banker et al. (1995) used data from electronics, machinery, and automobile components manufacturing plants and variables capturing transactions drivers (Miller & Vollmann, 1985) to estimate a log-linear model in which the natural logarithms of overhead costs are regressed on the natural logarithms of their volume-based and transactions-based drivers. They found that (i) direct labor costs, shop floor area per part, the number of personnel involved in purchasing and production planning, and the number of engineering change orders had significant positive associations with overhead costs but the number of personnel involved in quality control and improvement did not; (ii) production volume and transactions explained 83% of the variation in overhead costs, and transactions alone explained more (77%) than volume alone (48%); and (iii) in a misspecified model which included only volume, some of the variation that

should have been attributed to transactions was instead attributed to volume, biasing its coefficient estimate upward.

Ittner & MacDuffie (1995) estimated a model of the direct and indirect effects of three structural cost drivers (automation, scale, and product mix complexity) and three executional cost drivers (product manufacturability, management policies, and production practices) on automobile assembly plant manufacturing overhead labor hours. They hypothesized that, as changes in the drivers led to changes in the need for direct labor, they would also lead to changes in the need for supervisory and managerial labor. Using path analysis to estimate the model, Ittner and MacDuffie found that the structural and executional drivers explained about 55% of the variation in direct labor hours and (i) plant scale was not related to direct labor hours per vehicle but was associated with significant savings in direct and combined direct and indirect effects on manufacturing overhead labor hours per vehicle; (ii) automation and human resources policies were associated with significant savings in direct labor hours per vehicle but not direct and indirect effects on manufacturing overhead labor per vehicle; (iii) parts complexity and design age were associated with increases in the use of direct labor hours per vehicle as well as direct and combined direct and indirect effects on manufacturing overhead labor hours per vehicle; (iv) options complexity did not affect direct labor hours per vehicle but was generally associated with increases in the use of manufacturing overhead labor hours in terms of both direct and combined direct and indirect effects; (v) model mix complexity did not have significant effects; and (vi) the use of buffers and work systems were associated with savings in terms of direct labor hours per vehicle and both direct and combined direct and indirect effects on manufacturing overhead hours per vehicle. For future research, Ittner and MacDuffie suggested (i) investigating the influence of structural and executional drivers across the entire value chain, as opposed to just manufacturing, and (ii) understanding the interactions between structural and executional drivers, which Ittner and MacDuffie had treated as independent and exogenous when instead they were likely to be determined jointly and endogenously.

Anderson (1995) developed and estimated a model of the relationship between *product mix heterogeneity* and manufacturing overhead costs with data for more than 700 products in three weaving plants of a leading textile manufacturer. Anderson hypothesized that the measures typically used to capture the breadth and changes in product mix (ranges of products produced

such as the number of products, changes to existing products such as engineering change orders, and additions to product lines such as the number of product introductions) and the results of product mix heterogeneity such as engineering change orders, batch sizes, and cycle times failed to distinguish similarities and differences between products, the hypothesized source of economies and diseconomies of scope (Anderson, 1995, pp. 364–365). To address this problem, Anderson used factor analysis on product engineering specifications to identify seven forms of product mix heterogeneity for textile weaving. The factor weights captured the effects of product mix heterogeneity inherent in both simultaneous and sequential production processes. Anderson then computed factor scores for each product and, for each of the seven product mix heterogeneity attributes and each time period, a measure of product mix heterogeneity, the standard deviation of factor scores across products, weighted by the products' machine hours. Using the resulting time-series data, by plant, Anderson regressed the plants' variable manufacturing overhead costs on: two measures of sequential product mix heterogeneity, the numbers of major and minor setups; the seven measures of simultaneous and sequential product mix heterogeneity; and the percentage of unused capacity, to control the potential "stickiness" in reductions in overhead costs. (To avoid spurious correlations due to nonstationarity and persistence, Anderson prewhitened the product mix heterogeneity and manufacturing overhead time series.) Anderson found an interesting pattern of statistically significant and insignificant cost driver relationships that reflected the specific operating strategies of each plant.

Anderson (2001) argued that previous studies of the effects of product mix complexity on performance had treated plant capacity utilization and machine scheduling as exogenous, dependent only on demand, but should have treated them as *endogenous* if managers rationally anticipate the negative effects of product mix complexity on performance and, as a result, take actions to mitigate these effects in the short run. Anderson (2001) used data regarding product mix, capacity management, and operating performance from the same three textile weaving plants as Anderson (1995) and path analysis to estimate a model in which product mix composition and heterogeneity had not only direct effects on operating performance but also indirect effects through capacity management and machine scheduling decisions. Anderson (2001) used principal components analysis to reduce seven measures of operating performance into two factors capturing product quality and



production efficiency (particularly labor productivity). With respect to product quality, Anderson found that (i) the product mix composition and heterogeneity variables had both positive and negative signs, with patterns that made sense in the plants' specific production and decision-making contexts, and explained significant proportions of the variation in capacity utilization, major set-ups and minor set-ups; (ii) the direct effects of the capacity management decision and product mix variables explained most of the variation in product quality, with excess capacity and major set-ups having significant negative effects and several of the product mix composition and heterogeneity variables having significant direct effects; (iii) the indirect effects of product mix reduced quality, so the direct effects systematically misstated total effects; (iv) the results were consistent with managerial decision-making where managers used capacity decisions to maintain performance and could counteract those effects for some dimensions of heterogeneity but not others. Anderson found similar results for production efficiency and concluded that the results were consistent with a pattern of decision-making where managers used capacity management decisions to mitigate some but not all of the negative effects of product mix heterogeneity because top management monitored measures of capacity utilization and set-ups closely.

Balakrishnan et al. (1996) focused on issues regarding choices of volume- and complexity-related drivers in the context of hospital costs, including the complexity of patient care mixes, levels of aggregation, and functional forms. They drew upon economics literature regarding health care cost functions and management accounting research to specify their models. Balakrishnan et al. disaggregated operating costs into 3 broad categories and 18 cost pools: direct patient services, ancillary patient services, and support services. They employed both aggregate (hospital-wide) and department-specific cost drivers (measures of activity). At the aggregate level, they hypothesized that economies of scale would obtain and employed the number of short- and long-term patient days as the volume-based driver and a resource intensity weight for each institution as the complexity driver. At the department level, they selected department-specific measures of volume/cost drivers capturing levels of activities, such as inpatient and outpatient visits for ambulatory care and emergency visits. The departmental measures explained more of the variation in costs than the aggregate measure in 11 of the 16 pools with department-specific drivers. Balakrishnan et al. selected the best-fitting model for each cost pool and found: (i) at the aggregate operating cost level, incorporating the

measure of hospital-wide complexity as well as volume added significantly to the model's explanatory power; (ii) when three broad pools were used, incorporating complexity added to the explanatory power of volume for direct patient services and support services but not ancillary services; (iii) among the 18 disaggregated cost pools, different functional forms fit best statistically for different costs pools, and economies of scale obtained for some pools and diseconomies for others; (iv) among the direct patient service cost pools, incorporating hospital-wide complexity added to the explanatory power of volume for nursing, emergency care, and surgical suites but not for ambulatory, nursing, or obstetrics; (v) among the ancillary services, incorporating complexity only added to the explanatory power of volume for laboratory costs; and (vi) among the support services, incorporating complexity as well as volume added to explanatory power for maintenance costs and records and library costs. Balakrishnan et al. concluded that 42–50% of the hospitals' operating costs were influenced by the complexity of their case mixes and that the relationship between complexity and costs differed by department.

MacArthur & Stranahan (1998) focused on the relationships between hospital support department costs and volume- and complexity-based cost drivers, where support department costs, the breadth of services provided, and the intensity of services provided to individual patients were all treated as endogenous and simultaneously determined by hospital decision makers. MacArthur & Stranahan also discussed the ways in which hospital support department costs are driven by logistical, balancing, quality, and change transactions (Miller & Vollmann, 1985). Specifically MacArthur & Stranahan estimated a system of three equations in which (i) support department costs were determined by patient volumes, breadth complexity, depth capacity, and capacity; (ii) breadth complexity was determined by patient volumes and capacity; and (iii) depth complexity was determined by patient volumes and capacity. Each equation also included a set of control and identifying variables to capture regional differences in costs, differences in patient mixes and activities associated with sole community, non-profit, governmental, and for-profit hospitals, proportions of Medicare (elderly) and Medicaid (indigent) patients, and teaching hospitals. MacArthur & Stranahan found that (i) patient volumes, breadth complexity, depth complexity, and capacity explained about 91% of the variation in overhead costs and were all significantly, positively associated with overhead costs: (ii) patient discharges and capacity were positively associated with breadth

complexity but patient days were negatively associated with breadth complexity; (iii) patient volumes and capacity were positively associated with depth complexity; and (iv) most of the control and identifying variables had significant associations in directions hypothesized. Thus they concluded that (i) if hospitals attempt to reduce costs by reducing the lengths of patients' stays, as they have been, but substitute more patients, overhead costs will increase; (ii) if hospital reimbursements are based on costs, they should be based on the cost per patient as well as the cost per patient day (MacArthur & Stranahan, 1998, p. 306); and (iii) when making decisions to expand services, hospital managers should include likely incremental support department costs in their analyses. Finally, MacArthur & Stranahan found that a natural logarithmic functional form for their cost function fit the data better than a linear functional form.

Evans et al. (2001) estimated a similar model but focused on the effects of an executional driver, the introduction of a physician profiling relative performance information program, on patients' length of stay, and the numbers of procedures performed per patient. They developed and estimated a simultaneous equations model of hospital revenue-generating department costs in which (i) costs, average patients' length of stay, and weighted procedures performed per inpatient (a measure related to volume and complexity) were treated as endogenous; (ii) costs were determined by lengths of stay, procedures performed, numbers of patients as measured by inpatient admissions, and occupancy rates (a control variable); (iii) length of stay, in turn, was determined by a dummy variable capturing the presence or absence of the relative performance information program, weighted procedures performed, occupancy rates, the inpatient–outpatient mix, and percentages of Medicare and Medicaid patients; and (iv) weighted procedures performed, in turn, were determined by length of stay, the interaction between length of stay and the relative performance information system, occupancy rates, the inpatient–outpatient mix, and a patient severity mix index. Evans et al. found that (i) the system of equations explained 87% of the variation in the endogenous variables; (ii) lengths of stay and procedures performed both had significant positive associations with costs; (iii) procedures performed and occupancy rates had significant positive associations with average length of stay, and the relative performance information program reduced the average length of stay; (iv) lengths of stay had significant positive associations with procedures performed per patient, significantly more when the relative

performance information program was in place; (v) the relative performance information program, in conjunction with the reductions in average lengths of stay, led to reductions in the number of procedures performed per patient, but this effect was almost completely offset by additional procedures performed per patient, yielding an insignificant net effect; and (vi) similar results were obtained for the effect of the relative performance information program on costs.

### 2.7. Cost, Value, Revenue, and Profit Driver Relationships

Other researchers extended the scope of cost driver research to include *value* and *revenue drivers*, and by extension *profit drivers*. (Although the construct of customer value clearly underlaid their conceptual models, none actually attempted to measure customer value and employ it as an endogenous variable in their empirical models.) Kekre & Srinivasan (1990), Ittner et al. (1997), and Banker et al. (1997) developed and estimated models which recognized that the fundamental decision variables that drive costs are also, or more originally, variables stemming from managerial choices regarding business strategy, product markets, and product designs, and so value, revenue, and profit drivers. Comments regarding the motivations and findings of these studies are provided below, and details that can be tabulated are provided in Table 3.

Taking a strategic operations management perspective, Kekre & Srinivasan (1990) estimated a simultaneous equations model that incorporated hypotheses regarding product market benefits of product line breadth and costs of operational complexity. Although their focus was not cost, value, revenue, and profit drivers *per se*, nonetheless their model and findings informed management accounting research regarding these relationships. At the time, broad product lines were hypothesized to enable firms to meet the diverse needs and wants of heterogeneous customers and therefore to charge prices which reflect the perceived value that customers place on their products and to gain market share.<sup>6</sup> Related increases in operating costs were hypothesized to be driven by additional materials handling and inventories, more diverse process flows, the need for additional supervision, the potential degradation of product quality, and the need for more resources for scheduling, coordination and control associated with more frequent, smaller batches (Kekre & Srinivasan, 1990, p. 1216).

<sup>6</sup>See Lancaster (1990) for an excellent review of the economics literature regarding product variety and references to operations management and marketing literature.

Table 3. Empirical cost, value, revenue, and profit driver research.

Study	Endogenous variables	Exogenous variables			$R^2$ Statistics	Data
		Drivers	Hypothesized	Significant <sup>a</sup>		
Kekre & Srinivasan (1990)	Market share, relative price, direct costs, inventories, manufacturing costs, return-on-investment	Product line breadth Quality Capacity utilization Small batch production				Pooled cross-sectional, time-series (business units) four categories)
Ittner et al. (1997)	Plant-wide production and support costs	<i>Costs</i>				Time series (four product lines) (41 months; July 1992–November 1995)
		<i>Volume-based</i>	1	6/6; 3/8	0.67	
		<i>Activity-based</i>	3	2/14		
		<i>Revenues</i>				
		<i>Volume-based</i>	1	1	0.77	
		<i>Activity-based</i>	3	0–1		
Banker et al. (1997)	Operating costs Net revenues Net income	<i>Net income</i>				Cross-sectional (commercial banks) (11 yr; 1978–1988) (7,032 bank years)
		<i>Costs</i>				
		Structural <sup>b</sup>	5	4–5/11	0.33–0.55	
		Operational complexities	3	2–3/11		
		<i>Revenues</i>				
		Structural <sup>b</sup>	5	3–5/11	0.24–0.62	
Operational complexities	3	2/11				
		<i>Net income</i>				
		Structural <sup>b</sup>	5	0–5/11	0.01–0.37	
		Operational complexities	3	0–1/11		

<sup>a</sup>Significant with  $p < 0.10$ .<sup>b</sup>Scale, scope, product line complexity.

Specifically, Kekre and Srinivasan hypothesized that product line breadth had both direct and indirect effects on marketing performance, manufacturing costs, and profitability. Increasing product line breadth could have direct effects on products' direct costs, including increases due to increases in the numbers of parts, components, and suppliers, but indirect effects if increases in market share lead to increases in influence over suppliers and the ability to negotiate lower input prices or if *economies of scope* obtain through *cost complementarity* (where resources are shared by multiple products (Kekre & Srinivasan, 1990, p. 1217)). Increasing product line breadth could have direct effects on inventories due to higher inventories but offsetting indirect effects due to commonality of parts. Increasing product line breadth could have direct effects on manufacturing costs, increases due to increases in the number of changeovers, materials handling and expediting activities, quality control activities, and congestion, offsetting indirect effects if, as a result of increases in market share and power over consumers, the firm can schedule production and support activities more efficiently.

Kekre & Srinivasan (1990) used strategic business unit data from the Profit Impact of Marketing Strategies (PIMS) database to estimate a model which contained six endogenous variables (market share, relative price, direct costs, total inventories, manufacturing costs, and return-on-investment). They found that increases in product line breadth (i) had significant positive direct impacts on market share and relative prices; (ii) were associated with small, marginally significant decreases in direct costs and manufacturing costs, and reinforced by significant reductions in direct costs due to increases in market share; (iii) had no direct effects on inventories; and (iv) had significant, positive combined direct and indirect effects on ROI for consumer markets but not industrial markets. They speculated that the decreases in direct and manufacturing costs (as opposed to the increases hypothesized) may have been due to managers adopting strategies to mitigate any anticipated negative effects of the additional operating complexities associated with increases in product line breadth. Kekre & Srinivasan also found that (i) increases in quality were associated with increases in market share, relative prices, relative direct costs, and manufacturing costs for consumer markets and increases in relative prices and reductions in manufacturing costs for industrial markets; and (ii) increases in capacity utilization were associated with reductions in manufacturing costs.

Ittner et al. (1997) also drew upon literature regarding trade-offs between the benefits and costs of

expanding product lines (Lancaster's (1990) review of marketing research that argued that gains in revenues from expanding product lines should outweigh related increases in costs "... through spatial preemption of competitors, complementarities between products, consumer differences in preferences, and increased probability of product success" (Ittner et al., 1997, p. 147); Quelch & Kenny's (1994) counterarguments that expanding product lines too much can reduce revenues by weakening product line logic and brandy loyalty and image, and fragmenting marketing efforts (Ittner et al., 1997, p. 147)). Specifically, they examined the extents to which commonly used operational measures were associated with the classifications in Cooper and Kaplan's (Cooper, 1990; Cooper & Kaplan, 1991a, 1991b) manufacturing overhead cost hierarchy and increases (decreases) in revenues offset related increases (decreases) in costs in a manufacturing context. They used data from a manufacturer of outdoor packs, where each product line contained a wide variety of innovative, high-quality products.

- Ittner et al. used principal components analysis to determine the extent to which 14 operational measures related to production volumes, numbers of parts, numbers and sizes of batches, product offerings, and purchase volumes loaded onto factors that could be interpreted as reflecting unit-level, batch-level, and product-sustaining activities. Eight measures loaded highly onto a *unit-level factor*, two onto a *batch-level factor*, and five onto a *product-sustaining factor*, where the factor solution explained 80% of the variance in the measures. Several measures had relatively high loadings on more than one factor, indicating interdependencies between the measures and factors.
- When Ittner et al. regressed *costs* in each of six production cost pools and eight support cost pools on the factor scores for the three principal components, they found that (i) the three factors explained up to 67% of costs; (ii) the volume-related (unit-level) factor explained *most* of the variation in costs for all six production cost pools and for three of the eight support cost pools, as well as total costs; and (iii) the batch-level and product-sustaining factors also had positive effects on kitting costs, the batch-level factor had a positive effect on procurement costs, and the product-sustaining factor had positive effects on general and administrative costs as well as total costs. These results are not as strong as many others. Although Ittner et al. (1997) had compelling reasons for employing principal components analysis, their results may reflect some

loss of information and regression toward means. The factor solution explained 80% of the variation in the original measures, leaving about 20% of the information lost. Also, the factor loadings represent average relationships across 41 months of data for their sample firm, so computing factor scores would entail regression toward means.

- When Ittner et al. regressed gross revenues and profits on the three factor scores, they found that (i) the four variables explained 77% of the variation in revenues and 47% of the variation in profits; (ii) the unit-level and product-sustaining factors were positively associated with revenues; and (iii) the batch-level factor was positively associated with profits. They concluded that, on average, increases in revenues associated with increases in sales volume and product line breadth were offset by increases in unit-level, batch-level, and product-sustaining costs (Ittner et al., 1997, p. 159).
- They also concluded that managers need to consider the interdependencies between cost hierarchy levels when making decisions (Ittner et al., 1997, p. 161).

Banker et al. (1997) investigated the extent to which three structural drivers had significant impacts on revenues as well as costs and increases (decreases) in costs offset related decreases (increases) in revenues. They drew upon arguments by (i) Skinner (1974) that increases in product variety lead to increases in manufacturing complexity, which, in turn, lead to increases in the consumption of resources; (ii) Porter (1985) that firms that choose to pursue product differentiation strategies by providing product variety to consumers increase operating complexity and costs and must therefore earn price premiums that are high enough to compensate for those incremental costs; and (iii) Shank (1989) that managers need accurate estimates of product costs and models of the underlying relationships between cost drivers and product costs so that they can understand and manage the trade-offs between the benefits of providing product variety to consumers and the costs of the resulting operating complexities. Thus, Banker et al. recognized that, over the long term, as managers choose business strategies, they make fundamental choices regarding product markets and designs, operating strategies and marketing strategies which they believe will support their business strategies, and so choose characteristics of operations (scale, scope, complexity, distribution channels, and so forth) which constitute structural cost drivers.

Drawing upon the emerging strategic cost analysis and management literature from accounting and economic literature regarding production and cost

functions, Banker et al. developed and estimated a cost function for the commercial banking industry that incorporated three categories of structural cost drivers: scale, scope, and product line complexity. Drawing upon arguments and empirical evidence from Kekre & Srinivasan (1990) that there are (i) economies associated with product variety (scope) when products are related, in the sense that they can use common resources and capacities more efficiently than if they are produced separately, and (ii) diseconomies associated with product variety when products are not related and therefore joint production increases coordination costs, Banker et al. distinguished between variety *between* bank product lines and *within* bank product lines. They hypothesized that variety between product lines would be associated with diseconomies of scope but compensating increases in revenues, while variety within product lines would be associated with economies of scope but decreases in revenues due to competition. Banker et al. used the US Federal Reserve System Functional Cost Analysis data to estimate cross-sectional functions for 11 yr. They regressed operating costs, net revenue before operating costs, and net operating income before taxes on the measure of scale, four measures of scope, and three measures of complexity (batch size, transactions intensity, and the complexity of service delivery systems (branches)) and found:

- With respect to operating costs: (i) the scale, scope, and complexity drivers explained 38–55% of the variation in operating cost efficiency; (ii) diseconomies of scale obtained for the first 3 yr and economies obtained for 6 of the later 8; (iii) diseconomies of scope obtained for both categories of variety between product lines and economies obtained for both categories of variety within product lines for all but 1 yr; and (iv) the number of accounts relative to total assets (smaller batches) and operating costs were positively related for 9 of the 11 yr, and transactions intensity and branch complexity were positively related to operating costs for all 11 yr.
- With respect to interest and fee revenues: (i) the scale, scope, and complexity drivers explained 24–62% of the variation in revenue-generating efficiency; (ii) scale was positively associated with revenue generating efficiency in 5 of 11 yr and negatively in 1 yr; (iii) variety between unrelated product lines for asset and deposit portfolios was positively associated for all but 1 yr and variety within product lines was negatively associated for 6 yr; and (iv) smaller batch sizes were associated for

7 yr, transactions intensity positively associated for all years, and branch complexity positive for 4 yr.

- With respect to net income before taxes: (i) the drivers explained 1–37% of the variation in net income; (ii) the diseconomies of scale in the first 3 yr were more than compensated by revenues; (iii) diseconomies of scope between unrelated asset portfolios overwhelmed offsetting net revenues in 3 yr but diseconomies between unrelated deposit/liability portfolios were more than compensated by net revenues; (iv) diseconomies of scope for related asset portfolios were more than compensated in 2 yr and not compensated in 1 yr and for related deposit portfolios were more than compensated in 3 yr and not compensated in 4 yr; and (v) costs associated with transactions intensity were more than compensated in 3 yr and costs associated with channel complexity were less than compensated in the first 6 yr.

From a theoretical economic perspective, in equilibrium, or for the economic profit-maximizing levels of any given driver, the marginal revenues and costs associated with the driver should be equal, all else held constant (Banker et al., 1997). But, where economic profits are driven to zero, there should be positive accounting profits, reflecting the economic costs of a positive return on owners' investments. Economic theories model behavior as if rational decision makers move by trial-and-error learning toward equilibria where marginal benefits equal marginal costs or decision-makers satisfice. One should not expect the data to reflect equilibria but instead deviations from equilibria. As a result, it is not clear whether some of the weaker results in Ittner et al. (1997) and Banker et al. (1997) reflect from suboptimal decision-making, real-world trial-and-error deviations from equilibria, or markets driving profits toward zero, or incorrect specifications of cause-and-effect relationships.

### 3. Findings and Directions for Research

#### 3.1. Cost Driver Relationships

Although production and sales volumes may be the primary variables that drive costs in the short and long runs, variables other than production and sales volumes that represent managers' most fundamental, strategic decisions/choices also drive costs. When researchers estimated cost functions that contain both volume-based and operations/complexities-based drivers, product and process design characteristics and/or complexities, measures of the types of transactions proposed by Miller & Vollmann (1985), factor scores capturing unit-level, batch-level, and

product-sustaining activities, and/or structural and executional drivers, they have found that (i) the drivers explained moderate to high proportions of the variation in overhead costs, (ii) volume/unit-based drivers often had the most highly significant positive coefficient estimates, and (iii) a few, some or almost all of the other drivers had significant coefficient estimates in the hypothesized directions. Necessary compromises in terms of methodology may explain some of the less significant results. Adding operations- and/or complexity-based drivers to models often added significantly to the explanatory power of the models, enough that some researchers concluded that models containing only volume-based drivers were misspecified and involved omitted variable bias. Finally, both volume- and operations/complexity-based drivers had high levels of managerial or economic significance.

Thus all of the frameworks for organizing cost drivers exhibit some descriptive validity. (However, the parts of Cooper and Kaplan's hierarchy that cover stages of value and supply chains other than manufacturing have not been subjected to model-based empirical analysis.) Also, these results have obtained in a variety of manufacturing contexts as well as in the contexts of air transportation, commercial banking, and hospital services, collectively providing evidence of generalizability. All of the studies upon which these conclusions are drawn were carefully designed, executed, and reported. When researchers found that only some of their hypothesized drivers had significant coefficients, the patterns of significance generally made sense within the specific contexts of their models and estimation methods, and issues involving construct validity, measurement, sample size, and aggregation clearly made a difference in the researchers' abilities to draw conclusions. Perhaps more importantly, researchers have rarely found statistically significant results that have run counter to their hypotheses. Instead they have found instances of insignificant or only weakly significant results.

However, each set of results, whether it relates to the descriptive validity of one of the frameworks for organizing cost drivers or drivers in a single industry, is based on a small number of context-specific studies, often just one or two, that provided empirical evidence for each of the points underlying the summary above. Also, the underlying theories clearly posit cause-and-effect relationships, but much of the research primarily establishes associations between costs and drivers. (Of the 15 studies positing causality and summarized in Tables 2 and 3, six employed path analysis to estimate causal models or estimated

simultaneous equations models.) Thus one could conclude that “the results are still a bit mixed” and there is a need for more research to accumulate a broader, more solid body of empirical evidence to support and refine the underlying theories. It also seems that there is a need for a synthesizing, organizing taxonomy of cost drivers that combines and reconciles the differing frameworks. But that taxonomy must also take into account value, revenue, and profit drivers.

*3.2. Value, Cost, Revenue, and Profit Driver Research* Kekre & Srinivasan (1990), Ittner et al. (1997), and Banker et al. (1997) made particularly important contributions because their models recognized that the decision variables that drive costs are also, or more originally, variables stemming from fundamental managerial choices regarding business strategy, product markets, and product designs, and so customer value, cost, revenue, and profit drivers. Their studies provide at least some model-based, empirical evidence regarding trade-offs between the benefits of product line breadth or variety in product markets and related costs of product line and manufacturing complexities. However, there are only three studies in three contexts; none of the models estimated explicitly incorporates a measure of customer value,<sup>7</sup> and no management accounting researchers have tried to develop a more comprehensive framework for the way that drivers, value, costs, revenues, and profitability are related. Shank (1989) and Shank & Govindarajan (1989, 1993) have contributed the most.

Shank (1989) and Shank & Govindarajan (1989, 1993) tried to ground their strategic cost analysis and management frameworks tightly and explicitly in Porter's (1980, 1985) economic, strategic management framework (as well as other strategic management theories) and thereby tried to provide a stronger conceptual/theoretical base and more managerially relevant theoretical base for management accounting research and practice. In doing so, they argued that cost behavior should be understood as a function of strategic choices (decision variables) and should encompass analysis across the entire value chain. Although contemporary management accounting researchers take business, marketing, and operating strategies into account to a considerably greater extent than they did prior to the 1980s, it is not clear that Shank and Govindarajan's (Shank, 1989; Shank & Govindarajan, 1989, 1993) particular

theoretical framework, or any other framework, has taken hold.

### *3.3. Taxonomy of Value, Cost, Revenue, and Profit Drivers*

Although the notions of structural and executional cost drivers have taken hold with or been investigated by some researchers and Cooper and Kaplan's (Cooper, 1990; Cooper & Kaplan, 1991a, 1991b) activity-based hierarchy has taken hold with or been investigated by others, there still is no single clearly agreed upon unifying taxonomy of fundamental drivers or theory regarding the relevant underlying relationships. Moreover, in empirical management accounting research, there is only a beginning recognition of the extent to which these drivers more fundamentally represent strategy and product design choices that create customer value and therefore drive costs, revenues, and profitability (three studies), or represent interdependencies and are determined endogenously and jointly as opposed to exogenously and independently.

Such a taxonomy could be organized around the cause-and-effect relationships between generic business, marketing and operating strategies, and value, revenue, cost, and profit drivers depicted in Fig. 1. It corresponds most closely to the frameworks underlying Shank and Govindarajan's (Shank, 1989; Shank & Govindarajan, 1989, 1993) arguments and relates to value-creation business models such as underlying the balanced scorecard (Kaplan & Norton, 1996).

This model treats the choice of a business unit strategy, for example, Porter's (1980, 1985, 1996) low-cost leadership or product-differentiation strategies, as the most fundamental choice that managers make. That choice, in turn, influences choices regarding marketing strategies, for example, regarding segmentation, targeting, and positioning (Kotler & Levy, 2005), organizational structure (Milgrom & Roberts, 1992, 1995), and technology, including operating strategies regarding, for example, product quality, flexibility, and delivery, which all must be aligned with the generic business strategy.

The business unit and marketing strategies and associated consumers' tastes and preferences, wants and needs, in turn, determine specific *product design characteristics* which create value for customers and so drive costs, revenues and profitability. Product design characteristics may be defined broadly and include, for example, design quality (features) and product line breadth, as well as specific product design characteristics in the engineering sense, as in

<sup>7</sup>In the absence of the type of data required, perhaps customer value could be treated as a latent variable in a structural model.

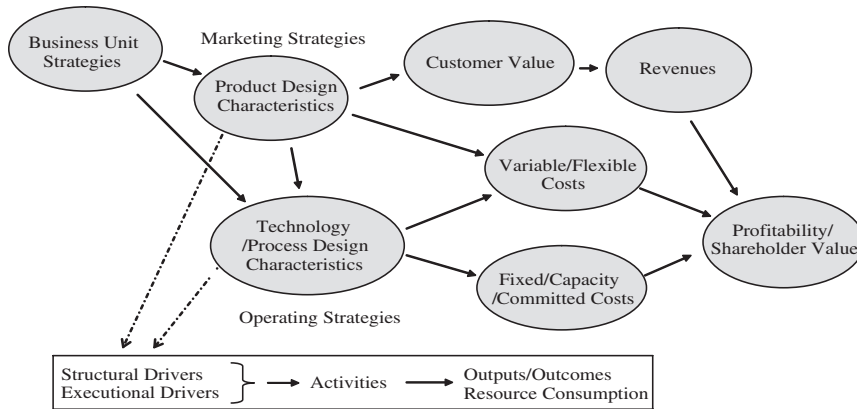


Figure 1. Relationships between business unit strategies and value, cost, revenue, and profit drivers.

Banker et al. (1990) and Datar et al. (1993).<sup>8</sup> These are driven by anticipated/understood customer needs and wants, and, in turn, drive revenues (by generating new customers, generating customer loyalty and retaining old customers, influencing selling prices in conjunction with product market economics, and generating market share and power/leverage) and variable/flexible costs. *Customer value* can be defined in terms of economic theory, as the difference between *willingness-to-pay* and market price (consumer surplus).

The business unit strategy, marketing strategies, and product design characteristics in turn drive choices regarding *technology*, *organizational structure*, and *operating strategies*. Technology is meant to be defined broadly, as in economics where technology encompasses all of the characteristics of organizational structure and production processes (or *process design characteristics*), all of the policies and procedures pursued and resources used (and, in that sense, operating strategies), not just a specific form of automation.

The specific product and process design characteristics in turn determine/drive costs; however, they are classified (variable versus fixed, flexible versus capacity and committed, or structural and executional, or according to an activity-based hierarchy across the value chain). *Product design characteristics* influence two structural cost drivers, scope (or product line

breadth or variety) and product line complexity. *Technology* or *process design characteristics* encompass all of the structural cost drivers outlined by Riley (1987) and advocated by Shank (1989) and Shank & Govindarajan (1993) (scale that entails capacity, scope, product line complexity, technology, and experience) as well as all of the executional cost drivers (quality management, plant layout efficiency, capacity utilization, continuous improvement programs, and linkages with suppliers and customers over the extended value chain or supply chain). These drivers are conceptual in nature and broadly/generally defined constructs, which span the entire value chain and in turn cause/drive *activities* which in turn can be generally classified using Cooper and Kaplan's (Cooper, 1990; Cooper & Kaplan, 1991a, 1991b, 1998; Kaplan & Cooper, 1998) activity-based hierarchy,<sup>9</sup> which in turn cause *outputs and outcomes* and *resource consumption*. Thus the Cooper and Kaplan hierarchy is a useful tool for structuring ABC and management systems in the sense of choosing cost pools and drivers. However, the activities and costs incorporated in the hierarchy are outgrowths of/driven by more fundamental choices regarding strategy, product and process design, and structural and executional drivers. Porter (1996) emphasized the importance of making trade-offs in choosing strategies, of choosing strategies which are distinct from those of competitors, tailoring activities to the selected strategy, and of achieving and sustaining competitive advantage by creating unique, integrated, mutually reinforcing sets of activities across segments of the value chain which are difficult for competitors to imitate.

<sup>8</sup>Jones & Flint (1995) describe an engineering model, based on case research, of the ways in which engineering design characteristics treated as exogenous by Datar et al. (1993) are actually endogenous in the sense that they are determined by customers' needs and wants and determined iteratively through models and analyses that take into account alternative sets of characteristics and production technologies.

<sup>9</sup>This hierarchy basically encompasses the logistical, balancing, quality, and change transactions framework introduced by Miller & Vollmann (1985).



Differences between revenues and costs, and the relationships between these and the economic values of the assets employed, determine profits, return-on-investment, and other measures of profitability and shareholder/owner value.

This discussion reconciles many of the drivers included in the frameworks summarized in Table 1. However, the set of cost drivers that Porter (1985) initially discussed is broader and more encompassing than Riley's (1987) taxonomy of structural and executional cost drivers. One could argue that Porter's (1985) *learning and spillovers* are at least roughly equivalent to Riley's (1987) *experience*, and that Porter's (1985) linkages with other business units within the firm fit within an extended value or supply chain, and geographic locations fit within a broad definition of technology and marketing and operating strategies. *Timing*, for example, for first and late movers, could be considered an executional driver. Porter (1985) also includes institutional factors such as regulation, tariffs, and unionization. Over the long run, managers make strategic choices subject to the constraints involved and seek to make changes to ease those constraints or to work more effectively and efficiently within them.

Strategy formulation and implementation is an ongoing, iterative, evolutionary process. Therefore, although this discussion and Fig. 1 indicate a sequence of importance and causality in decision-making, beginning with strategy and ending with profitability and shareholder value, it can be modified to incorporate causality and feedback loops, mutually reinforcing effects, and/or the enabling/constraining effects of management accounting information/planning and control systems.

### 3.4. Endogeneity and Simultaneity

At the beginning of the paper, we concluded that Kaplan (1983) was implicitly arguing that (decision) variables other than volume drive costs, as well as long-run profitability, and therefore management accounting research should be based on models of cost structures that incorporate variables representing product and process design characteristics and should do so in a manner which treats them as endogenous rather than exogenous. We also noted that, in discussing cost driver analysis, Shank (1989) and Shank & Govindarajan (1993) argued that understanding cost behavior requires understanding "the complex interplay of the set of 'cost drivers' at work in any given situation" (Shank, 1989, p. 55) and contrasted this to the independence and mutually exclusive partitioning reflected in traditional cost accounting

systems and the design of ABC systems that was emerging at the time, and as characterized by Norreen's (1991) stylized model of a "well-specified" cost accounting system. Contemporary ABC systems exhibit these same characteristics.

Several researchers have recognized that many costs and revenues, as well as some of their drivers, involve simultaneous relationships, that is, they are, or should be, simultaneously or jointly determined by managerial decisions and/or external forces. When this is the case, it is important for researchers to develop models that capture the rich, underlying complex set of hypothesized relationships, to the extent feasible, and to use appropriate econometric techniques to estimate the models. (In a representative model, one or more of the variables that are endogenously determined in one equation would be treated as exogenous in another equation.) Otherwise, researchers will not be able to estimate both the direct and the indirect effects of the exogenous variables on the endogenous variables, and the parameter estimates may be biased and inconsistent (Greene, 1990; Judge et al., 1985). Ittner & Larcker (2001) have drawn similar conclusions with respect to the broader field of empirical management accounting research<sup>10</sup> and discussed the practical as well as theoretical problems involved in estimating simultaneous equations models in management accounting research contexts.

This raises engaging issues and challenges for academic empirical researchers and should yield fruitful results. However it also raises serious questions about the potential biases involved in models discussed in management and cost accounting textbooks and employed in practice, for example, in the development and application of ABC and management systems and development and estimation of models underlying value-creation models and balanced scorecards.

<sup>10</sup>Ittner & Larcker (2001) have called on management accounting researchers to develop and estimate models that incorporate both direct and indirect effects of drivers, incorporate contingency factors that moderate relationships between drivers and outcomes (and therefore may affect the relative importance of specific drivers in specific contexts), contain more executional cost drivers that some hypothesize are potentially more important than structural drivers because they may be more difficult for competitors to duplicate (Ittner & MacDuffie, 1995; Ittner et al., 1997), contain drivers that span the extended value chain, and capture the potential of managers to make better decisions given access to improved information (or the potential for organizational performance to improve).

### 3.5. Theory Development and Testing

Ittner & Larcker (2001) have criticized the early cost driver research as being motivated too heavily by arguments oriented toward practice, toward arguments from operations management and ABC rather than economics, operations research, or other behavioral sciences. Also, Ittner & Larcker (2001) and Zimmerman (2001) have concluded that the broader field of empirical management accounting research has not yet produced an integrated, substantive body of theory-based knowledge.<sup>11</sup> We believe that management accounting research should be motivated by both theory development and practice and that there is a need for more modeling and empirical research which explicitly incorporates *managerial decision-making* and its effects on customer value, costs, revenues, and profitability. (For example, in the face of capacity-related transactions costs, managers may choose to maintain unused capacity and wait to gather more information regarding trends in demand before reducing capacity (Anderson et al., 2003); or, as discussed by Anderson (2001), in response to control systems that focus on measures of capacity utilization, managers may manage set-ups and capacity utilization to mitigate the effects of increased operating complexity on product quality and production efficiency.) Anderson (2001), Anderson et al. (2003), Balakrishnan et al. (2004), and Banker et al. (2005) have begun to develop and estimate models in which managerial decision-making explicitly underlies their hypotheses, although the variables which capture the hypothesized effects constitute outcome measures consistent with the hypothesized decision-making, as opposed to managerially reported indicators of decisions being made.<sup>12</sup> These studies represent steps in a promising direction.

<sup>11</sup>Zimmerman (2001) called upon empirical management accounting researchers to ground their models more explicitly in economic theory and test more economics-based hypotheses. Ittner & Larcker (2002), Luft & Shields (2002), Lukka & Mouritsen (2002), and Hopwood (2002) argued, as we do, that management accounting researchers should draw upon a combination of economic and behavioral/social science theories in generating and testing hypotheses.

<sup>12</sup>Anderson et al. (2003), Balakrishnan et al. (2004), and Banker et al. (2005) tested a series of hypotheses involving managers' decisions to ramp up or reduce production capacity, depending upon the availability of slack capacity, the costs of increasing or decreasing capacity, and their estimates of underlying trends in demand and expectations regarding future demand. All found empirical evidence consistent with their hypotheses.

Also, management accounting researchers who have been developing and estimating cost, revenue, and profit driver models have been drawing upon the economic theories of production and costs to motivate their models, particularly with respect to economies of scale and scope, and estimating functional forms which are inherently nonlinear but linear in logarithms. However they have not begun to employ theoretical economic models and the associated parametric and nonparametric techniques for estimating these models to the extent possible, and, as a result, have not been able to develop and test their theories to the extent possible. (An exception, Banker et al. (1997), reported the results of a linear model but also estimated their model using a translog cost function to demonstrate the robustness of their results.) Economic production and cost functions represent frontiers (as opposed to average relationships) that are based on the assumption of cost minimization and profit maximization by rational managers, are generally nonlinear, and incorporate parameters to capture economies and returns to scale, economies of scope, and technical and allocative efficiency (constructs that relate directly to structural and executional cost drivers). These economic models also capture some endogeneity and interdependencies between drivers in the sense that they are derived and estimated in a manner that treats input quantities or their costs as endogenous and jointly determined. (Estimating such models as, for example, *seemingly unrelated regressions* (Zellner, 1962) would yield efficiency gains in parameter estimates when drivers differ between equations and contemporaneous error terms are correlated.) However, the economic frontier models are derived holding all else about technology constant, so they would have to be adapted to handle heterogeneity between units of analysis, for example, in terms of strategic choice variables such as product and process design characteristics. If  $z_i$  captures a vector of such technology characteristics as they pertain individually and/or jointly to products  $i$ ,  $i = 1, 2, \dots, k$ , then it seems that the models would have to be adapted to incorporate costs  $c(q_1(z_1), q_2(z_2), \dots, q_k(z_k))$  where  $q_i$  indicates the quantities of products, each with its own characteristics  $z_i$  and revenues  $r(q_1(z_1), q_2(z_2), \dots, q_k(z_k))$ .

## 4. Concluding Remarks

The added conceptual and technical challenges involved in developing and estimating models that incorporate strategic choice variables, economic frontiers, simultaneous equations, and endogeneity ultimately raise serious questions regarding teaching

and practice. In the past, management accounting researchers have reconciled their approaches to economic models by specifying input, cost, and revenue functions that are *separable, additive, and linear* (by specifying the *relevant range* over which the assumptions regarding linear relationships hold, a range within which constant returns-to-scale would obtain, and conditions under which there would not be substitution between inputs). Textbooks highlight these assumptions so that managers will be less likely to overlook them and draw erroneous conclusions (for example, in cost-volume-profit analysis or ABC). This reconciliation *may* still be reasonable for short-term, tactical decision-making contexts. However, for long-run strategic decisions, it *cannot* be reasonable, because managers are much more likely to consider changes which violate assumptions regarding linearity, independence and substitutability. Noreen (1991) and Noreen & Soderstrom (1994, 1997) have argued that managers can mistakenly employ average costs estimated from activity-based models instead of marginal costs when making product-related decisions, and Noreen & Soderstrom (1994, 1997) have found preliminary empirical evidence that average costs tend to exceed marginal costs in the context of hospital services. Also, as Shank & Govindarajan (1993) have argued, existing ABC systems reflect existing business strategies, but strategic analysis requires re-evaluation and reformulation of strategy, often subject to considerably different technologies, structural and executional drivers, and activities. It would seem then that the problems involved in reconciling the cost and profit driver models that we teach with the models that we know we should be developing and estimating are exacerbated when we incorporate strategic decision variables, customer value, cost, revenue, and profit driver relationships into our models.

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# Analytical Modeling of Cost in Management Accounting Research

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**Abstract:** The advantage of analyzing the highly complex economics of a firm by means of a model is the simplicity of the model. Historically models of cost have developed from simple models under certainty to models incorporating uncertainty and strategic behavior. Models of cost are constructed with either a product cost focus or a stewardship focus. As the focus of the problem changes the model changes dramatically as some dimensions are highlighted and others are dimmed. This represents the challenge of the model constructor. The chapter will illustrate these facets of building and using analytical models for analysis of cost.

## 1. Introduction

In this chapter we provide a systematic introduction to some key issues and challenges encountered and confronted in formal models designed to address and inform core managerial accounting issues. The chapter is not meant to provide a comprehensive review of the analytical literature on costing in managerial accounting or to be exhaustive in terms of topics. The vastness of the area alone precludes us from pursuing such objectives. Instead we hope, by giving a thorough yet accessible introduction to the issues detailed above, to provide a jumping off point to those interested in familiarizing themselves with the formal managerial accounting literature as well as individuals intent on contributing to it.

The chapter starts out with a discussion of modeling cost. A cost model is viewed as a representation of the underlying economic structure of the firm. This is a rather complex problem and a demand for simplification is evident. We discuss a series of simplifications focusing on different aspects of problems related to models of cost. This series is then also the models we are going to present in the remaining sections. First, the cost function of a multiproduct firm is presented. The framework for this is economics under certainty. This is an important model of cost as it serves the purpose of guiding decisions in firms. In addition to that it serves as a point of reference in the subsequent section when the accounting cost structure for the same firm is introduced.

The accounting constructs are used for decision making as a substitute for the underlying economic counterpart. With the economic point of reference we are comparing different accounting systems to see which is best able to simulate the economics of the firm. Cost-allocation issues are used as examples of accounting systems. Thus our analysis mirrors the debate on Activity Based Costing (ABC). We focus on one cost statistic: the marginal cost in a multiproduct firm.

In Section 4 the analysis is carried out in a decision context under the heading of accounting and efficiency. Then the decisions are endogenous to the analysis. The accounting numbers are used for decision making and the units are seeking to maximize accounting profit. The analysis reveals that control is an important element in this problem. Thus we are able to get some insights from the analysis of this model about the connection between the accounting system and the structure of the economics. However, to get additional insights the model of cost has to be developed further.

The subject for the subsequent section on modeling is control problems. The analysis in this section migrates into a completely different model as uncertainty, differential information, and lack of goal congruence are assumed. The agency model forms the basis for the analysis. This leads to fundamental insights into when information is useful for control purposes and the well-known controllability principle

is reinterpreted. This line of analysis can be extended to participative budgeting, transfer pricing, and cost management. In a subsequent section conclusions are offered.

## 2. Modeling Cost

An analytical model of cost means a formal representation of economic consequences of resource consumption in an organization. In general there is duality between the real object and the representation thereof in a model. Consequently, we have to explore the differences between the real object and its formal representation when we want to analyze the properties of any given model. This is by no means simple as it entails both a representation of the real object and the model thereof!

In most textbooks and in the early writings on ABC accounting,<sup>1</sup> cost analysis is restricted to an accounting model of the firm. Then, different accounting models can be compared simply by looking at the result in terms of, for example, the product cost representations. If the resulting costs are different for two alternative systems, the more complicated system (it is argued) must be an improvement, as more of the underlying structure is fed into the accounting model. This approach to analyzing, however, is not adequate for drawing such conclusions. The key question that needs to be answered is whether we get a better insight into the real phenomenon, and that question is not addressed by simple reference to complexity. However, as the real phenomenon is always left outside the analysis, we are never in a position to provide a definitive answer to that fundamental question.

Consequently, models of cost eventually migrated into economics of uncertainty. This in turn led to the introduction of the state, act, and outcome paradigm to enter the analysis of cost. Pioneers of this type of cost analysis were Feltham (1972), Demski & Feltham (1976), or Demski (1980, 1994). This paradigm allows for an abstract definition of an information system and for a consideration of the value of an information system. The next logical step then is the comparison of information structures, and thus the work of Marschak & Miyasawa (1968) found its way into accounting. Accordingly, the idea that could be a complete ordering of information systems or accounting systems had to be abandoned. Instead, when comparing accounting systems, a cost-benefit criterion has to be employed. When analyzing models of cost the decision problem must be part of the analysis.

Use of this framework requires a complete specification of the problem, which involves all conceivable states of nature and information structures, all decision problems to be faced by the organization, and a representation of all individuals in the organization. Representation of the decision makers is in itself a major task as the preferences and the information held by each relevant individual have to be included in the analysis. This is an overwhelming task. Consequently, simplification (cf. Demski, 1980) must be the name of the game when modeling cost: for each issue to be addressed it is of central importance to frame the analysis and make the model a minimal representation of the problem under scrutiny. All relevant factors should be included in the model while issues of second-order importance are to be left out. This approach is illustrated in this chapter as part of the analysis.

The chapter unfolds as follows. We start by identifying the fundamental properties of cost functions in multiproduct firms and their relation to the nature of operations as well as problems to be encountered in relation to disaggregation. This analysis is framed in the economics of certainty. This represents the real object. We then turn our attention to accounting models of cost to demonstrate the duality between the real economy and the accounting construction of unit cost. Different accounting systems are represented by different overhead allocation schemes. One has the flavor of an old-type labor-based allocation scheme, another has the flavor of an ABC system as the overhead allocation mechanism mirrors the structure of the production process, and the last has even more flexibility as even more allocation pools are included. This allows the progress in the analysis of the question of which cost system is better. In this section we first detail how aggregation and specification errors interact to generate the specific properties (such as bias and precision) of estimates produced by a costing system. This part of the analysis is limited to properties of accounting numbers versus the real counterpart.

Real accounting problems usually involve the demands of a decision maker and this is introduced next at the cost of a more complicated analysis. We discuss how desirable properties of cost estimates may differ relative to the objective at hand and then demonstrate the different implications of alternative costing errors in relation to two alternative uses of cost information. Here the decision maker is facing a resource allocation mechanism, and the accounting system (again modeled as a cost-allocation mechanism) is used to guide his decisions as the incentives are tied to the profitability measure of divisions. The analysis

<sup>1</sup>Examples of this are found throughout the literature and include Horngren et al. (2006) and Cooper & Kaplan (1998).

provides insights into the relative merits of the analyzed accounting systems and shows an interesting interaction between control and decision relevance of accounting systems. At the same time, though, this analysis also points to the deficiency of this type of model as the control problem is largely left outside.

Finally we therefore turn to the role of cost information in influencing organizational behavior. This introduces the control problem into the analysis and the cost is (yet again) an even more complicated model. Here we rely on the agency paradigm to first provide insights into the nature of the cost of obtaining the desired productive input. Then we investigate the use of other cost information. We examine what constitutes desirable properties of individual as well as a portfolio of performance measures and the determinants of relative importance in (balanced) performance measurement. An implicit cost of using this model is that the precise nature of the decision problem in terms of the production program is less specified. It is often reduced to an abstract action, but then the statistical distribution of the possible outcomes is introduced. The reason for this is again the overwhelming amount of details otherwise required. Indeed, just to perform our simple analysis it is necessary to specify the statistical outcome distributions for all conceivable actions as the optimal control is exercised through an incentive scheme geared to the on- versus off-equilibrium distribution of the outcomes.

We close this section and the chapter by looking at issues related to dissemination of (cost) information in an organization. We focus on the costs as well as the benefits of systems, such as participative budgeting systems, designed to elicit local knowledge and communicate it upward. Similarly, we identify costs and benefits of information systems designed to generate local knowledge, either asymmetrically or through the sharing of information already present higher up in the organization.

### 3. The Multiproduct Firm

The modeling of cost functions has a long tradition, as there has always been a demand for cost information for product quantity decisions, product costing, and performance evaluation. Cost functions are hardly linear as economics of scale and scope are almost the norm. The implication of this for costing and the interpretation of cost statistics are important. The model firm as described in this section is one of a multiproduct producer. For this type of firm we demonstrate (1) how cost can be modeled, and (2) the relation to characteristics of the cost function, which are important in a decision context. This model is in

itself important as it is used to guide decisions. However, we also want to compare it to the accounting cost construct we introduce in the following section and consequently, this section also serves as a point of reference for subsequent analysis.

#### 3.1. The Cost Function Construct

We envision a firm that produces  $m$  products. For this production the firm has  $n$  factors of production available. At this basic level the choice of the firm is to decide the quantities  $\tilde{q} \in \mathfrak{R}^m$  of each of the  $m$  products and determine how to produce this. This again involves deciding upon the combination of the  $n$  production factors  $x$  which will enable the firm to produce these outputs.

The formal representation of this problem will develop in several stages, cf. Danø (1966), Knudsen (1973), or Chambers (1988). First the basic production decision problem is formulated. It is only possible to produce the output quantity  $q$  from the inputs  $x$  if the pair of output and input quantities belong to the set  $T$  or  $(q, x) \in T$ . Often the set  $T$  is characterized through a set of inequalities describing the structure of the production process and constraints,  $Aq \leq f(x)$ , where  $A$  is a matrix and  $q$  and  $x$  are the noted vectors. The function  $f(x)$  describes the production process in terms of transformation of inputs to outputs.

The objective of the firm is to find the output-input combination that results in the maximal profit. The profit maximization program below describes this optimization.

$$\pi(\hat{p}, p) = \max_{q, x} \hat{p}q - px$$

subject to  $Aq \leq f(x)$ ,

$$q \in \mathfrak{R}^m \text{ outputs } (q \geq 0),$$

$$x \in \mathfrak{R}^n \text{ inputs } (x \geq 0).$$

This program balances the input factors with the output. The program uses no notion of a cost function specifying the cost of a single product or a combination of products. Essentially there is no demand for a cost function construct in this formulation.

The cost function is a function that summarizes the factor cost of an efficient combination of input factors at the production level  $q$ . Thus the input factors are only implicitly included in the cost function and the cost function represents an aggregation of the efficient set of inputs in monetary terms. The construction of the cost function takes on the following format:

$$C(q; p) = \min_x px$$

subject to  $Aq \leq f(x)$ .



This cost function enters the production planning as

$$\pi(\hat{p}, p) = \max_q \hat{p}q - \left\{ \begin{array}{l} \min_x px \\ \text{subject to } Aq \leq f(x) \end{array} \right\}$$

or

$$\pi(\hat{p}, p) = \max_q \hat{p}q - C(q; p).$$

The technology of the production process is described by the function  $f(x)$  and a Leontief structure combines the technologies into outputs. With this cost function the notion of marginal cost is well defined and is readily calculated as

$$\partial C(q; p) / \partial q_i = \lambda A_i.$$

This means that there is a linear relationship among the marginal costs of the products. Furthermore, the Leontief coefficients capture the differences in the marginal cost of the products. These are used as weights attached to the marginal cost of each of the production technologies. The Leontief coefficients in turn aggregate the cost of the production factors into marginal cost-statistics using the Lagrange multipliers. With this particular production technology one cost-statistic is used for each of the production technologies to capture the marginal cost of all the products.

### 3.2. More Structure—Introduction of the Service Department

The existence of service departments causes a slightly different structure in the program to determine the cost function. The essential observation is that a service department does not in itself work directly on the product. The relation between the service provided by such departments and the products is only indirect. Figure 1 illustrates this relationship.

Here the construction of the cost function includes an intermediate pool as this only produces factors of

production to be used in the primary production departments.

$$C(q; P) \equiv \min Px \tag{C}$$

subject to:

$$a_1 q \leq f(x_1, x_2, x_3) \quad \text{First pool}$$

$$a_2 q \leq g(x_4, x_5, x_6) \quad \text{Second pool}$$

$$x_3 + x_6 \leq h(x_7, x_8) \quad \text{Intermediate pool}$$

The interesting finding for this cost function is that the marginal cost reflects the production constraints. The technology constraint representing the service department is only indirectly accounted for as the Lagrange multipliers on the two production departments will reflect it. Consequently the marginal cost is calculated as

$$MC_i = \partial C(q; P) / \partial q_i = \lambda_1 a_{1i} + \lambda_2 a_{2i}. \tag{MC}$$

(MC) reveals that this cost function has a particularly simple structure. The two cost statistics  $\lambda_1$  and  $\lambda_2$  contain all the cost information used in calculating the marginal cost for all products. The adjustment factors are the technical coefficients that capture the use of the two primary factors of production. However, the cost function is not necessarily linear in the production. The cost statistics  $\lambda_1$  and  $\lambda_2$  might be nonlinear functions of the quantities produced. Only when all of the functions  $f(\cdot)$ ,  $g(\cdot)$ , and  $h(\cdot)$  exhibit constant returns to scale, can we expect to find a linear relationship between produced quantities and the cost (cf. Christensen & Demski, 1995). It is noteworthy that the intermediate pool only indirectly enters the cost function. Again the cost statistics  $\lambda_1$  and  $\lambda_2$  are instrumental in aggregating this information.

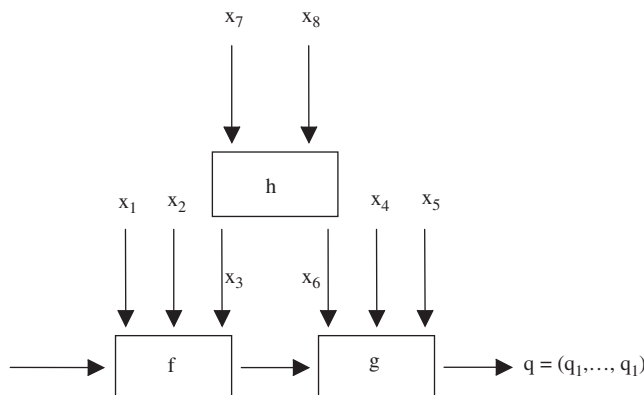


Figure 1. Primary production departments and service department.

#### 4. Accounting Structure

Having characterized the marginal cost of products in various settings, we now superimpose an accounting structure on the setup. Here the question we find interesting is whether the accounting system is able to frame and simulate the economics of the setting. We have chosen to focus on the marginal cost for this exercise as this cost statistic has its obvious application in decisions regarding production quantities. The analysis is framed in the classical economics under certainty and no decision problem is considered. Only the cost statistics are assumed to be of interest here.

The accounting details can be summarized as follows. We assume there are two direct cost categories: direct labor ( $c_L = P_9x_9$ ) and direct material ( $c_M = P_{10}x_{10}$ ). In addition to that there are two direct cost pools: first pool ( $c_1 = P_1x_1 + P_2x_2$ ) and second pool ( $c_2 = P_4x_4 + P_5x_5$ ). Finally the single service department is accounted for as an intermediate pool ( $c_0 = P_7x_7 + P_8x_8$ ). The total cost  $C(q;P) = c_L + c_M + c_0 + c_1 + c_2$  and the direct cost pools are  $C_L(q;P_9) = c_L$ ,  $r_L = c_L/Lq = P_9$ ,  $C_M(q;P_{10}) = c_M$ ,  $r_M = c_M/Mq = P_{10}$ . For the overhead pools we have the total  $C_0(q;P) = c_0 + c_1 + c_2$  and the factor demand is calculated as  $A_j \leq a_jq$ .

Cost allocation is often used to assign the cost to the products in circumstances like the above. We thus have several possibilities available at this point. One is to use a one-pool procedure in which all costs are allocated via a single cost driver such as direct labor. Traditional overhead allocation schemes are of this type. A second possibility is to allocate cost from each of the two primary production departments to the products. Then the cost of the secondary department is allocated to the two primary departments. Following the Leontief structure the allocation is based upon the relative use of the secondary department. This describes a two-stage procedure not unlike an ABC allocation mechanism. Finally we can use a three-pool procedure. Here all department costs are allocated directly to products. In this case there is no natural allocation basis and a mix of labor and material cost is used. For the setting outlined this gives maximum flexibility in terms of cost allocation.

With this structure in place we are in a position to compare the marginal cost to the accounting cost when accounting cost allocation is used. Here the functional form of the cost function turns out to be essential. When the production is characterized by constant returns to scale, the cost functions are all linear in which case the two-pool procedure will be able to replicate the marginal cost for all products simultaneously. When the production is characterized by decreasing returns to scale in just one of the

production units, however, the two-pool procedure will systematically underestimate the cost of all products. The reason is that the cost function is convex for the production unit exhibiting decreasing returns to scale and that leads to the result. The average cost estimated for the decreasing returns unit will be underestimated by the averaging procedure and that carries over to the product cost calculation.

This bias can be alleviated by introducing a modified two-pool procedure. Here the cost for the production department is adjusted by a number which is greater than one. Thus it is possible to get the modified procedure to provide accurate cost estimates for all products simultaneously. When the production exhibits increasing returns to scale, this two-pool procedure will produce product costs that are lower than the marginal cost and a scalar less than one will then be able to repair this uniformly for all products.

Finally we will consider the three-pool procedure. Adding a third cost statistic to the problem surely adds flexibility to the estimation exercise. However, this turns out to be useless. Only when the coefficient attached to the indirect cost pool is set to zero is it possible to get the cost statistics produced by the costing procedure and the marginal cost to be equal. The point is that even though the added cost statistic adds flexibility it is tied to a cost driver that allocates the cost to the products and this cost driver does not capture the differences among the products with respect to their marginal cost. In fact, looking at the characterization of the marginal cost of the products it is observed that the Leontief structure coefficients as expressed by  $a_1$  and  $a_2$  will exactly capture the difference of the products in terms of the marginal costs. Moreover, in addition to these two coefficients only two cost statistics are used to calculate the marginal cost for all products.

#### 4.1. Production Technology and Accounting Structure

The above analysis points to the close connection between the production technology and the cost statistic of interest. The production technology described consists of several layers. One is the production of all the products and how the products interact. In the structure we assumed this is modeled as the Leontief structure, which essentially means that there is no interaction effect among the products. This is a linear and additive production technology. The other layer is the production process. This is the process that transforms inputs into outputs. This is described via the production functions  $f$ ,  $g$ , and  $h$ . Often this is characterized by returns to scale as well as economics of scope. Consequently the firm has an

advantage of producing several products on the same production facility.

The cost estimate of products will contain the consequences of both of the above effects. The cost functions or cost statistics of the individual production process will be combined to result in product cost. Essentially this is a structural estimation procedure that the accounting system produces. The result might be biased as a consequence of deviations from linearity in one or both of the above effects unless adjustments are made for the nonlinearity (cf. Datar & Gupta, 1994). The point is that it is not enough to focus on getting the structure of the production process into the accounting system.

This interaction between accounting system, production technology, and cost estimates has been the subject of analysis in Christensen & Demski (1997). The question of interest is twofold. One is if the accounting system that is aligned to the structure of the production performs better, or more accurately, than other accounting systems. The other question is how the accounting errors are allocated. Throughout, the measure of accuracy that is used is percentage deviation from the accurate marginal cost. The analysis is done both at a system-wide level and at product level.

The analysis of the system confirms that when production technology is linear, the two-pool system is accurate and the product cost statistics all hit the marginal cost. This is the benchmark for ABC accounting systems as noted by Noreen (1991). Once the production technology deviates from constant returns to scale, the two-pool procedure is not accurate any longer and it might even be more accurate to use a one-pool procedure or a three-pool procedure. It is therefore not sufficient to consider the structure of the production process. The economics of production and the interaction among products are determinant of the efficiency of the accounting system. This is an important observation as these two factors often motivate the creation of the multiproduct firm.

At the individual product level the choice becomes even more complicated once the cost functions are not linear. Linear cost functions will again induce no errors in the product cost for a two-pool procedure. With nonlinearity in the production functions the effect on different products will be different. That is, for some products one accounting procedure is preferred while for another product a different accounting procedure is preferred. Thus the choice of accounting procedure will be a matter of where to place the accounting error.

Our analysis shows some of the pitfalls associated with the common intuition that cost pools and multiple-cost drivers lead to an improved costing system.

In a similar vein, Datar & Gupta (1994) demonstrate the existence of tradeoffs attributable to specification errors, aggregation errors, errors in measurement of overhead cost, and errors in measurement of product-specific units of allocation basis. Empirically this has been demonstrated by Anderson (1995). In sum, then, modeling cost is highly circumstantial and requires careful cost benefit analysis.

#### 4.2. Efficiency and Cost Allocation

The next step in our analysis is to consider the efficiency effects of the choice of accounting method when production decisions are at stake. Cost allocation is used to reflect the accounting system and, as often assumed, the nature of the cost allocation might influence the decision making of the divisions. Much research on this has been framed as accounting for defense contracting, and notable contributions are Rogerson (1992) and Reichelstein (1992).

When the divisional structure of the firm contains several producing divisions, it is often the case that the divisions serve several customers. The trading mechanism regulating the trade among the divisions might be asymmetric in the sense that some products are sold to internal customers while others are sold to outside customers. For the internal customers the price might be determined through a cost-allocation mechanism, while for the external customers the market prices will prevail. This pricing structure might lead to an inefficient resource allocation even though it is part of local optimization in the department.

Assume the same setting as described in the previous section but assume further that some of the products are sold in the open market, while others are sold internally and the compensation for the internally produced products is determined through a cost-allocation mechanism. In this way we refer to one of the products as being sold for profit and the other as being reimbursed.

The central question is as before: how do different cost-allocation mechanisms promote efficiency? First the structure of the production process enters the analysis. As a secondary part the controllability of the use of resources is entered into the analysis reflecting the fact that controls step in when the level of inefficiency increases beyond a certain point. The evaluation of the divisions, again, is assumed to be based upon divisional profit as measured by the accounting system.

The two different allocation mechanisms we consider are those compared in Christensen & Demski (2003b). One is a two-pool procedure like the one that models the structure of the production process. This allocation procedure has a flavor of an ABC

accounting system. The other allocation mechanism is arguably a more traditional method as labor cost per hour is used for allocation of indirect cost. Both allocation schemes are somehow (exogenously) bounded as a control mechanism limits the level of inefficiency.

Returning to our notation assume  $f(\cdot)$ ,  $g(\cdot)$ , and  $h(\cdot)$  exhibit constant returns to scale. Then ABC-based reimbursement leads to no inefficiency. As long as all cost functions are linear, the two-pool procedure will always induce an efficient allocation. The reimbursement will exactly match the resources used for the reimbursed product and consequently there is no way to burden these products with some of the cost from the products sold for profit.

The labor-based cost allocation is an incentive for increasing the labor use for the reimbursed products inefficiently and that leads to a higher fraction of the indirect cost being allocated to the reimbursed products. This leaves the department with a higher profit. Only the controllability of the labor supply to the reimbursed products limits the fraction of the indirect cost that is allocated to the reimbursed products. However, this is the only inefficiency that is associated with this system. The use of the indirect production factors is efficient while the cost minimization objectives with respect to the indirect production factors are not challenged.

The picture changes somewhat, however, once the production functions deviate from constant returns to scale. If the production functions in the primary production departments are characterized by increasing returns to scale, it is optimal to increase the service provided by this department to the reimbursed product and keep the service delivered to the other product efficient. The net result of this is that the unit cost of service decreases and the product sold for profit benefits from this. The cost is carried by the reimbursed products as they are burdened with the consequences of the additional and inefficient production. The bound on this inefficiency is set by the controllability of the use of service.

Decreasing returns to scale in the primary production departments leads to no inefficiency. The only way to get lower production costs allocated to the products sold for profit is by decreasing the production of service. This is, however, not possible in the production technology given the Leontief structure.

When the production technology in the indirect production department is not linear, there are almost always gains to inefficient operation. Increasing returns to scale leads to a higher production level and decreasing returns leads to a lower level of production in the indirect production department. In case of

increasing returns the additional production in the intermediate pool is mainly allocated to the primary pool that comparatively provides most of the services to the product. In this way the inefficiency is allocated to the reimbursed product. In case of decreasing returns to scale the production in the intermediate pool is downscaled. This causes a reduction in the unit cost of service. The primary pool, which mainly services the product sold for profit, is allocated approximately the efficient level of service while the primary pool, which mainly serves the reimbursed product, is getting less service from the intermediate pool. The changed allocation from the intermediate pool is compensated by using other factors of production with the net result that the reimbursed product gets less service from the intermediate pool. This then gets cheaper, which leads to a higher profit in the profit arena.

In summary we find that when the production is not characterized by constant returns to scale, we are likely to find that accounting errors or accounting simplification leads to inefficiencies. If a labor-based allocation mechanism is used, the errors will be confined to the labor cost category. If a more involved accounting system is used, the inefficiency will be found in the use of the indirect factors of production. The choice between these two types of accounting systems then becomes a question of which type of error or inefficiency is least costly or which is easiest to control.

#### 4.3. Costing and Control

The problem at hand gets increasingly complicated once it is acknowledged that accounting cost constructs are used both for decision making and for influencing behavior. Our analysis of cost allocation is a simple example of this. Inefficiency of factor consumption might be observed when different accounting rules are in place and when the decisions are engineered by the accounting cost statistics. This deviation from efficient production is caused by a linear accounting system, which is put in place to allocate the cost to the reimbursed product. This part is descriptive of most accounting systems as they are characterized by linear transformations.

Any deviation from linearity in the production technology makes it possible for the rational department to exploit the inaccuracy of the accounting model to increase the profit of the department. The choice of accounting system then becomes a question of which of the different types of accounting variables are most efficiently controlled. Fair cost allocation is not the center of the game. It is a matter of how accounting variables are part of the firm's overall

control system and the implications of that for the use of cost data for decision making.

The setting of classical economics under certainty is not an adequate framework for analysis of control issues. There is no way of incorporating a suitable allowed level of inefficiency. Assumptions about what headquarters know about the local conditions must be incorporated into the analysis. This means that participants with access to different information sets are part of the problem and must be addressed in the analysis. This leads to the formal introduction of uncertainty. Finally, as suggested by the *ad hoc* analysis of the previous section, strategic behavior of all the agents of the firm is also an important ingredient of the analysis. Thus the control problem of accounting has a fundamental implication for the modeling of cost and one way of addressing this will be demonstrated below. In order to cope with the added complexity introduced by uncertainty, the modeling of cost is simplified on other dimensions. The direct and very descriptive connection to the planning problem is abandoned and replaced by a generic choice of action.

## 5. Modeling of Cost in the Context of Control Problems

To have any hope of understanding the popularity of particular accounting practices as well as what leads different organizations to choose different accounting system designs, one needs to develop a solid understanding of what it is that gives rise to the demand for information: when is a particular piece of information of value to an organization and when is it not? In this part we take a control perspective and address two related issues: how to model the control problem and the related cost, and how to model cost and other accounting information to study its value in relation to the control problem at hand.

The basic Principal-Agent model is the *simplest* possible representation of a hierarchical organization facing a control problem. The model is used to analyze the optimal use of (cost) information to overcome this inherent control problem. In particular, it makes formal and (thus) precise the divergence of individual interest and knowledge that leads to a nontrivial (costly) control problem: one owner per residual claimant (the principal), one worker per manager (the agent), and a contracting horizon of just one “period.”

Obviously this is not descriptive of the “real world,” nor is it meant to be. However, unless we can understand the most simple of organizations, how could we ever (with a clean conscience) claim to understand the more complex ones we come in

contact with? This is the nature of all good theory development: parsimony.

As it turns out, the basic model we will study here has indeed been extended to make it more “realistic” and, as some would argue, more credible. The bad news is that things are complicated enough even when one confines attention to the most basic version of the model. The good news is that once you master the basic model, understanding those extensions becomes fairly easy. Moreover, most of the key insights of the standard model have close counterparts in richer models.

### 5.1. The Cost of Control

The basic Principal-Agent model studies a relationship between the two parties that unfolds as follows:

*First:* The parties enter into a binding contractual arrangement specifying the agent’s compensation (a sharing rule) as a function of all available performance measures.

*Then:* The agent chooses his action to maximize his own utility, taking into account both the positive effect on his expected compensation and the negative implications of doing something he would rather not.

*Finally:* Output is realized, the performance is measured, and the agent is paid according to his contract.

In our treatment of the problem at hand we simplify (with limited loss of generality) matters by assuming that the principal is risk-neutral and simply values residual output,  $x_i - s(x_i, y_j)$ , where  $x_i \in \{x_1, \dots, x_N\}$  is the jointly observable economic output produced,  $y_j \in \{y_1, \dots, y_M\}$  is some jointly observed accounting measure, for example, a product cost metric, and  $s(x_i, y_j)$  is the benefits that accrue to the agent as (potentially) determined by the realized values of these two measures.

The agent is assumed risk-averse by the strictly increasing and strictly concave function  $U(s(x_i, y_j))$ , while the source of diverging interests is introduced by the agent’s aversion to supplying productive input. We simplify matters here by assuming the agent’s choice is between two different actions (“high” or “low”) so that  $a \in \{a^l, a^h\}$ , where  $a^h$  is the action desired by the principal. The agent’s aversion towards this particular action is captured through the additional personal cost,  $V(a^h) - V(a^l) \equiv V > 0$ , which the agent incurs when taking this action.

The desirability to the principal of the high  $a$  must be a result of the implications of  $a$  for expected output. This is captured by assuming that the probability distribution,  $p(x|a)$ , is “shifted to the right” in the sense of first-order stochastic dominance when the agent chooses  $a^h$  rather than  $a^l$ .

To round things off we assume, at least initially, that  $p(x_i|a) > 0$  for all  $x_i \in \{x_1, \dots, x_N\}$  and both actions. The relation between  $x$  and  $y$  as represented by  $p(x_i|y, a)$  will be discussed later. Indeed, as the next subsection is dedicated to desirable properties of cost information, in this section we suppress  $y$  entirely and concentrate on solving the control problem using only  $x$ . For now, the notation simplifies a bit as  $s(x_i, y_j) \equiv s(x_i)$ . Finally, throughout it is assumed that the agent has outside opportunities that he values (in utilities) at  $\underline{U}$  and that the agent is unwilling to take any position that does not guarantee him at least that level of (net) utility.

With this particular structure the purpose of the contract is twofold. First, it must guarantee that the agent finds it acceptable (under the implicit assumption that the principal does better with than without the agent). Second, it must solve the control problem in that it provides the agent with the incentives to actually deliver  $d^h$ . At the same time the principal's reason for employing the agent in the first place is to maximize his own residual. Formally, all of this can be achieved by solving the following optimization program:

$$\begin{aligned} \max_{s(x)} \quad & \sum_{i=1}^N [x_i - s(x_i)] p(x_i|d^h) \\ \text{s.t.} \quad & \sum_{i=1}^N U(s(x_i)) p(x_i|d^h) - V(d^h) \geq \underline{U} \end{aligned} \quad (IR)$$

$$\sum_{i=1}^N U(s(x_i)) p(x_i|d^h) - V(d^h) \geq \sum_{i=1}^N U(s(x_i)) p(x_i|d^l) - V(d^l) \quad (IC)$$

The (IR) (for “individual rationality”) constraint simply states that the contract must provide the agent with an expected utility net of his personal cost of taking high effort that at least meets his opportunity cost of not exercising his best other outside option. In general the (IC) (for “incentive compatibility”) constraint is a bit of a troublemaker. Fortunately, however, with our simple problem of getting the agent to choose one particular action out of only two available, things become pretty straightforward. Here (IC) simply states that the agent must be at least as well off when making the “right” choice ( $d^h$ ) as if he was to make the “wrong” choice ( $d^l$ ) instead.

The solution for  $s(x_i)$  can be obtained using the standard optimization technique and forming the Lagrangian, and reorganizing the first-order condition w.r.t.  $s(x_i)$  to obtain

$$\frac{1}{U'(s(x_i))} = \lambda + \mu \frac{p(x_i|d^h) - p(x_i|d^l)}{p(x_i|d^h)} \quad (1)$$

where  $\lambda$  and  $\mu$  are the Lagrange multipliers on the (IR) and the (IC) constraint, respectively, and the ratio multiplying  $\mu$  is the so-called likelihood ratio. The left-hand side is the ratio of the principal's to the agent's marginal utilities; the principal's being one due to our assumption that he cares only about the expected residual and not about risk, while the agent's is represented by  $U'(s(x_i))$ —the first derivative of  $U(s(x_i))$ —which is strictly positive.

The question now is “how does the cost of control manifest itself in eq. (1)?” The answer is through  $\mu$ . The reason is that the control problem here is only costly if it forces the parties to write a contract that deviates from optimal risk sharing. With the principal risk-neutral, optimal risk-sharing occurs when the principal bears all the risk and  $s(x_i)$  is therefore constant across all output realizations. Since the likelihood ratio is *not* constant—if it was, the agent's action would be without impact—the right-hand side is constant if and only if  $\mu = 0$ .

For the case where the principal is risk-neutral (i.e., our case) there is a nice proof in Jewitt (1988), showing that as long as the principal wants more, the constraint on effort supply from the agent is binding and  $\mu > 0$ . This implies that obtaining control is indeed economically costly. Translated to our discrete setting, the proof proceeds as follows. Simply rearrange (IC) and eq. (1) appropriately and substitute for  $p(x_i|d^h) - p(x_i|d^l)$  in eq. (1). Then rearrange again to obtain

$$\begin{aligned} \sum_{i=1}^N U(s(x_i)) \left( \frac{1}{U'(s(x_i))} - \lambda \right) p(x_i|d^h) \\ = \mu [V(d^h) - V(d^l)] \end{aligned} \quad (IC')$$

Since

$$\begin{aligned} E \left[ \frac{p(x_i|d^h) - p(x_i|d^l)}{p(x_i|d^h)} \right] &= \sum_{i=1}^N \frac{p(x_i|d^h) - p(x_i|d^l)}{p(x_i|d^h)} \\ &\times p(x_i|d^h) = 0 \end{aligned}$$

it follows from eq. (1) that

$$\sum_{i=1}^N \left( \frac{1}{U'(s(x_i))} \right) p(x_i|d^h) = \lambda$$

Thus (IC') gives the covariance between  $U(s(x_i))$  and  $1/U'(s(x_i))$ . Since  $V(d^h) - V(d^l)$  is positive, it is clear from (IC) that  $s(x_i)$  cannot simply be a constant. Then, since the functions  $U(\cdot)$  and  $1/U'(\cdot)$  are monotone in the same direction they have a strictly *positive* covariance. Then it follows directly from (IC') that the constant  $\mu$  must be strictly positive.

In our analysis of incentive provision so far we have primarily focused on the use of  $x$ . However, the

key question remains: would we want to use additional variables, such as accounting measures of costs and profits as well, or do we prefer simply to use the most direct measure of value that we can get? Holmström (1979) shows that with very few exceptions we can do better when we have such additional measures at our disposal. The only time where we actually would want not to make use of an additional performance measure is when it satisfies the so-called “sufficient statistic condition” (SSC).

This condition goes like this. Using both  $x$  and  $y$  (instead of  $x$  alone) in the performance evaluation leads to a Pareto improvement, *if and only if* it is not the case that

$$pr(x, y|a) = pr(x|a)pr(y|x) \tag{SSC}$$

We can get most of the intuition for why this is correct by doing a slight rewrite of eq. (1) to accommodate the case where there are two performance measures that the contract can reference:

$$\frac{G'[x_i - s(x_i, y_j)]}{U'(s(x_i, y_j))} = \lambda + \mu \frac{p(x_i, y_j|a^h) - p(x_i, y_j|a^l)}{p(x_i, y_j|a^h)} \tag{2}$$

Now substituting the right-hand side of (SSC) into eq. (2), it simplifies to

$$\frac{G'[x_i - s(x_i, y_j)]}{U'(s(x_i, y_j))} = \lambda + \mu \frac{p(x_i|a^h) - p(x_i|a^l)}{p(x_i|a^h)} \tag{2'}$$

That is, when the relation between our two pieces of information,  $x$  and  $y$ , is as specified by (SSC),  $y$  drops out on the right-hand side of eq. (2') meaning it is *irrelevant* for the purpose of control. As Holmström proves formally,  $y$  remains present on the right-hand side of eq. (2') whenever (SSC) is *not* satisfied, which implies that it is optimal to base the contract on  $y$  in a nontrivial way.

Notice here that the Blackwell fineness criteria for evaluating information quality in single decision making as well as in optimal risk-sharing settings *do not* correspond to (SSC). One key insight of this formal approach to modeling the cost of control thus is that better information in the traditional Blackwell sense is not necessarily better when the focus is on the control problem.

5.2. Modeling Cost Information for Control Purposes

This brings us to the question of how best to use accounting measures such as product cost for control purposes. Standard managerial accounting textbooks have argued (and many continue to do so) that people should be held responsible only for performance measures they are supposed or able to control. For example, if you are a sales person, you should be held

responsible only for the sales you generate. Similarly, if you are in charge of controlling costs, you should be held responsible only for measures such as product cost. Divisional managers, following the same logic, should be held responsible for the performance of his/her division—not firm-wide performance.

This principle, which is known as the “controllability principle,” is not founded in any particular theory. Its popularity stems from standard intuition (which unfortunately tends to be wrong) and constructs such as “fairness”—that it just sounds plain reasonable. It is an excellent example of the collection of self-evident truths that guided managerial accounting up to the 1980s and still to some degree to this day. It is also a good example of the type of loose logic that led to the introduction of principal agency in managerial accounting. It presented a formal, internally consistent framework for developing managerial accounting theory and, thus, management accounting practices.

Antle & Demski (1988) provided an example of the benefits that stem from using the principal-agent model to study the validity of such standard views of how best to use cost information, and the rest of this section is therefore dedicated to this. This chapter relies on a particular parametric version of the model we have introduced above. Specifically, the agent’s risk-aversion is described by assuming that he has a square root utility function so that  $U(s(\cdot)) = \sqrt{s(\cdot)}$ . Here  $V(a^h) = 50$  and  $V(a^l) = 0$  (so that  $V = 50$ ) while the agent’s opportunity cost  $\underline{U}$  is assumed to be 250. The problem is set up again to make sure that the principal prefers “high”. Probabilities of observables are constructed from three possible “states of the world” that are not observed directly. The tables below summarize the relation between probabilities, state realizations, actions, and the revenue, cost, and profit realizations.

Example 1. (000 omitted):

$a^l$ :	Probability	1/3	1/3	1/3
	Revenue	800	1000	1000
	Cost	400	500	500
	Profit	400	500	500
$a^h$ :	Probability	1/3	1/3	1/3
	Revenue	800	1000	1000
	Cost	400	400	500
	Profit	400	600	500

It should be clear from this table that in the case of Example 1, revenue is unaffected by the agent’s action choice. In contrast, the agent does control cost

here! In keeping with the controllability principle, we therefore start by using cost to evaluate the agent.

In this case the principal's problem is

$$\begin{aligned} \max \quad & 500,000 - \frac{2}{3}s(400) - \frac{1}{3}s(500) \\ \text{s.t.} \quad & \frac{2}{3}U(s(400)) + \frac{1}{3}U(s(500)) - 50 \geq 250 \quad (IC_C) \end{aligned}$$

$$\begin{aligned} & \frac{2}{3}U(s(400)) + \frac{1}{3}U(s(500)) - 50 \\ & \geq \frac{1}{3}U(s(400)) + \frac{2}{3}U(s(500)) - 0 \quad (IC_P) \end{aligned}$$

The constraints correspond directly to the (*IR*) and (*IC*) constraints introduced in the previous section. The 500,000 in the objective function are the principal's expected profit when the agent selects  $a^h$ . We know he will do that because the *IC* constraint makes that the better choice for him.

The simple way to solve this problem is to realize that if for a problem like this a solution exists for which both the *IR* and *IC* constraints hold with equality, then this solution is also the optimal one.<sup>2</sup> If both the *IR* and *IC* constraints hold with equality here they simply define two equations with two unknowns which have the solution  $U(s(400)) = \sqrt{122,500}$  and  $U(s(500)) = \sqrt{40,000}$ . Since this is a feasible solution (both numbers are nonnegative) we have found that the optimal (second-best) contract and the maximum expected net profit to the principal can be calculated to be

$$EG = 500,000 - \frac{2}{3}122,500 - \frac{1}{3}40,000 = 405,000$$

Since the contract was based only on cost, this is how well the firm does if it adheres strictly to the (traditional) controllability principle. Let's see what happens if we instead compensated the agent on profit which includes revenue that we *know* he does not control!

Then the principal's problem becomes

$$\begin{aligned} \max \quad & 500,000 - \frac{1}{3}s(400) - \frac{1}{3}s(600) - \frac{1}{3}s(500) \\ \text{s.t.} \quad & \frac{1}{3}U(s(400)) + \frac{1}{3}U(s(600)) \\ & + \frac{1}{3}U(s(500)) - 50 \geq 250 \quad (IR_P) \end{aligned}$$

$$\begin{aligned} & \frac{1}{3}U(s(400)) + \frac{1}{3}U(s(600)) + \frac{1}{3}U(s(500)) - 50 \\ & \geq \frac{1}{3}U(s(400)) + \frac{2}{3}U(s(500)) - 0 \quad (IC_P) \end{aligned}$$

The *IC* constraint here can be rewritten as

$$\frac{1}{3}U(s(600)) - \frac{1}{3}U(s(500)) - 50 \geq 0$$

As can be seen,  $s(400)$  does not appear in the *IC* constraint. It can therefore be chosen as if there were no control problems, which implies that it can be set at its first-best level. The first-best compensation to the agent would not be risky but would simply compensate him for his effort and his outside opportunities. We can therefore find  $U(s(400)) = 250 + 50$  and thus  $s(400) = 90,000$  in this example.

By substituting  $U(s(400)) = 300$  and  $s(400) = 90,000$  back into the principal's problem we get

$$\begin{aligned} \max \quad & 500,000 - 30,000 - \frac{1}{3}s(600) - \frac{1}{3}s(500) \\ \text{s.t.} \quad & 100 + \frac{1}{3}U(s(600)) + \frac{1}{3}U(s(500)) - 50 \geq 250 \\ & \frac{1}{3}U(s(600)) - \frac{1}{3}U(s(500)) - 50 \geq -0 \end{aligned}$$

Solving the same way as before we then get  $U(s(500)) = \sqrt{50,625}$  and  $U(s(600)) = \sqrt{140,625}$ . This, again, is a feasible solution and the maximum expected net profit to the principal in this case therefore is

$$\begin{aligned} EG &= 500,000 - \frac{1}{3}90,000 - \frac{1}{3}140,625 \\ & - \frac{1}{3}50,625 = 406,250 \end{aligned}$$

This is clearly better than before so it is clear already that it cannot be optimal to adhere strictly to the traditional "controllability principle."

**Example 2.** (*000 omitted*):

$a^l$ :	Probability	1/3	1/3	1/3
	Revenue	1000	800	800
	Cost	400	500	500
	Profit	600	300	300
$a^h$ :	Probability	1/3	1/3	1/3
	Revenue	1000	1000	800
	Cost	400	400	500
	Profit	600	600	300

<sup>2</sup>The reason why that might not be the case is that with the particular utility function chosen here,  $U(\cdot)$  cannot be negative!

As is clear from this table, unlike in Example 1, revenue now *is* affected by the agent's action choice. Also, the agent continues to control cost!



What should be noted here is that high revenues are always (without exception) accompanied by low costs and high profits. If we were again to write down the principal’s problem when he holds the agent responsible for revenue only, cost only, and profits, what we see is that  $s(1000) = s(400) = s(600) = 122,500$  and  $s(800) = s(500) = s(300) = 40,000$  just as in the first example. Since the expected profit is also the same the net profit to the principal here is the same.

**Example 3.** (*000 omitted*):

$a^l$ :	Probability	1/3	1/3	1/3
	Revenue	800	700	1000
	Cost	400	500	500
	Profit	400	200	500
$a^h$ :	Probability	1/3	1/3	1/3
	Revenue	800	1000	1000
	Cost	400	400	500
	Profit	400	600	500

Here the solution is easy if we base it on either revenue or profit. Simply pay the agent nothing if revenue is 700 or profit is 200 and 90,000 otherwise. Indeed this would satisfy the *IC* and *IR* constraints and give the principal the first-best level of expected net profits. The agent controls both cost and revenue. Using cost alone here will not work as well, though. You should be able to see that that would be no better than using cost alone in the other examples.

This, of course, all ties back to the sufficient static condition we developed in the prior section. Specifically, if we are able to optimally exclude revenue as a performance measure it must be the case that the (*SSC*) holds so that we have

$$Pr(R, C|a) = Pr(R|C)Pr(C|a) \text{ for all } a, R, \text{ and } C.$$

If instead it is true that

$$Pr(R, C|a) = Pr(R|C, a)Pr(C|a) \text{ for some } R \text{ and } C,$$

the (*SSC*) is violated and both performance measures are valuable whether they are individually controllable or not.

We can indeed check the validity of this statement using the various numerical examples. In Example 1 we have

$$Pr(800, 400|a^l) = 1 \times \frac{1}{3} = \frac{1}{3}$$

$$\text{and } Pr(800, 400|a^h) = \frac{1}{2} \times \frac{2}{3} = \frac{1}{3}.$$

Accordingly, the (*SSC*) is *not* satisfied and it is of value to use revenue in the performance evaluation *even though* the agent does not *control* revenue!

In Example 2 we have

$$Pr(1000, 400|a^l) = 1 \times \frac{1}{3} = \frac{1}{3}$$

$$\text{and } Pr(1000, 400|a^h) = 1 \times \frac{2}{3} = \frac{2}{3},$$

$$Pr(800, 500|a^l) = 1 \times \frac{2}{3} = \frac{2}{3},$$

$$\text{and } Pr(800, 500|a^h) = 1 \times \frac{1}{3} = \frac{1}{3}.$$

Accordingly, the (*SSC*) is satisfied in this case and it is of no value to use (for example) revenue in addition to cost in the performance evaluation *even though* the agent *does* control revenue!

Example 3 is a little trickier. The problem here is that we could attain first-best when either revenue or profits are used for the performance evaluation. Therefore, when we use either one of those the (*SSC*) does not work. It is only valid for second-best cases. It can be verified, however, that using the (*SSC*) when cost is used does lead to the right answer. This is of course because when cost is used the solution is indeed second-best.

In sum, the key insight that emerges from these examples is that the traditional “controllability principle” is simply not valid. What matters is informativeness and that is an entirely different concept. Equally important, however, the examples also demonstrate that by formally modeling the relations between costs, revenues, and the fundamental underlying activities within a framework where there is a nontrivial control problem present, it becomes possible to provide clear and precise statements about specific management accounting practices as well as guidance for future developments.

### 5.3. Additional Considerations

A key requirement of cost data to be used as part of the control problem is that the cost data are “hard.” Specifically, they must be both contractible and verifiable so that there are no doubts as to the reported numbers as they are used to balance the interests of the interested parties. Not all accounting data satisfy these criteria, or perhaps most do not. Most cost data are self-reported and they are even engineered. These two characteristics and the implications thereof are dealt with next.

Self-reporting of accounting variables has always been of fundamental concern in the accounting

literature. Lawler & Rhode (1976) emphasize the objectivity of accounting measures as one of the key characteristics of an accounting control system. Yet self-reported accounting variables are found throughout accounting systems in form of the accounting accruals. Likewise most budgeting systems emphasize a bottom-up process in which the lower levels of the organization provide information to be used in a subsequent performance evaluation, a practice often referred to as “participative budgeting.”

This issue has been analyzed in an agency model by Christensen (1982), Melumad & Reichelstein (1989), Penno (1990), and Demski & Sappington (1993). It has been shown that it is possible to benefit from using a self-reported accounting variable. However, the use does not come without a cost. Indeed, in most cases it is not possible to use the self-reported accounting measure the same way as it would have been used had it been public. The reason is the concern that a manager is willing to submit only reports that are in his own interest. Furthermore, the willingness to report specific information relies heavily on it being possible for the firm to commit to use the report only as promised at the contracting stage. Thus the price of getting self-reported information is in having to make less aggressive use of it.

When a commitment technology is not available the identical effect might be attained through a biased cost report from the agent. Again it is expected that the agent will only report whatever is in his own interest and the result is likely an aggregated cost report that does not reveal the accurate cost. This way the report is biased. This type of reporting can actually be a part of an equilibrium between a supplier and a producer of the information. The supply is adjusted according to the use of the information. The more interesting point is that such a biased report might actually be part of an *efficient* equilibrium as in Demski et al. (2004).

To take this analysis one step further, the use of the accounting cost information has to be endogenous to the analysis. One situation where this is the case is reflected in the transfer pricing problem in Christensen & Demski (1998). Here one division is supplying a product, which is used in another division. The divisions are both on an incentive scheme and the trade among the divisions is regulated via a market. The pricing in this market is negotiated by the divisions.

Two aspects of this pricing arrangement are important: the efficiency of the production and the incentive arrangement. The two interact. At one extreme we find the optimality of opportunity cost and at the other extreme the information content of

the aggregated divisional performance measures. The transfer price serves both purposes simultaneously and the accrual that is constructed might be superior in terms of information content compared to the primitive cost data. The information content of accounting accruals is the more general label of this type of problem. The accruals often contain an element of self-reporting. Even when used for performance evaluation the accruals might be superior to the more primitive accounting variables such as cash flow (Christensen & Demski, 2003a; Demski, 1998). The key to the information content of self-reported accruals is the information content of the hard accounting data that will eventually surface in the evaluation process. The hard data are used to discipline the self-reporting process.

## 6. Concluding Remarks

Models of cost have a long history, cf. Clark (1923). They have evolved over time as our insight into cost issues developed. The cost function in itself is not unique but is closely tied to the decision problem it is part of. In this chapter we offer several versions of this decision problem and discuss their implications.

As our discussion highlights, the relationship between the economic cost function and the accounting cost function is of central importance. Moreover, the production technology is a key to understanding this relationship. The accounting cost function is often constructed to be linear, whereas the economic cost function reflects the often nonlinear production technology. Large-scale operations and multiproduct firms are often the result of nonlinear production technologies. The discrepancy between the linear accounting cost function and the nonlinear economic cost function leads to accounting errors. Consequently it is not sufficient to focus on the structure of the production process when an accounting system is designed. Indeed, if we want to stick to the linear accounting structure we might be better aligned to the decision problem if the accounting structure does not mirror the production technology. We might find counter balancing errors.

Accounting cost is used to facilitate decisions and at the same time they are used to define the objectives of operational units such as firms and divisions thereof. Efficient factor use is a key to a manager's performance evaluation. Accounting cost is used to guide decisions and to measure the performance. When the two cost functions are not in line, the consequence might be inefficiency. A narrow focus on the structure of the production process might therefore result in missing the target and the controllability of

accounting measures thus becomes important when choosing between different accounting systems.

Understanding controllability turns out to be an entirely different problem than understanding the cost function. The agency model has been used to analyze this problem. It includes specification of likelihood and risk-aversion. Following the development of the agency model our understanding of controllability of cost has been refined. The central concept has been shown to be conditional controllability. It is not the information content of a variable in itself that matters. Rather it is the added information in light of whatever information that was available before the new variable was introduced. The role of a variable is to provide information and not merely to enter a cost calculation. The aggregation of several decision variables is a question of providing information. The accounting accrual does exactly this.

At the modest level of our analysis is the question if a more or less complicated accounting system is best at estimating a cost statistic. The answer to that question is not simple. Simply modeling the structure of the production technology is not enough. The economics of scale might interact with structure and consequently this effort fails. A simple system might outperform the more complex one simply because the errors interact. At the individual product level this problem also exists. Then the question becomes which of the product cost statistics is more important for the problem at hand. As we illustrate here, then, products or problems must be given priority when an accounting system is designed.

At the simple level there are tradeoffs among products and at the more sophisticated level there is a tradeoff between the product cost and accounting information for stewardship. As illustrated these two purposes demand different types of information and model of cost change accordingly.

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# Transfer Pricing: The Implications of Fiscal Compliance

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**Abstract:** In modern-day commercial enterprises, complex inter-relationships between sub-units are commonplace. Many of these relationships are subjected to or reflected by transfer prices that traditionally contribute to the economic co-ordination or optimisation and performance measurement of the affiliated sub-units. When trades cross national boundaries, there is also an opportunity for multinational enterprises to optimise global after-tax profit. From the mid 1990s, however, fiscal regulators have strengthened requirements to the extent that transfer pricing tax compliance becomes a potential alternative strategy. A review of the regulatory framework raises questions for the existing theory and practice not least in terms of the implications of adopting a tax-compliant strategy on the design of management control systems.

## 1. Introduction

If there is one thought we wish to convey through this review, it is that tax compliance in terms of transfer pricing has far-reaching consequences for the existing theory, practice and, not in the least, for the design of the management control system (MCS). The primary focus is on the multinational enterprises (MNEs) where the fiscal regulations are most well-developed, but it is worth noting that the Organization for Economic Co-operation and Development (OECD) regulations now apply to domestic transactions with EU countries (UK Inland Revenue bulletin 17, 2004). However, the issues are most acute at the MNE where differentials in taxes and tariffs offer the greatest scope to manage global after-tax profit. The response of fiscal regulators to continually tighten rules to prevent transfer pricing abuse forms the core of our analysis.

The principles, norm, rules and procedures of the international transfer pricing tax regime are first reported. Extensive documentary evidence is required but the details and precision of rules tend to vary in different jurisdictions as do the penalties for non-compliance. We suggest that a highest-common-denominator effect is occurring with MNEs seeking assurance by reference to the jurisdiction producing the most detailed rules, currently the Internal Revenue Service (IRS) of the USA. This level of compliance is then used to examine extant theory, principally the assumptions underpinning the 'arm's length' standard (ALS) and the

internalisation-specific advantages influencing foreign direct investment. Similarly, the practical implications of adopting a tax-compliant transfer pricing policy are examined for each of the main acceptable transfer pricing methods. Finally, we attempt to deduce the consequences of compliance for the MCS. Our contention is that MCS within the MNE is difficult to understand unless fiscal regulation is recognised as an endogenous variable.

## 2. The International Transfer Pricing Regime

### 2.1. Principles and Norms

There is a general agreement that any tax system should be equitable and neutral in that two taxpayers in similar economic circumstances should pay the same tax and that choices of corporate form, location of the tax base and choice of pricing policy should not be influenced by the system (Eden, 1998). These principles flow through to international trades where the sub-units of MNEs can be engaged in substantial exchanges of goods, intangibles and support services. The monetary expression attaching to these trades are transfer prices (Wells, 1968).

Applying these principles of equality and neutrality creates difficulties for national government tax authorities because tax evasion and double taxation are competing aims. Tax and tariff differentials provide an opportunity for MNEs to shift income

among different countries to increase global after-tax profit and, consequently, report results dissimilar to indigenous taxpayers. Where tax authorities compete for a 'fair' share of the tax base, unilateral adjustment of the transfer price results in more tax being extracted from the MNE unless a compensating adjustment is made in another jurisdiction. The international perspective of the MNEs and national perspective of tax authorities offer ample scope for conflict. The tax authority may view the affiliated sub-unit as a stand-alone entity whilst the MNE integrates its activities strategically to achieve economic efficiency.

The magnitude of cross-border inter-unit trade indicates the significance of the issues. UNCTAD (2003) reports 44,500 MNEs with over 275,000 affiliates in the mid-1990s whose inter-unit trade in total exceeded world trade exports. In 1994, the value of foreign affiliates' worldwide assets was estimated as \$8.4 trillion. It is unsurprising, therefore, that governmental co-operation has developed over the last decade building on national corporate income tax regulations, bilateral tax treaties and model tax treaties. Leitch & Barrett (1992) and Picciotto (1992) provide comprehensive reviews of the initial developments where the contribution of the Committee on Fiscal Affairs of the OECD is recognised and continues to play an important role.

At the heart of the regulations is the ALS. It is based on the principles of equity and neutrality and adherence to the standard should obviate double taxation or tax evasion and avoidance. The standard states that inter-unit transactions should be priced the same as the prices chosen by unrelated parties engaged in similar trades under similar circumstances (Eden, 1998; OECD, 1995, art. 9). The 30 governments that are members of the OECD have long accepted this recommendation and include the standard in their national regulations. This does not mean that all tax authorities interpret or apply the standard in the exact same way. Nevertheless, there is general agreement that the ALS is applied to the individual or a similar set of transactions. This creates or reinforces the differing perspectives of MNEs and tax authorities. As Pagan and Wilkie (1993) clearly state:

Tax authority thinking is national, not global, and principally uses methodology for establishing individual transaction profit. By contrast, the commercial thinking of the MNE is global, not national, and the emphasis is on consolidated accounts or results. (1993, pp. 26–27).

## 2.2. Fiscal Rules

The ALS has survived from the earliest pronouncements of tax authorities and the OECD but the

momentum to specify the rules of application more closely occurred first in the USA (US Internal Revenue Service, IRC s 482, 1994). Australia (TR 94/14), the OECD (1995), UK Inland Revenue (1998) and numerous other countries have followed suit making this a continuing worldwide trend. The IRS represents one of the most detailed, comprehensive and complicated rule-based regulations. Recent tightening of rules is apparent by the information MNEs are required to maintain for inter-unit trades. For example, demonstrating comparability with uncontrolled transactions depends on the characteristics of the property or service, functions performed and risks assumed, contractual terms, economic circumstances and business strategies. This extends the OECD (1979) code significantly. Other noteworthy changes involve the provision of multiple-year data to illustrate a possible history of losses or evidence of a product life cycle; re-structuring transactions to clarify the substance over form of a transaction and providing information of host government policies that effect market conditions. Further tightening is evident on the bundling of transactions as a package deal, loss-making affiliates and intentional set-offs. There is also a recommendation for greater co-operation between customs and tax authorities, a trend seen in the UK by the recent creation of Her Majesty's Revenue and Customs.

There are two rule changes recommended by the OECD that appear to offer MNEs some flexibility. The arm's length range recognises transfer pricing as an inexact science and that one or more transfer prices may produce a range of reasonable results. Secondly, the number of transfer pricing methodologies acceptable under the ALS is extended. However, the burden of proof remains on the taxpayer and, under certain jurisdictions, there is a need to justify the choice of pricing method over other alternative methods. Eden (1998) provides a more detailed review of these developments whilst Deloitte Touche and Tohmatsu (2004) give a comprehensive analysis of 39 countries' current transfer pricing rules.

To the familiar transaction-based approaches of comparable uncontrolled price (CUP), re-sale price and cost plus are added profit-split (PS) and transaction net margin methods (TNMM) or the comparable profits method (CPM) which is acceptable under IRS regulations.

All of these approaches rely on comparables being available. For CUP, a transaction relating to a specific product or service looks to the market for an exact or inexact comparable. The re-sale price examines the functions undertaken by the last affiliate in the value chain, such as a distributor, before sale to

an independent client. Independent distributors, in similar economic circumstances, can provide an indication of the gross margin the affiliate might earn. When this is deducted from the price to the client, the residue that is the re-sale price is deemed to be the return of the prior affiliate in the MNE value chain, for example, the manufacturing sub-unit. The cost plus approach centres on the comparable functions of affiliates early in the value chain and requires a search for profit mark-ups of independent manufacturers engaged in similar transactions. Both re-sale price and cost plus can be criticised because they concentrate on just one side of the transaction and assume that the comparable functions are standard or contract activities (Eden, 1998).

The PS method attempts to divide or allocate the share of profit between sub-units on the basis of various ratios, such as operating profit to operating assets. The comparable is the relative value of the functions performed by the affiliated sub-units. This can be problematic if the sub-units use intangibles. In this situation, the profit may first be shared based on the routine or contract functions undertaken by cost plus or re-sale price. Any residual profit is assumed to be due to the unique intangibles used. Both sub-units are included in the analysis but the specific ratios are employed to show that the relative value of sub-unit functions are potentially contentious issues.

TNMM compares the net margins of independent firms that are engaged in broadly similar transactions with the net margins of affiliates in the MNE. CPM follows the same approach but the comparable is independent companies or sub-units engaged in similar functions or transactions. Again a choice of ratios including net margin on sales, on cost, on assets or on operating expenses can be used and the arm's length range determined. In practice, the selection and justification of comparable transactions or unrelated firms may be daunting, particularly if the MNE sub-unit is other than a simple distributor or contract manufacturer.

Justification of an acceptable 'arm's length' transfer pricing method, therefore, places considerable weight on the search for comparables. This does not mean that all fiscal authorities following OECD recommendations place the identical emphasis on documentary evidence or transfer pricing method. Table 1 indicates the rules the five countries, which are all OECD members, employ.

While all require extensive documentation that includes a business overview, organisation structure, etc., some like the US or Australia require or recommend contemporaneous availability. Some tax authorities impose penalties for failure to provide

documentary evidence. In the event of an adjustment, all can impose penalties but these vary from 10% to 200%. The enforcement powers associated with the transfer pricing rules, therefore, differ by tax jurisdiction.

### 2.3. Procedures

The same resolve for national sovereignty fiscal regulators reserve for control over tariffs and taxes can be seen in the differing rules and preferences used to interpret the OECD recommendations. The real possibility of double taxation occurring when an adjustment to a transfer price in one jurisdiction is not matched in another is apparent. Traditionally, bilateral treaties are the way to mitigate double taxation and the MNE requests the competent authority to agree the transfer price with the counterpart authority. This can be a slow process and there is no guarantee that the tax authorities will reach agreement. The MNE is not normally a participant in these procedures. Bilateral treaties exist to prevent double taxation but the same trend of strengthening regulations is evident.

The competent authority procedure enables the tax authorities to exchange information and the OECD (1992) suggests simultaneous examination of transactions where there is suspicion of tax evasion or avoidance, non-compliance with tax laws, aggressive tax minimisation strategies, reported losses over several time periods or tax haven involvement. The examinations of each tax authority are synchronised but undertaken independently.

To overcome the slowness and potential inconclusiveness of this procedure, the EU introduced an arbitration convention in 1990 that is renewed every 5 years. An independent panel will adjudicate and provide arbitration on whether and to what extent profits were manipulated. Arbitration is at the request of the MNE when the competent authority procedure is exhausted. Once a decision is made by the panel, the tax authorities have a further 6 months to eliminate the double taxation. The EU arbitration model applies when the transaction under scrutiny crosses the jurisdictions of EU countries and offers a swift and binding solution, in principle, relative to competent authority procedures. But the success and use of this procedure is difficult to gauge (Atkinson & Tyrrall, 1999) despite successive renewals of the convention. Little is known of the processes the independent panel uses or how fiscal authorities and MNEs have reacted to adjudications.

Binding arbitration procedures are advocated more generally by Shoup (1985) not least to aid competent authorities in less developed countries. There are also developments to include this arbitration



Table 1. A comparison of transfer pricing rules.

	Australia	Hungary	Japan	OECD	UK	USA
Tax law	Income tax assessment Act 1936	Corp. income tax Act 2003	Special tax measures law 1986	Not applicable	Income & corp. taxes Act 1988	Internal revenue service s 482, 1986
Acceptable methods	CUP, RP, C+, PS, TNMM	CUP, RP, C+ Any other method	CUP, RP, C+ PS, TNMM and similar methods	CUP, RP, C+ PS, TNMM	CUP, RP, C+ PS (residual analysis), TNMM	CUP, RP, C+ PS, CPM
Priority of methods	Most appropriate. Transaction preferred.	No priority	Transaction preferred	Reasonable method. Transaction preferred	Reasonable method. Transaction preferred	Best method
Penalty on assessment	50% of additional tax: 10–25%: + interest	Penalty + late interest + fine if no documentation	10–15% of additional tax: 35% if concealed	National jurisdictions decide: range 10–200%	Max 100% of tax unpaid: fine if no documentation	20–40% of additional tax adjustment
Tax return disclosure	Sch 25A, type of trade, \$, parties, countries, doc. methods	No disclosure required	Sch 17(3) parties, methods.	Limited to allow national fisc. to identify case to examine.	No separate disclosure. Self assessment assumes ALS compliance	Forms 5471, 5472 require detailed disclosure
APAs	TR 95/23, unilateral, bilateral	In theory available but no guidance	NTA 2001 bilateral preferred	Ch V F unilateral, bilateral	IR 3/99 and TB 43 guidance for both	Rev Proc 2004-40 guidance for both
Acceptance of foreign comparables	Prefers local comparable data	Yes, as supporting documentation	No	Yes, from same or similar market as tested party	Sometimes	Yes, from same or similar market as tested party
Documentation Required	Recommend contemporaneous: Prudent business practices	CIT Act 2003 Method and all relevant facts, circumstances	No contemporaneous requirement	In accordance with prudent business practices	Records and complete return kept for 6 yr	Contemporaneous required
Alternative methods rejected	Yes	Yes	Yes	No	No	Yes
Economic analysis	Yes	Yes	No	Yes	Yes	Yes
Relevant data after year end	Yes	No	No	No	No	Yes

Source: Table compiled from strategic matrix for global transfer pricing (Deloitte, Touche and Tohmatsu, 2004). Other documentation required of all regulators in Table 1 include: a business overview, organisation structure, method selected, analysis of controlled transactions and identification of comparables.

procedure in bilateral treaties (Eden, 1998). The benefit of a clear decision and end to the dispute accrues to the MNE but the procedure requires one tax authority to lose tax revenue. There is also the thorny problem of sacrificing sovereignty to an international body over one area of taxation.

In contrast to both these procedures, an advanced pricing agreement (APA) is prospective and, when successful, grants the MNE a level of security that is missing in settling disputes by competent authority or court case. The APA procedure is relatively well established in the USA, Australia and Japan although the time required to complete the agreement can vary. Once agreed, the MNE obtains some certainty against tax audit for 3–5 years, subject to annual monitoring. However, information disclosure during the negotiation is substantial and may or may not involve greater disclosure than under the normal transfer pricing documentation requirement. Most transfer pricing documentation requires the related parties, their functions and risks, financial evidence, identity of comparables and an economic analysis to be made available on request. Prior to filing, the preferences of the tax authorities for specific methodologies need to be determined and the possible overlap between the tax authorities analysed. The MNE also has to evaluate the possibility of a successful APA negotiation against an unsuccessful outcome that may lead to an audit. Even if successful, the IRS has applied the agreed APA transfer pricing method retrospectively (Atkinson & Tyrrell, 1999). At the pre-filing stage, a meeting with one or both of the tax authorities offers an indication of consensus and the merits of progressing the APA. Each stage is voluntary and in the USA pre-filing can be anonymous where the experts representing the MNE need not reveal the taxpayer's identity. A formal APA request by the MNE provides more detailed supporting documentation. At the evaluation and negotiation stage, the MNE provides factual evidence for the tax authorities that relate to the validity of methods, comparables and the relevance to future economic fluctuations. The tax authorities will still need to negotiate the merit and details of the APA among themselves. Finally, the APA becomes binding and the detailed terms are annually reviewed to evaluate compliance. These terms involve examination of changes in business operations, critical assumptions, accounting methods and other aspects of the inter-unit transaction. Not all tax authorities follow the same number of stages or require the exact same evidence, but it seems unlikely that agreement between the regulators will be achieved unless the requirements of the most specific rule enforcer are met.

APAs benefit MNEs most where acceptable transfer pricing methods under the ALS fail to accommodate idiosyncratic, large-volume trades that incorporate intangibles. Financial products that are globally traded 24/7, such as non-US dollar swap derivative transactions, offer the opportunity for an APA to test and agree PS or cost-sharing methodologies for example (Elliott & Emmanuel, 2000). The downside risk is whether the agreement can be reached and whether the evidence can be produced to satisfy the tax authorities. MNEs need to evaluate this against the risk of being subjected to audit in the first place.

### 3. Adjustments in Practice

There are no regulations that require MNEs to use transfer prices acceptable under the ALS for internal management purposes. However, the actual results reported for internal purposes then need to be adjusted to provide 'arm's length' results and this documentation is satisfactorily maintained and updated for each transaction or set of similar transactions. If a legitimate and reasonable request is made by the tax authority, MNEs and their sub-units are at risk of being penalised if the primary accounting records, tax adjustment records or records of transactions with affiliates are not available. In some jurisdictions, 'a reasonable time' to respond is offered or, the more stringent, contemporaneous availability is required; failure to comply can be penalised in some jurisdictions as can failure to demonstrate a reasonable attempt to calculate 'arm's length' results. These penalties are separate from any caused by re-assessment due to investigation and audit.

The core transfer pricing documentation, as described at the initial stage of an APA, may be supplemented with an explanation of the business' general and commercial strategy as well as the current and forecast business and technological environment, competitive conditions and regulatory framework dependent on the tax authority concerned. In addition to these disclosures, costs relating to expert advice, management time must be balanced against the risk of audit (Tran-Nam et al., 2000). Should an audit lead to an adjustment revealing a loss of tax, the shortfall plus additional penalties and interest may be imposed. Again the tax authority may obtain assistance or information from a treaty partner under the Exchange of Information Article in the relevant bilateral treaty taxation agreement.

#### 3.1. Penalties

The consequence of fiscal audit can be significant. The results of adjustments and re-assessments can

cause headline news such as ‘Nissan pays Y17bn in US penalty taxes’ (Financial Times, 11/11/1993), ‘GSK vows to fight US tax demand for extra \$5.2bn’ (Financial Times, 8/01/2004). A recent Ernst & Young survey (2003) of 641 parent and 200 affiliates in 22 countries reported 49% as having an examination or audit by tax authorities since 1999 and 47% regarding an audit as very likely to happen in the next 2 years. The benefits to tax authorities can be substantial. The ATO completed 33 transfer pricing audits during 2001 that generated A\$276 million of tax and penalty adjustments.

Whilst there is evidence in the recent past of MNEs maintaining two accounting records (at least) for internal management and tax compliance purposes (Borkowski, 1996), Durst (2002) indicates there is reluctance to continue this practice. With two accounting records, the credibility of both may be questioned by the tax authorities, affiliate managers and other stakeholders. In an era of heightened emphasis on internal systems and processes that contribute to corporate governance practice (PCAOB, auditing standard no. 2, 2005; Sarbanes–Oxley Act, section 404, 2002), the mere existence of alternative records may suggest an intention of deceiving. The potential convergence of tax compliance documentation and governance requirements is now being recognised by influential players such as the head of the transfer pricing unit at the OECD (Siberztein, 2005).

The implications of adopting a single transfer pricing policy compatible with tax regulations are our main concern and at least one authoritative researcher argues this has dysfunctional consequences for resource allocation and investment decisions within the MNE (Eden, 1998). The trend towards tighter rules, procedures and penalties suggests that prevention of tax evasion is being replaced by an increasing focus on tax compliance. One way to demonstrate this commitment to fiscal regulators is to use the same transfer price for internal management purposes and for tax compliance. Evidence is beginning to emerge (Cools, 2002; Elliott, 1999; Lopez, 2005) and is reinforced by recent survey results where only 38% of respondents believe management or operational objectives have a stronger influence on determining transfer prices than satisfying tax requirements (Ernst & Young, 2003). Of the same sample, 86% believe transfer pricing is important to their group at present.

### 3.2. *The Fiscal Environment MNEs Face*

There is an integrated, comprehensive international transfer pricing tax regime that incorporates principles, norms, rules, procedures and penalties. However,

not all tax authorities specify the architecture of the regime in the same degree of precision, which means that the MNE faces varying interpretations and constraints. In such an environment, the tax authority providing the most specific, if not draconian, requirements is likely to determine the regime in practice. The IRS is generally accepted as holding this position currently although there is evidence of mimetic isomorphism occurring as other tax authorities issue more and more transfer pricing pronouncements.

Whether the influence of the IRS is confined to the US is debatable given the international nature of the trades involved. Even if a sub-unit does not deal directly with an affiliate in the USA but is one or two steps removed in the value chain, the MNE may be required to provide a detailed and contemporaneous documentation. This can be invoked by means of the substance over form principle and operationalised by requiring details of strategy from the sub-units or parent immediately involved in the US trade. Hence, a kind of higher common denominator in compliance with the strictest rules of one tax authority applies.

This may be reinforced under procedures for bilateral tax treaties, APAs involving other tax authorities and binding arbitration agreements (US Internal Revenue Service, 1996). The documentary evidence required by the IRS becomes the benchmark and MNEs with any sub-unit dealings in the US may need to adopt those requirements for tax compliance and management purposes. The pervasiveness of the IRS regime can be argued to afford global coverage over all inter-unit trades whether these are tangible, intangible or support services. By concentrating on individual transactions and requiring extensive evidence to place these in a strategic, business and technological context, the MNE becomes increasingly transparent. It may also mean that the discretion management has customarily been assumed to exercise over the choice of transfer price is now constrained.

## 4. Theoretical Implications

The ALS effectively argues that a transfer price is acceptable for tax purposes if the same price can be demonstrated for that trade between independent parties. This contrasts with the theoretical explanations of why MNEs exist.

### 4.1. *Competitive Advantage*

Leitch & Barrett (1992) argue MNEs venture overseas in order to take advantage of structural market imperfections, a theme that Porter (1985) earlier developed to show comparable advantage. The theory of foreign direct investment is possibly best

articulated by eclecticism (Dunning, 1980) where the specific advantages of ownership, location and internalisation offer explanations for expansion to other jurisdictions. In particular, the internalisation-specific advantages such as stable supply chains, exploitation of technology and 'know how' and vertical integration across economies and markets offer real opportunities for transfer pricing management. To take advantage of market imperfections, it is assumed that the MNEs enjoy some specific advantages that the indigenous firms do not enjoy. Transaction cost economics offers an analysis at the specific level of the transaction where investment in specific assets, the frequency of trades and market uncertainty may combine to suggest transfer pricing methods that preserve the internalisation-specific advantage. For example, where idiosyncratic goods or services are traded and there is high asset specificity, top management determines the frequency of trade and actual manufacturing cost is recommended as the transfer price. When sub-units trade standard components or goods because *inter alia* asset specificity is low, market prices or the CUP are preferred. For the intermediate situation where customised products or specialised designs are transferred, sub-units may negotiate the price with or without top management acting as mediators, with or without recourse to the intermediate market (Spicer, 1988). Other than the CUP, none of these alternative transfer prices are immediately recognisable as compatible with the ALS. While the transaction cost economics approach has yet to develop into an international theory encompassing tariffs and taxes, the emphasis on product or service characteristics and their underlying specific advantages suggests transfer pricing methods will vary within the MNE and potentially within an individual sub-unit. The tax-compliant MNE is, therefore, required to provide detailed evidence for each transaction with differing characteristics against a background of non-comparable indigenous firms. If they were comparable, a major reason for foreign direct investment would be eliminated.

#### 4.2. Dynamism

Compliance with the tax regime may constrain MNEs in modifying their transfer pricing policies, which contrasts with the view of Bartlett & Ghoshal (1993) who argue MNEs have to be highly flexible and ready to continuously change product designs, sourcing patterns and pricing policies. For any organisation to be successful, Lawrence & Lorsch (1967) contend the states of differentiation and integration must be managed in a way consistent with the environment sub-units face. Differentiation reflects

the goal, time, inter-personal orientations and formality of practices of sub-unit managers whilst integration relates to the quality of the state of collaboration amongst sub-units to achieve unity of effort caused by the demands of the environment. A balance is required and transfer pricing is central to ensuring effective sub-unit relationships (Ghosh, 2000).

Taking a behavioural perspective, Watson & Baumler (1975) view transfer pricing as both a consequence of and a mechanism for promoting integration and differentiation. At the extremes, sound theoretic arguments to integrate by formulaic pricing and to differentiate by negotiation with arbitration can be forwarded. Increasingly, theory has investigated the process of transfer pricing and attempted to place it within an organisational context. Swieringa & Waterhouse (1982) contributed to this by adopting four frames to view the transfer pricing process, namely, the behavioural, garbage can, organising and markets and hierarchies models. Each frame defined the problem, diagnosed the questions and provided different solutions that were complementary. They conclude that the transfer pricing should be viewed as a process of organisational learning and adaptation, which should be able to convey changes in strategy to sub-unit management. More recent research has suggested this is two directional with sub-units using transfer pricing as instruments to signal the need for strategic change (Boyns et al., 1999; Perera et al., 2003).

It is difficult to see the accommodation of extensive maintenance and updating of documents for tax compliance with the strategic change role transfer pricing may play. In addition, the use of negotiated transfer prices, or hard bargaining, is not sufficient to satisfy the ALS (OECD, 1994).

#### 4.3. Interdependencies

The attainment of internalisation-specific advantages often results in the MNE following a vertically or horizontally integrated strategy. For any transaction between sub-units, the firm may wish to balance or emphasise a particular strategy that allowed Eccles (1985) to prescribe certain transfer prices. An emphasis on vertical integration suggests a mandated full cost price; for a diversification focus, market price or CUP and where a balance is required, suspension of the requirement that the cost to the buying sub-unit is the same as the revenue to the selling sub-unit. This last prescription is a transitional measure for circumstances where the market price is inappropriate.

Inappropriateness can be related to the demand or supply interdependencies in the MNE. For example,

central purchasing, R&D, legal services or single sources of product offer economies of scale and scope which when decomposed and compared with the market show residual benefits. These can be regarded as the internalisation-specific advantages relating to supply interdependencies. Demand interdependencies for the output of sub-units may be positively or negatively related, for example, Sony playstations and games, or a Honda Civic and an Accord. Under both supply or demand interdependencies, the MNE in total is greater than the sum of the parts (Solomons, 1965).

The presence of these externalities questions the appropriateness of the market in providing comparables for complex organisations like MNEs. Whilst the IRS and tax regulators promote CUP as an 'arm's length' price and offer Hirshleifer's (1956, 1957) path-breaking analysis as justification, Hirshleifer himself recognised that interdependencies undermined the economic efficiency of using the market. This is especially true when dealing with supply interdependencies that are intangible. The transfer of intellectual capital constitutes a major specific advantage for MNEs and will be dissipated if made available to unrelated firms. The search for comparable trades or functions in these circumstances is likely to be fruitless. The tax authorities are, therefore, forced to accept some allocation based on a cost-benefit analysis or commensurate with income. Certain business support service transfers between centralised purchasing, finance, legal units and sub-units of the MNE may prove equally difficult to justify. It is in these areas, however, that tax authorities appear to be increasing their audit activity (Ernst & Young, 2003).

Providing detailed justification for the inter-connection between strategy and transfer price is no easy issue. Supply and demand interdependencies even for tangibles may render market comparables inappropriate. For intangibles and some business support services, comparables do not exist and the problem becomes one of justifying apportionment or allocation methods. In any event, the IRS requires extensive documentation that includes strategic intent in order that the transfer price can be evaluated in context. Undoubtedly, MNEs have reaped the benefits of internalisation and in so doing have created endogenous market imperfections by organising activities and trades in specific ways. When following a transfer pricing policy consistent with maximisation of global after-tax profit, the capacity to arbitrage tariffs and taxes may have led to a perception of manageable control over the tax regime. Most theoretical attempts to model strategy, interdependencies and transfer pricing in the international arena have, therefore, treated tax regulations as exogenous (Choi & Day, 1998;

Copithorne, 1971; Halpirin & Srinidhi, 1987; Horst, 1971; Jensen, 1986; Smith, 2002). The time may now be right to change this assumption and to recognise fiscal regulation as an endogenous variable capable of influencing the MNE strategy.

## 5. Practical Implications

In order to comply with the ALS, the MNE is forced to seek comparables. These are required in all the acceptable pricing methods to some degree and justified in a functional analysis required by the most closely specified rules of tax authorities like the IRS. While tax-compliant transfer pricing becomes a primary objective of the MNE, we now examine the implications for two other well-established transfer pricing objectives, economic efficiency and performance measurement.

### 5.1. Economic Efficiency

Support for the OECD and IRS 'arm's length' pricing methods is offered by the neo-classical economics approach (Dopuch & Drake, 1964; Gould, 1964; Hirshleifer, 1956, 1957; Samuels, 1969), which found the optimal transfer to be the marginal cost of the selling sub-unit at the optimal output level. When a perfectly competitive external market exists, this is equivalent to the market price or CUP. Through successive, complex situations, the optimal rule can be upheld using the shadow prices of constrained resources from linear or dynamic programming. Opportunity cost is the guiding principle of the economists' approach with either the next best alternative being determined by the market or by the alternative functions or uses of scarce resources.

### 5.2. Transaction Methods

One potential defect of the interdependencies problem has already been addressed but, additionally, it should be noted that the tax authorities use accounting rather than economic concepts to evaluate transfer prices. The differences are non-trivial. Accounting costs are contractual not opportunity costs, accounting profit excludes returns to investors; assets are valued at historic cost as opposed to current replacement cost. These differences carry implications for showing cost behaviour patterns and effect resource allocations such as trading volumes and make-or-buy (outsourcing) decisions (Solomons, 1965).

The least problematic method is the CUP if a perfectly competitive market exists for the transferred tangible, intangible and business support service. When the traded goods or services are idiosyncratic or customised, an inexact comparable is needed that

assumes material dissimilarities and circumstances can be quantified and evidence provided.

The re-sale price examines the functional comparables of the buying sub-unit, for example, other distributors engaged in similar activities. Functional comparability is measured by the functions performed, the economic circumstances, assets used and risks assumed. The gross margin is the average of independent distributors in the external market. Deduction of this margin results in a transfer price that tends to overestimate the profit for the selling sub-unit if the functions of the distributor are transaction specific or incorporate some internalisation-specific advantage.

The reverse occurs under the cost plus approach and assumes that the selling sub-unit is performing functions similar to those of other manufacturers in that market. If there are dissimilarities, adjustments are allowed but again need to be justified by functional analysis. The tendency here is to overestimate the profit of the buying sub-unit. There is no likelihood under either approach that data equivalent to marginal cost or net marginal revenue will be given for optimal output decisions. It is also questionable whether either method provides relevant incremental data to decide if outsourcing is beneficial (Thomas, 1980).

Reliance on accounting data is more pronounced under PS. Whether the contribution analysis or residual analysis approach is applied, operating profit is divided based on the relative value of the sub-unit functions. The values of the functions are measured by accounting ratios like return on operating assets for the sub-units that may be contaminated by overhead allocations. It is difficult to understand how the resulting transfer price or profit measure contributes in a meaningful way to economic efficiency or resource allocation.

TNMM looks at one party to the transaction and compares the net margins of an uncontrolled party on similar transactions. The selection of the independent party is, therefore, critical as is its position in that market. CPM adopts the same approach but compares the financial data of an uncontrolled party on an entity or firm-wide basis. Again the relevance of the resulting transfer price for decision making can be questioned, which may lead to distortions in efficiency and resource allocation. Against this, we must recognise that evidence of domestic enterprises and MNEs applying marginal cost or shadow prices in practice is extremely thin (Emmanuel & Mehafdi, 1994; Grabski, 1985; McAuley & Tomkins, 1992).

### 5.3. Performance Measurement

These distortions flow through to sub-unit financial performance measures partly because resale price, cost plus and TNMM, seek comparables for only one

party to the trade and partly because the emphasis on comparables might under- or overplay the specific sub-units' contribution to the value chain. The MNE has the choice of which tax-compliant method to apply and to which sub-unit and transaction. These can be important considerations because, in combination, an individual sub-unit's reported profit may still be tax and tariff minimising even if tax-compliant transfer prices are adopted. Whilst the tax authorities' prime focus is at the transaction level, the surreptitious selection of transfer pricing methods for dissimilar trades may aggregate to a reported profit that allows effective arbitrage of tax and tariffs at the sub-unit level. There appears to be an assumption made by the tax authorities that each sub-unit of the MNE is primarily concerned with one type of transaction or following one strategy for all transactions. It should be noted that the IRS and others require the best method to be used plus an analysis of rejected alternative methods. Nevertheless the extent to which an audit examines other transactions in which the sub-unit participates is moot. However, if the chosen method(s) causes one sub-unit to perpetually report losses, it is likely that it will risk the attention of the tax authorities. Should the MNE re-structure its activities, the necessary change in documentation may also trigger investigation (Ernst & Young, 2003). The checks and balances of the IRS regulations appear to pre-empt the options available to the MNEs. Whether this marks a greater emphasis beginning to be placed on the performance of sub-units is difficult to gauge but acceptance of profit-based transfer pricing methods suggests the possibility.

For decision making and performance measurement, it is extremely difficult to uphold any of the tax-compliant transfer pricing methods with the exception of CUP employing exact comparables. This may be of little consequence if neither marginal costs nor shadow prices were previously used. Nevertheless, the usefulness of the tax-compliant data to sub-unit managers for decision making (Gerdin, 2005) and to top management in evaluating performance appears limited and potentially distorted. Tax authorities may counter that economic efficiency and performance measurement are not the aims of the transfer pricing regime. Equity and neutrality are the primary objectives.

## 6. Implications for the Management Control System

Neutrality in a tax regime assumes there should be no dysfunctional effects on MNEs in terms of choice of transfer pricing policy. We have reported in some detail the norm, rules and procedures that MNEs now face. The premise of the ALS can be questioned

with respect to the current foreign direct investment theory, especially when seeking comparables for inter-unit transactions. We also contend that a highest-common-denominator effect applies amongst fiscal regulators, which results in compliance with the most specific regulations. To reduce the risk of investigation, audit, adjustment and penalties, the MNE may now adopt the transfer pricing methods acceptable to the IRS for internal purposes. What are the likely implications for the MCS?

At the pragmatic level, extensive documentation that spans strategy, comparables, functional analysis and risk assessment is required contemporaneously or within a specified time period. The focus is on individual or sets of similar transactions but the tightening of rules requires these to be evaluated in a more holistic context. One implication is the likely extension and elevation of the influence of internal tax units and external fiscal consultants. The need to maintain and update the transfer pricing analysis becomes important as does the need for functional analysis and databases of comparables that provides tax experts a greater involvement in operational matters. As most MNEs regard their inter-unit transactions to be idiosyncratic or customised, this involvement of tax specialists is likely to increase. In addition, there is a need to monitor compliance with the applied transfer pricing rules that is likely to extend the role of the internal audit function. Whether this is compatible with the purposes of internal governance is open to conjecture at this time and a fruitful area for future research.

Due to the strictures of tax compliance and the increasing influence of tax experts and internal audit, the motivation for an all-encompassing, universal transfer pricing policy that is tax compliant may seem attractive to the MNE. Together, these imply centralisation and uniformity in terms of information provision wherever possible. All tax authority enquiries may be handled centrally by tax experts whilst maintaining a uniform policy suggests changes in documentation will only occur in response to critical events. Satisfying the IRS and other tax authorities that documentation applies to all relevant transactions and is monitored regularly reduces the risk of audit but suggests the MNE top management assumes a degree of centralised control, which in real terms empowers internal tax and audit functions.

Sub-unit discretion is likely to be severely constrained. The tax-compliant transfer prices are unlikely to support efficient decision making or to contribute to financial measures of performance that reflect sub-unit economic viability. Certain ALS methods focus on one party to the trade and, dependent on the appropriateness of comparables, have a built-in bias to transfer income between sub-units.

Sub-unit accountability is narrowed to outperforming the transfer price in cost or revenue terms. The buying sub-unit increases sales volume or decreases selling costs to outperform an RP margin or the selling sub-unit attempts to reduce actual costs below the tax-compliant cost. Should either of these be achieved then the possibility of justifying good or outstanding performance may be of interest to the tax authorities particularly if the unexpected performance is outside the range of acceptable transfer price and 'arm's length' results. This is a perverse effect. It stems from the use of tax-compliant transfer prices for target or budget setting. In reality, actual versus budgeted performance compares actual with unchanging tax-approved transfer prices. Actual and budgeted transfer prices cannot vary when compliance is the primary aim. Given these prices are substantiated by functional analysis and considerable documentation, the scope for sub-unit management participation in target-setting appears limited. They may report changes in local market conditions but are unlikely to change the transfer price in the short term.

There is a distinct likelihood that financial performance measures will no longer provide a means for motivating managers through a reward-linked system nor offer an intrinsic reward when control is constrained. Where sub-unit managers remain committed to outperforming financial targets, the possibility of gaming, provision of inaccurate information and alibi seeking may become commonplace. It is questionable if internal audit will be capable of detecting such behaviour. Alternatively, the MNE and sub-unit managers may recognise that non-financial measures offer a more accurate reflection of controllability. Linking these with a corporate rewards system will be difficult given the sub-unit-specific focus of the measures.

The scope for sub-unit managers to exercise initiative is limited under either scenario. Learning by means of financial performance measures is confined to sales generation or cost reduction and non-financial measures may appear misaligned or partially compatible with MNE strategy. Entrepreneurial innovations to increase shareholder value may be subordinated to the need to remain within result ranges expected by the tax authorities. One supposition is that the tax-compliant MNE will ossify. Tax-compliant transfer prices built into plans will inhibit learning from financial performance indicators and reduce sub-unit management motivation.

## 7. Conclusions

The implications of the MNE adopting fiscal compliance as the objective of transfer pricing is the focus of

this review. It was first necessary to show the pressure tax authorities and regulators can exact on MNEs in order to discover the incentives for adoption or, more realistically, the penalties for non-adoption. Since 1995, the international transfer pricing tax regime has become more comprehensive, precise in its requirements and potentially more intrusive. Principles, the ALS norm, rules and procedures continue to evolve within the OECD recommendations but the level of detail varies by national tax authority. The new regime offers incentives for compliance mainly by means of APAs, acceptance of a range of 'arm's length' results and by an increase in the number of alternative acceptable transfer pricing methods. Simultaneously, the burden of proof and extensive documentary evidence is placed on the MNE to demonstrate compliance. For the most stringent, rule-based tax authorities this requires strategic, functional analysis with comparables at an operational level to be available contemporaneously for an individual or similar transactions between sub-units or affiliates. We argue that the MNE will be inclined to comply with the tax authority's rules that are most detailed, the highest-common-denominator effect. This is partly because APA's competent authority and binding arbitration procedures are unlikely to be settled or progressed effectively until the rules of the tax authority with the greatest detail are satisfied. It is also due to the need to meet these stringent requirements in the event of an audit or adjustment taking place. The penalties that national tax authorities are now able to impose provide additional momentum for tax compliance and for seriously considering ALS acceptable transfer prices for internal management reporting purposes.

At a theoretical level, there appears to be a major contradiction between the ALS and foreign direct investment with the former assuming markets or functions can provide comparables whilst the latter credits MNE existence to internalisation-specific advantages that overseas markets and firms do not possess. The practical battleground is provided by the transfer pricing method chosen and the ability to find comparables to satisfy fiscal regulators. Depending on the specific transaction, this may become more and more contrived unless an exact CUP or market price can be found. All other ALS acceptable methods may have economic efficiency and performance measurement distortions. Even CUP is questionable when supply or demand interdependencies exist. The adoption of tax-compliant transfer pricing for internal purposes may not prevent maximisation of global after-tax profit for the MNE unless tax authorities also focus on the sub-unit's results. The more

rule-based tax authorities have perhaps recognised this by targeting loss-making sub-units and those with results outside the 'arm's length' range. The pervasiveness of these regulations, therefore, penetrates through to the sub-unit's aggregated results and the MNE's strategy whilst concentrating documentary requirements at the level of transactions.

The implications for the MCS are more difficult to predict because a change to tax-compliant transfer pricing necessitates knowledge of a prior non-arm's length policy being employed. Longitudinal case studies may be one way to ascertain the impact of the change. We, nevertheless, argue that the documentary burden will lead to greater centralisation with internal and external tax experts and internal auditors being involved in systems governing sub-unit relationships and trade. The need to maintain and update functional analyses will substantiate the transfer price for tax and internal management purposes. Uniform, consistently applied transfer prices are likely to result with little scope for exceptions to accommodate market changes in different parts of the world. With the use of these same transfer prices for target setting and combined with the ALS-accepted method, there is limited scope for sub-unit management control over financial results. It is possible that managers who attempt to decrease costs and increase sales volume may produce results that trigger tax authority's interest. In exceptional circumstances, this seems feasible even though tax-compliant transfer prices are used.

The detail and volume of documentary evidence required to justify transfer prices from a fiscal perspective is unlikely to offer scope for meaningful participation by sub-unit managers in setting or changing the transfer price. The motivation usually associated with financial performance measurement for lower level managers is, therefore, put in doubt. When financial results are perceived as largely non-controllable, learning is adversely affected and any rewards link is haphazard. Sub-unit managers are either faced with a situation to game financial results or to press for performance indicators that reflect their control more accurately such as non-financial measures. Whether rewards, extrinsic or intrinsic, can be adequately associated with specific, multifarious non-financial measures acceptable to every sub-unit managers' satisfaction is an open question. The fundamental difficulty concerns the extent to which managerial judgement and commercial realities can play a part in a tax-compliant MCS.

The bleak outcome of this assessment suggests the MCS ossifies. Market dynamics, unless they effect comparables or functional analysis, have limited impact on the tax-compliant transfer price. When



they do, substantial evidence is required to alter the existing arrangement, especially if this is subject to an APA. A more sanguine view may emphasise that some tax authorities recognise the need for judgement. This enlightened perspective must be juxtaposed with the highest-common-denominator effect. It does, however, highlight the importance of the relationship between the individual MNE and the tax authority.

If we have conveyed the significance tax authorities and MNEs are giving to international transfer pricing tax policy, that is satisfactory; if we have whetted the appetite for future research in this area, that is very pleasing; if we have planted the view that the MCS of the MNE cannot be examined unless transfer pricing compliance is an endogenous, contingency variable, that is very satisfying.

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# Budgeting Research: Three Theoretical Perspectives and Criteria for Selective Integration<sup>☆</sup>

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**Abstract:** Budgeting is one of the most extensively researched topics in management accounting and has been studied from the theoretical perspectives of economics, psychology, and sociology. In the first part of this chapter we analyze budgeting research in these three theoretical perspectives, focusing on important similarities and differences across perspectives with respect to the primary research question, levels of analysis, assumptions about rationality and equilibrium, budgeting and nonbudgeting variables, and causal-model forms. In the last part of this chapter we identify four interrelated criteria for selective integrative research and provide an example of using these criteria for research on participative budgeting.

## 1. Introduction

Virtually every aspect of management accounting is implicated in budgeting.<sup>1</sup> Budgeting is related to cost accounting, responsibility accounting, performance measurement, and compensation. Budgeting is used for many purposes, including planning and coordinating an organization's activities, allocating resources, motivating employees, and expressing conformity with social norms. Not surprisingly, budgeting is one of the most extensively researched topics in management accounting (Luft & Shields, 2006). It has been investigated from multiple social

science theoretical perspectives, generating diverse streams of research that have developed in partial isolation from each other. Although any social science can, in principle, provide a basis for investigating budgeting, most of the existing accounting research on budgeting is informed by economics, psychology, and sociology; we therefore focus on these three theoretical perspectives.

Research on budgeting in all three theoretical perspectives has grown from common roots and addresses a common set of problems. Research in the three perspectives has tended to grow apart, however, as budgeting researchers are influenced more by non-budgeting research in their own theoretical perspective than by budgeting research in other theoretical perspectives. Each perspective makes different choices about which budgeting-related issues have to be examined intensively. To make the chosen issues tractable, each perspective also, at least temporarily, "simplifies away" other potentially important issues, using maintained assumptions to eliminate, hold constant, or substitute simpler versions of issues that are not the primary focus of attention. One reason for integrating the budgeting research in all three social science perspectives is that, taken together, they provide a more complete understanding of

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<sup>1</sup>We use the term "budgeting" to refer to a broad range of topics. Some research focuses on the budget as a set of numbers: for example, the amount of resources allocated to an organizational subunit and the performance target. Other research focuses on the processes of developing and using budgets: for example, the negotiation that is involved in setting budgets and modifying them after they are set. In the remaining part of this chapter, we use "budgeting" to refer to both the set of numbers and the process of arriving at it, "budget" to refer to the set of numbers only, and "budgeting process" to refer to the process only.

budgeting than is available from the literature in any one theoretical perspective alone.

Another reason for an integrative strategy is that research within a theoretical perspective often advances by modifying its assumptions and addressing issues that were previously simplified away. Researchers are likely to find that their own theoretical perspective offers only limited assistance in specifying alternative assumptions and predicting their effects. Other perspectives, which have chosen different assumptions and therefore have more experience with these alternatives, can provide assistance. For example, psychology and sociology can be helpful to economics-based researchers who want to relax the characteristic economics assumptions of unbounded rationality and stable, exogenously given preferences for wealth and leisure only. Similarly, psychology-based researchers may want to relax the common simplification of taking the behavior of superiors in a budget setting as exogenously given in order to examine the reactions of subordinates to budgeting. Economic theory can help by suggesting ways of structuring and solving the problem of mutual influences between superiors and subordinates in budgeting. However, researchers trained in one theoretical perspective often find it difficult to take full advantage of the assistance offered by research in other perspectives, because research in each perspective uses different names for the same (or similar) variables, uses the same names for different variables, makes different simplifying assumptions (not always explicitly identified), and has a different primary focus of attention (also not always explicitly identified).

The first objective of this chapter is to offer a guide to economics-, psychology-, and sociology-based scholarly research on budgeting that shares important common ground and can be integrated relatively readily. The intent is to make such research in each theoretical perspective better known and more accessible to those whose training is mostly in other perspectives. The second objective of this chapter is to identify criteria for designing and evaluating research that selectively integrates across these theoretical perspectives and to provide an example of applying these criteria to budgeting research.

These objectives limit the scope of this chapter in important ways. First, we have excluded some important budgeting research because it does not easily lend itself to the kind of integration that is the focus of this chapter. For example, the extensive political science research on governmental budgeting is not included because many of its important research questions (e.g., causes of budget deficits) differ from the questions addressed in the accounting literature.

Also, some important streams of sociology-based research are not included in this chapter because of epistemological differences (e.g., differences about what constitutes “reality” or persuasive evidence) that pose significant challenges to integration with the largely positivist research described in this chapter. The streams of research omitted in this chapter are covered in other chapters: see Miller (2006), Cooper & Hopper (2006), and Abernethy et al. (2006). A second scope limitation is that the integration this chapter aims at is selective, making valid use of a specific theory, concept, or result developed in one theoretical perspective to research a specific set of cause-and-effect relations in a different perspective. The chapter does not aim at a general theoretical unification or the creation of “one big model” of budgeting.

### *1.1. Budgeting Research: Historical Development*

The growth and contributions of the existing budgeting literature can be presented in two ways. One form of presentation is historical, showing how research questions in each theoretical perspective grew out of interactions among practice concerns, budgeting research in other perspectives, and developments in basic economics, psychology, and sociology theories. The other form of presentation is analytical, separately describing the research questions, assumptions, and results characteristic of each theoretical perspective. Although the latter presentation mode, which we use in the following sections of this chapter, is convenient for orderly exposition, it can give the impression that the three theoretical perspectives are more isolated and incompatible with each other than they actually are. Therefore, the remaining part of this introduction summarizes the common historical background of the three perspectives on budgeting and describes their key similarities and differences.

All three literatures analyzed in this chapter grew out of a common set of practitioner concerns about budgeting, which received classic expression in a field study commissioned by the Controllershship Foundation (Argyris, 1952, 1953).<sup>2</sup> These concerns continue to be reiterated in current practitioner literature (see Hansen et al. (2003) for examples). The source of these practitioner concerns is that, although budgeting has potential benefits—it can increase efficiency through planning and coordination and can support both control and learning through the comparison of actual results to plans—budgeting also has large costs beyond the easily-measured, out-of-pocket costs of operating the budgeting system. It can create rigidity,

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limit cooperation and creative response, overemphasize short-term cost control and top-down authority, encourage gaming, and demotivate employees (Hansen et al., 2003).

The initial scholarly response to these observations was a stream of motivation- and social psychology-based research, which searched for (but did not always find) systematic evidence of the costs of budgeting described anecdotally in the practitioner literature. Recognizing the complexity of individuals' responses to their social environments, the psychology-based research investigated the effects of budgeting on a variety of potentially conflicting mental states and behaviors, primarily motivation, stress, satisfaction, commitment, relations with peers and superiors, and individual managerial performance. This research also examined the association of these effects with specific budgeting practices such as the level of difficulty of budget goals, the supervisor's budget-related performance-evaluation style, and the extent to which employees' compensation depends on meeting budget goals. In particular, this research investigated the effects of participative budgeting, the remedy Argyris (1952, 1953) proposed to eliminate or reduce the costs of budgeting he observed.<sup>3</sup>

Like the psychology-based literature, the sociology-based budgeting literature was influenced by Argyris' (1952, 1953) description of the costs of budgeting. Early sociology-based studies linked this description of budgeting with the emerging literature on organizational theory, which was synthesized by March & Simon (1958) and associated with a second study of practice commissioned by the Controllershship Foundation at about the same time, examining the controllershship function in organizations (Simon et al., 1954).<sup>4</sup> This organizational theory literature focused on the difficulties of decision-making and coordination in large, complex organizations engaged in diverse activities in uncertain environments over many periods. In this setting, identifying optimal organizational practices seemed beyond the capabilities of boundedly rational individuals. In consequence, an important role of organizational structures and routines such as budgeting was to simplify organizational decision-making. Although sociology-based research

did not expect organizational practices to be always optimal, a stream of studies based on the contingency theory of organizations argued that organizations would tend to adopt practices (such as budgeting) that improved performance, and that these practices would vary systematically depending on organizational variables such as size, environmental uncertainty, and technology (Chenhall, 2006).

As sociology-based budgeting research evolved, it increasingly emphasized that individuals within an organization have conflicting interests, and organizational structures and routines can establish power relations. Some sociology-based research argued that budgeting could reduce resistance to the exercise of power by concealing it in apparently neutral routine or technical procedures such as budget formulas. Budgeting could also be identified with a social norm of rational organizational behavior, thus conferring legitimacy on decisions reached through the budgeting process. However, the breakdown of routines, structures, or shared representations through changes in budgeting (or the initial development of such routines in new organizations or subunits) could generate conflict (sometimes prolonged) that hindered the operation of an organization's decision-making process.<sup>5</sup> Thus, the sociology-based budgeting literature sometimes represented practices like participative budgeting and budget-based performance evaluation and compensation as ways of simplifying organizational decision-making for boundedly rational individuals, and sometimes represented them as part of the construction, functioning, and occasional breakdown of power relations in and around organizations.

Argyris' study (1952, 1953) and the early psychology-based research it stimulated also played a role in early economics-based studies, as researchers began to use the emerging economics of information to analyze accounting practice, including budgeting. Citing Argyris (1952) and social psychology-based studies such as Hopwood (1972), which documented costs of budget-based evaluation of employees, Demski & Feltham (1978) asked: what are the offsetting benefits of this practice that might account for its prevalence? How can the cost-benefit tradeoff be analyzed to determine whether the combination of costs and benefits provided by one budgeting practice (such as budget-based performance evaluation and reward) is better for both employer and employee than the tradeoff provided by an alternative practice? Economics-based research (e.g., Baiman & Evans,

<sup>3</sup>The emphasis on employee empowerment in some of the practitioner literature analyzed in Hansen et al. (2003) can be seen as a contemporary analog to the emphasis on employee participation in the earlier literature.

<sup>4</sup>Hopper et al. (2001) note the importance of the Argyris' (1952, 1953) and Simon et al.'s (1954) studies for the early development of organizational and behavioral management accounting research in Britain.

<sup>5</sup>For examples of this stream of budgeting research, see Covaeski & Dirsmith (1988a, 1988b) and Czarniawska (1997).

1983; Kanodia, 1993; Penno, 1984) also took up the theme of participative budgeting from the practice- and psychology-based literatures, and subsequent economics-based research has explored the optimal cost-benefit tradeoffs associated with other budgeting practices (e.g., variance investigation policies, hurdle rates for capital budgeting).

The economics-based research thus often addressed the same budgeting practices as the psychology- and sociology-based research but shifted the focus of primary, intensive research attention. In the psychology-based research, what was “under the microscope,” showing its full complexity, was the nature of individuals’ reactions to budgeting practices, while many features of the organization in which these practices operate appeared only sketchily in the background. In the economics-based research, the preferences and beliefs of individuals were much simplified, and what was “under the microscope” was the nature of the optimal tradeoffs in employment agreements between owners and employees with conflicting preferences and different information, and how these tradeoffs affect organizational performance. In the sociology-based literature, what was “under the microscope” was the role of budgeting in organizational processes and their outcomes (e.g., organizational performance). Representations of individual preferences and beliefs are relatively underdeveloped in the sociology-based research, just as representations of organizational structure and process in large complex organizations are relatively underdeveloped in the economics- and psychology-based literatures.

The research questions formulated by the budgeting literature in the last several decades are likely to remain important questions for future research: How do budgeting practices affect individuals’ motivation and organizational performance? What role should budget goals play in evaluating and rewarding employees’ performance? What are the costs and benefits of different levels of budget–goal difficulty and different methods of setting these goals? How does budgeting help or hinder in planning and coordinating activities in complex organizations, and what is its role in generating or resolving organizational conflict? How do the answers to all these questions change with changes in nonbudgeting variables like environmental uncertainty, technology, and organizational strategy and structure?

### 1.2. Three Theoretical Perspectives: A Summary Matrix

The matrix in Table 1 provides a structure for our analysis of the budgeting literature. The rows identify

important characteristics of budgeting research that will be described in more detail in the remainder of this chapter. The three columns of the matrix represent the three theoretical perspectives: economics, psychology, and sociology. It is important to note that the existing scholarly literature on budgeting has drawn on only limited portions of the social sciences on which it depends. The psychology-based literature on budgeting relies more on motivation psychology and social psychology than on cognitive psychology. The economics-based literature on budgeting relies on principal–agent models but not on other potentially relevant economic theory such as models of adaptive behavior in games or complementarities in organizational design. The sociology-based research on budgeting is mostly based on contingency and institutional theories rather than population ecology or critical theories. Thus, the entries in the columns of Table 1 are not descriptions of economics, psychology, sociology as a whole, but only of the scholarly literature on budgeting that is most prevalent in each perspective.

The first row in the matrix presents the (broadly defined) primary research question about budgeting on which each perspective focuses. The second row presents the level of analysis at which most research in each perspective is conducted. The level of a variable is defined *at the level at which the variation of interest occurs* (Klein et al., 1994; Kozlowski & Klein, 2000; Rousseau, 1985).<sup>6</sup> For example, participative budgeting is an individual-level variable when a study examines effects on individual mental states or behavior of individuals’ beliefs about how much they participate in budgeting, and the researcher is interested in variation across individuals *per se*, not in individuals as proxies for subunits or organizations. Participative budgeting is an organizational-level variable when a study examines cross-organizational differences in participative budgeting, and the researcher’s goal is to relate this variation in budgeting

<sup>6</sup>This use of the term “levels” differs from two others that occasionally appear in the literature. First, levels of analysis are not identical to hierarchical levels. A CEO is not a higher level of analysis than a shop-floor worker: both are individuals. Second, the level of analysis of a variable is not necessarily the level where it appears to belong because it is internal to or controllable at that level. For example, environmental uncertainty, even if it is external to and uncontrollable by organizations, can be an organizational-level variable in studies that focus on cross-organization differences in this uncertainty, or an individual-level variable in studies that focus on differences across individuals in their beliefs about the uncertainty of the environment.

Table 1. Comparison of budgeting research across three social science theoretical perspectives.

	Economics	Psychology	Sociology
Primary research question	What is the economic value of budgeting for owners and employees?	What are the effects of budgeting variables on individuals' minds and behavior?	How does budgeting influence decision-making and bargaining processes among a plurality of interests pertaining to planning and control of social and organizational resources?
Level of analysis	The agency (employer and employee), as a simplified representation of an organization or subunit.	Individual. The focus is on a subordinate, frequently in the context of a superior-subordinate dyad.	Organization and subunit.
Rationality assumption	Perfect rationality: costless calculation and consistent preferences.	Boundedly rational.	<ol style="list-style-type: none"> <li>1. Contingency theory: boundedly rational and satisficing.</li> <li>2. Institutional theory: bounded rationality and satisficing (volition and choice are important).</li> </ol>
Equilibrium assumption	Nash equilibrium.	Single-person cognitive consistency.	<ol style="list-style-type: none"> <li>1. Contingency theory: fit between contingencies and organizational characteristics.</li> <li>2. Institutional theory: tension and disequilibrium are due to conflicting interests of employees.</li> </ol>
Budgeting variables	Characteristics of budgeting and compensation practices, including budget-based contracts, participative budgeting, capital budgeting, and variance investigation.	Participative budgeting, budget goal difficulty, budget emphasis in performance evaluation, budget-based compensation.	<ol style="list-style-type: none"> <li>1. Contingency theory: participative budgeting, budget-based performance evaluation, budget importance, using operating budgets for management control.</li> <li>2. Institutional theory: budgeting process</li> </ol>
Nonbudgeting variables	<ol style="list-style-type: none"> <li>1. Labor market: employees' skill and preferences;</li> <li>2. Information structure: public and private information, state uncertainty;</li> <li>3. Outcomes: individual welfare, organizational performance, budget slack.</li> </ol>	<ol style="list-style-type: none"> <li>1. Mental states: attitudes, motivation, satisfaction, stress;</li> <li>2. Organizational context: task uncertainty;</li> <li>3. Behavior: gaming;</li> <li>4. Performance: individual managerial.</li> </ol>	<ol style="list-style-type: none"> <li>1. Contingency theory: organizational size, structuring of activities, decentralization, technology automation, subunit interdependence, diversification strategy.</li> <li>2. Institutional theory: symbolic value of accounting, resource negotiating and</li> </ol>



Table 1. (Continued)

	Economics	Psychology	Sociology
Causal-model form	1. Analytical models: bidirectional nonlinear interaction; 2. Empirical models: unidirectional linear additive.	Stage 1: unidirectional direct linear additive; Stage 2: unidirectional direct linear interaction; Stage 3: unidirectional indirect linear additive.	bargaining, concealing and mobilizing power, environmental change, and organizational change. 1. Contingency theory: unidirectional, direct, linear additive or interaction. 2. Institutional theory: unidirectional or bidirectional direct or indirect linear additive or interaction.

to variations in technology, structure, or performance across organizations.

The third and fourth rows present assumptions about rationality and equilibrium that differ across perspectives and create important differences in the way in which budgeting is represented and analyzed in each perspective. The fifth and sixth rows present the budgeting practices most commonly studied in each perspective and the nonbudgeting variables most often linked to budgeting in each perspective. The last row presents causal-model forms that are characteristic of the research in each perspective (e.g., unidirectional versus bidirectional,<sup>7</sup> direct versus indirect, linear versus curvilinear, additive versus interactive; see Luft & Shields (2006) for definitions of causal-model forms).<sup>8</sup>

<sup>7</sup>In unidirectional models, causal influence runs from independent to dependent variables but not in the opposite direction. In bidirectional models, two variables or sets of variables mutually influence each other. In cyclical recursive bidirectional models, there is an identifiable time interval between the change in one variable and the resulting change in another variable. In contrast, in reciprocal nonrecursive models, the changes in the two variables occur simultaneously or at time intervals too short for the causal influences in each direction to be distinguished empirically (Berry, 1984).

<sup>8</sup>The matrix rows represent cross-perspective similarities and differences relevant to the specific integration opportunities and challenges described in this chapter (see the final section of the chapter for examples). For an example of a broader characterization of differences across multiple theoretical perspectives (including a wider range of sociological theories and accounting issues other than budgeting), see Hopper et al. (1987).

The following three sections use the structure in Table 1 to describe and analyze the research on budgeting in the economics, psychology, and sociology perspectives, respectively. The criteria and examples for valid integrative research are discussed in the final section.

## 2. Economic Perspective on Budgeting

### 2.1. Primary Research Question

Economics-based budgeting research views budgeting as a component of the organization’s management accounting system.<sup>9</sup> Budgets play important roles in coordinating activities and providing appropriate incentives within organizations. Economics-based research focuses on equilibrium budgeting arrangements that maximize the combined interests of organization owners and managers. This research investigates the use of budgeting practices (e.g., budget performance measures, budget goals (standards), budget-based compensation, participative budgeting) as an equilibrium response to labor market characteristics such as the skills and preferences of potential employees, information characteristics such as uncertainty with respect to factors such as cost and

<sup>9</sup>As indicated in the introduction, we consider the allocation of resources to organizational units and the evaluation of those units based on some comparison of actual versus budgeted results to be the essential features of budgeting. Economics-based research on organizational incentives and compensation does not always use the term “budgeting” to describe these situations and practices. We concentrate primarily on research labeled as “budgeting”, but we also incorporate other research that addresses the essential features of budgeting even if it does not use that term.

demand (state uncertainty) and differences in information between owners and managers (information asymmetry). This research also analyzes how the equilibrium choices of budgeting practices produce outcomes such as individual welfare, organizational performance, and budget slack.

The primary research question underlying economics-based budgeting research is: what is the economic value of budgeting practices for owners and employees? Economics-based research attempts to answer this question as an outcome of organizations' choosing budgeting practices that maximize their objectives, given the specific circumstances that they face. Of course, this approach implies that budgeting's benefits exceed its costs; otherwise, organizations would be better off without budgeting.

Economics-based research views budgets as playing *decision facilitating* and *decision influencing* roles within the organization (Demski & Feltham, 1976).<sup>10</sup> Budgets *facilitate* decisions by enhancing coordination across subunits as the planned activities of one subunit affect the plans of other subunits. Budgets also facilitate decisions when employees with superior information about local conditions such as market demand or production costs supply that information so that owners can improve decisions. Employees often communicate such information via participative budgeting. The employees' communications concerning anticipated demand or production potential inform subsequent decisions about levels and mixes of organizational inputs and outputs. Owners must carefully consider how to use such communications because this use will determine how costly it is to induce employees to communicate fully and honestly, as we illustrate later. Budgets *influence* decisions because of their role in managerial performance evaluation and compensation. That is, budgets influence managers' and other employees' personal tradeoffs between labor and leisure, as well as their allocation of total effort across different tasks. For example, the potential to earn a bonus for achieving budget goals will influence employees' total effort and the distribution of their effort across specific activities such as cost control, sales, or quality improvement.

<sup>10</sup>Economics-based budgeting research focuses primarily on for-profit organizations. Nevertheless, budgeting's decision-facilitating and decision-influencing roles operate in both for-profit and not-for-profit organizations. Hence, we use the broader term "organizations" to refer to both types of entities.

## 2.2. Level of Analysis

The economic approach to budgeting focuses on "the agency"; that is, the owner-employee dyad, as the level of analysis.<sup>11</sup> The agency can serve as a simplified representation of either an organization as a whole (owners and employees) or a subunit of the organization (superior and subordinate).

## 2.3. Assumptions

Owners and employees are assumed to be perfectly rational individuals who make decisions that maximize consistent preferences and for whom calculations are typically costless and perfect. Conventional assumptions about preferences are that individuals prefer more wealth to less, more leisure to less, and that they are either risk-averse or risk-neutral.<sup>12</sup> Individuals generally know others' preferences and they anticipate that others will act to maximize those preferences. Choosing what actions to take or what budget communications to send can be complex problems in environments with large sets of possible actions, communications, uncertain states, and related decisions by other individuals. Despite these complexities, the economic approach typically assumes that individuals can solve such problems perfectly and costlessly.<sup>13</sup>

Next, we describe how the economic perspective on budgeting identifies equilibrium outcomes that balance the interests of the owner and employee. Although an organization is unlikely to be in equilibrium at any given time, economics-based research nevertheless focuses on equilibrium as the natural position toward which an organization will move as a result of strategic interaction between the owner and employee. In this strategic interaction, the owner moves first by selecting the organization's

<sup>11</sup>We later discuss how some economics-based theoretical research extends the level of analysis to more complex organizational structures; for example, Melumad et al. (1992) allow the principal to contract with responsibility center managers who, in turn, contract with other agents.

<sup>12</sup>The economic approach can potentially incorporate richer preferences (e.g., one individual's utility could depend not only on her own wealth, but also on the wealth of other individuals). Nevertheless, the great majority of economics-based research assumes that individuals are purely self-interested.

<sup>13</sup>Although analytical economic models assume that individuals' information processing is costless, the firm may incur a cost to acquire information (e.g., Demski & Feltham, 1978). Similarly, some economics-based research on budgeting and incentives assumes that there are costs associated with transmitting detailed information from local managers to headquarters within an organization.

information system, incentive system, and budgeting practices. Employees move next by deciding whether to work for the organization, and if so, choosing a mix of effort levels across tasks. In equilibrium, the owner selects the profit-maximizing information, incentive and budgeting systems, given all conditions facing the organization and anticipating how the employee would react to all possible information, incentive, and budgeting choices. In turn, the employee selects actions and reports that maximize his or her own expected utility in light of the information, incentive and budgeting systems that he or she faces. The result is a Nash equilibrium in which both parties (owner and employee) choose the best responses to the other party's strategy.

#### 2.4. Budgeting and Nonbudgeting Variables

This section begins with a brief overview of the recent development of the literature on the economic approach to budgeting. After this overview, we discuss the budgeting and nonbudgeting variables addressed in this literature, organized according to the research methods employed—analytical models, econometric analysis of archival data, and laboratory experiments.

Current economic models of budgeting evolved from the development in economics of the role of information in organizations beginning in the 1960s (Demski, 1980; Demski & Feltham, 1976; Feltham, 1972). Researchers began with single-person models in which budgeting could provide decision-facilitating information for that individual. Feltham (1968) first emphasized that under uncertainty an individual's demand for information depends on the relation between the decision to be made and the potential information available. This was the first recognition that the demand for information (or processes such as budgeting) was endogenous rather than exogenous. This means that the value of information should be derived from the decision context rather than being simply assumed.

The other extensions recognized separate roles for different individuals. For example, the decision maker and the information evaluator could be different individuals (Demski & Feltham, 1976) or individuals with common goals could operate in teams who shared information (Marschak & Radner, 1972). The final step in this evolution came with the development of agency theory, in which individuals have different preferences and information. By proper designing of incentive and budgeting arrangements, an owner can induce an employee, who would otherwise devote all available time to activities the employee prefers, to devote some time to activities that benefit the owner, and to communicate to the owner what the employee knows about local conditions.

The economic theory of agency (Ross, 1973) forms the foundation for analytical budgeting models by evaluating how state uncertainty and information asymmetry affect the use of information-based practices such as budgeting in incentive contracts between owners and employees. Baiman's (1982, 1990) two literature reviews on agency theory and managerial accounting, as well as Lambert's (2006) review of contracting theory and accounting, provide comprehensive and insightful analyses of the broad conceptual foundations and technical modeling issues that arise when researchers apply agency theory to a range of managerial accounting issues, including budgeting.<sup>14</sup>

Agency theory provided an important conceptual advance for the study of budgeting by offering a well-defined structure in which the value of such practices (including their decision-influencing value) could be established in a rigorous, internally consistent manner. But perhaps even more important than the internal rigor of the analysis was agency theory's shift from a single-person (owner or employee) paradigm to a multiperson paradigm (owner–employee dyad). Agency theory showed how practices such as budget goals and communication of employees' private information in incentive contracts could create value by improving the resolution of the owner–employee conflict resulting

<sup>14</sup>Budgeting and incentive research in accounting relies heavily on results from economics, including optimal risk-sharing, the value of monitoring, and the Revelation Principle. Optimal risk-sharing means that a risk-neutral principal should impose the minimum risk on risk-averse agents, so long as incentive arrangements are adequate to motivate the desired effort and communication of private information. Holmstrom (1979) establishes that when a monitoring signal, such as an accounting report, is at least marginally informative about the agent's action, the signal has economic value. Therefore, contracts incorporating the signal can provide better incentive versus risk-sharing tradeoffs than any contract that excludes the signal. The Revelation Principle (Myerson, 1979) greatly simplifies modeling communication within firms, including budget-related communication. Myerson's insight in the Revelation Principle is that for any budgeting arrangement in which the manager has incentive to report falsely (e.g., to create budget slack) the owner could have induced the manager to report honestly by promising the slack as a reward. Therefore, the researcher loses no generality by building a model with honest reporting as long as the model requires that owner to give the manager the necessary incentive to report honestly. Focusing only on models with honest reporting greatly simplifies modeling budgeting problems. Using these results, researchers in accounting can consider an economic environment, analyze whether budgeting creates value in that environment, and if so, then address how budgeting should be used.

from differences in preferences and information. Agency theory did so by integrating elements of budgeting into the compensation system that simultaneously determined the welfare of the owner and employee. We next examine the role of budgeting in such analytical models.

#### 2.4.1. Analytical Models

Building on these developments in economics, Demski & Feltham (1978; hereafter DF) first introduced analytical (formal mathematical) agency models of budgeting. DF demonstrate how budgeting (in the limited sense of the use of “budget-based contracts,” as defined in the next subsection) can create value when markets are “incomplete.” In complete markets, all information is public, enabling owners to construct contracts with employees based on the level of effort that the employees would supply as well as on the employee’s skill (in economics terminology, the employee’s “type”). As a result, owners could design optimal incentives without introducing budget-based compensation practices. However, firms typically operate in incomplete markets, where employees’ efforts and skills are private information known only by the employees. In such environments, DF prove that budgeting creates value. They do so by showing that compared to the welfare of the owner and employee without budgeting, introducing budgeting-based compensation yields a Pareto improvement. This means that with budgeting the owner is better off and the employee’s welfare either stays the same or improves relative to their welfare levels without budgeting.

The ability of agency theory to relate budgeting to the welfare of both owners and employees has two important implications. First, alternative budgeting practices can potentially increase or decrease the welfare of both the owner and the employee, or increase the welfare of one while decreasing the welfare of the other. For example, increasing budget-based incentive compensation could improve the employee’s welfare while making the owner worse (better) off by decreasing (increasing) organization profit. This first implication means that a complete analysis of alternative budgeting practices should reflect their effect on the welfare of both parties. For example, showing that budgeting practice A improved the employees’ welfare relative to budgeting practice B, while ignoring the effects on the owner, would be an incomplete basis for judging the relative desirability of the two practices.

A second important implication of the economic perspective’s focus on the agency is that budgeting is treated as a component of the incentive-contracting system that governs the employment relation. DF describe how budgeting practices operate within the

incentive contracts that owners design to influence the reports and decisions of employees. Both the analytical agency and the organizational architecture literatures (Brickley et al., 1997) emphasize the importance of the owner simultaneously choosing various features of the budgeting and compensation systems so that these choices properly complement each other.

We next describe the budgeting and nonbudgeting variables that have been addressed by analytical research. Models of four budgeting practices are selected on the basis of representing the most important analytical budgeting research: budget-based contracts, participative budgeting, capital budgeting, and variance investigation. These examples also illustrate the simultaneous consideration of both owner and employee welfare, as well as the integration of the budgeting and compensation systems.

*2.4.1.1. Budget-Based Contracts.* The primary budgeting variable that DF address is whether the employee’s incentive contract is budget-based (i.e., whether or not it contains a budget goal with one payment rule for outcomes above the goal and another for outcomes below the goal). The nonbudgeting variables addressed by DF are characteristics of the labor force such as the employee’s skill and risk preferences and characteristics of the information possessed by the owner and employee such as state uncertainty and information asymmetry (the employee’s possession of information the owner does not have).

DF analyze when budget-based contracts can provide better incentives than alternative contracts. More specifically, they establish conditions under which budget-based contracts that pay the employee a fixed incentive for achieving production at or above a budget goal are Pareto superior to linear incentive contracts that pay the employee a fixed amount per unit produced without a budget goal. The budget-based contract plays a decision-influencing role by providing the employee an incentive to exert effort at a lower cost than any linear incentive contract. The cost is lower because the budget-based contract’s fixed payment for achieving the budget goal means that as long as the risk-averse employee meets the goal, she bears no risk because her incentive payment is fixed. In contrast, because the total production depends in part on the exogenous state outcome, a linear incentive contract imposes additional risk on the risk-averse employee (e.g., the incentive payment could vary for reasons unrelated to the employee’s actions), and the owner must ultimately compensate the employee for bearing this additional risk.

DF’s results relate the budgeting variable of budget-based goals to the nonbudgeting variables of

employee risk preferences and information. They establish that two necessary conditions for budget-based contracts to outperform linear contracts are that the employee be risk-averse and that the employee's productive effort be unobservable to the owner.

DF's analytical results offer an explanation for why we observe budget-based goals in some circumstances but not in others. For example, when the owner can observe the employee's effort level, the owner has no need for budget-based goals because he can discipline the employee by threatening to fire him if he fails to exert enough effort. Likewise, if the employee's effort is private information but the employee is risk-neutral, the owner will do better to let the employee bear the risk by leasing the operations to the employee. Based on this type of reasoning, analytical models predict that organizations are more likely to use budget-based contracts as the employee's effort becomes more difficult to control by direct observation and as the employee becomes more risk-averse.

*2.4.1.2. Participative Budgeting.* A second important budgeting practice examined by analytical research is participative budgeting. In this context, several models relate the budgeting variables of participative budgeting and the employee's incentive contract to local conditions including the actual cost of production or the actual level of demand, the employee's private information about the cost and demand, and the employee's risk preferences. In these models, participative budgeting means that the employee communicates private information about local conditions to the owner and these reports influence the organization's production plans and the employee's compensation. The owner has the choice as to whether or not to base the employee's compensation, in part, on the employee's communication about local conditions. In making this decision, the owner knows that the employee has superior information about local conditions, but the employee also has the ability and incentive to manipulate his report to create budgetary slack.

Baiman & Evans (1983) and Penno (1984) demonstrate how participative budgeting can create a Pareto improvement by allowing employees to communicate their private information to the owner. Incentive payments to the employee then depend on the relation between the employee's specific communication and the resulting production and organization profit. The value of budgeting is that contracts incorporating the budget communication from the employee are Pareto superior to all contracts without budgeting communication (i.e., to all contracts without participative budgeting).

The analytical results offer an explanation for why participative budgeting is observed in some circumstances but not in others. For example, when the employee possesses no private information, participative budgeting has no value. Likewise, if the employee possesses private information but is risk-neutral with sufficient resources to fund production, then the owner will do better to let the employee bear the risk by leasing the operations to the employee. Based on this type of reasoning, analytical models predict that participative budgeting becomes more likely as the employee becomes more risk-averse, possesses more private information, and has less personal wealth.

*2.4.1.3. Capital Budgeting.* The capital-budgeting context is similar to participative budgeting in that the employee's budgetary reports communicate his private information. However, in capital-budgeting studies the budgeting variables are the level of the budget goal (hurdle rate for project approval) and the form of the budget-based contract, while the nonbudgeting variables include the employee's private information, risk preferences, wealth level, and alternative labor-market opportunities. Antle & Fellingham (1995; hereafter AF)<sup>15</sup> show how the employee's private information leads the organization to set the hurdle rate for capital-budgeting projects above the cost of capital. AF show that when the employee has superior information about local conditions (production costs), the organization maximizes expected profit by setting the hurdle rate above its cost of capital, thus foregoing profitable projects that yield returns between its cost of capital and the hurdle rate. The rationale for doing so is that the higher hurdle rate saves the organization more by limiting the employee's ability to obtain excess resources (budgetary slack) than the organization loses in foregone profits. The empirical implications are that organizations will set their hurdle rates for project approval above their costs of capital and that organizations will not invest in all apparently profitable projects.

The analytical results on capital budgeting explain why owners permit employees to build budgetary slack and why organizations set their hurdle rates for project approval above their cost of capital. The owner permits budgetary slack because eliminating all slack is too expensive; it would require producing only when the minimum cost was realized. The owner

<sup>15</sup>See also Antle & Eppen (1985) and Antle & Fellingham (1997). The latter article reviews the capital-budgeting literature, emphasizing differences between the analytical approach and behavioral approaches to information asymmetry and budgetary slack.

will do better to let the employee build in some slack because the owner is simultaneously also accumulating profit. Based on this type of reasoning, analytical capital budgeting models predict that budgetary slack and the gap between the hurdle rate and the cost of capital will increase as the employee's private information increases.

**2.4.1.4. Variance Investigation.** In this final budgeting context, the budgeting variables are whether and when the owner investigates budget variances and how the results of the investigation are incorporated into the employee's incentive contract. The nonbudgeting variables include the information structure, specifically the statistical relation between the firm's outcome and the results of the variance investigation as well as the employee's risk preferences. **Baiman & Demski (1980)** describe an organization's optimal policy for investigating budget variances. They demonstrate that given certain assumptions about the signals that are available to evaluate the employee's performance and the employee's preferences, the optimal variance investigation policy depends on how risk-averse the employee is. Specifically, for more risk-averse employees, the owner maximizes organization profit by investigating unfavorable variances and then penalizing the employee if the outcome of the variance investigation indicates that the employee has shirked. For less risk-averse employees, the owner maximizes organization profit by investigating favorable variances and then rewarding the employee if the outcome of the variance investigation indicates that the employee has exerted the proper level of effort.

**Baiman & Demski's (1980)** analytical results offer an explanation for why organizations investigate some variances but do not investigate others. The explanation is that the organization should match its investigation process to the type of employees it has. Specifically, the model predicts that as an organization's employees become more risk-averse, the organization will shift from investigating favorable variances to investigating unfavorable variances. Likewise, the organization will shift from using bonuses to reward positive investigation results to using penalties to discipline employees when the investigation reveals negative results.

**2.4.1.5. Organizational Structure.** The preceding analytical models treat an organization's organizational structure as exogenously given, and hence as one dimension of the organization's environment. However, more recent analytical research in accounting has allowed components of the organizational

structure to be endogenous (e.g., **Arya et al., 1996; Baiman et al., 1995; Hemmer 1998; Melumad et al., 1992**).<sup>16</sup> Although this research has not focused on budgeting *per se*, the simultaneous examination of compensation and organizational structures has important implications for budgeting. For example, **Melumad et al. (1992)** analyze when an owner employing two managers would designate one manager to be responsible for a cost center with authority to contract with the second manager rather than employing a "flatter" organizational structure with both managers responsible directly to the owner. They show analytically that even when communication is costless, a cost-center arrangement with budget-based contracts can do as well as any arrangement in which the owner contracts directly with both employees. Further, when communication is costly, the owner is strictly better off with the cost-center arrangement. These results illustrate how the certain features of organizational design can be treated as endogenous within the economic perspective on budgeting.

Similarly, **Arya et al. (1996)** analyze alternative organizational reporting structures to deal with multiple managers. They illustrate how the single-manager, single-project capital-budgeting model in AF, can be extended to richer settings. In particular, they show how relative ranking of projects can help an owner to obtain information from multiple managers at the minimum cost.

#### **2.4.2. Developing Empirical Implications from Analytical Budgeting Models**

The preceding discussion of analytical budgeting models has emphasized the conceptual appeal of the models' joint owner-employee focus as well as their integration of compensation and budgeting practices. Both of these features operate to make more variables endogenous, which is conceptually attractive but costly. The cost is that simultaneously analyzing owners' and employees' welfare, as well as compensation and budgeting practices, requires more complex models. In turn, more complex models reduce a researcher's ability to derive precise, unambiguous, empirically testable implications from the models. As models become more complex with additional endogenous variables, the effect of a change in any one variable depends on how that variable relates to the increasing number of other variables in the model. Because the variables in economic models are typically not assumed to be related in a unidirectional

<sup>16</sup>Much of this work is inspired by related work in economics (e.g., **Milgrom & Roberts (1992, 1995)**).

linear additive fashion, the model is more likely to predict that the effect of interest is ambiguous because it depends on other variables or relationships. We next discuss some examples of economics-based empirical budgeting research, starting with archival studies and then laboratory experiments.

*2.4.2.1. Archival Research.* Relatively few studies have tested economics-based budgeting hypotheses using archival data. This section discusses some obstacles that may account for the relatively limited research in this area, and describes three of the studies that have been conducted. Several factors combine to limit the empirical testing of the analytical budgeting models described in the previous section.

First, because disclosures mandated by the Securities and Exchange Commission (SEC) and Financial Accounting Standards Board (FASB) typically do not include many of the variables in budgeting models (e.g., employees' skills, preferences, and knowledge, local production functions, etc.), data availability is the most fundamental limitation. The relatively large number of studies of CEO compensation using mandated disclosures for the top five executives of publicly traded corporations suggests that researchers would conduct many more archival studies of budgeting in for-profit organizations if corresponding empirical archival budgeting data were available.<sup>17</sup>

Second, certain features of the results from analytical budgeting models complicate the task of a researcher attempting to conduct empirical tests based on those results. Some analytical results (e.g., the DF results cited earlier about when budget-based contracts will dominate linear contracts) are not well suited to testing with archival data. The problem is that although DF rank these two types of contracts, they cannot rule out some other contract form dominating both budget-based and linear contracts. Hence, the DF results fail to provide an unambiguous prediction about the form of contract one should expect to observe in practice. Perhaps even more importantly, many analytical results depend on non-budgeting variables such as individual risk preferences and the precise private information held

by different parties that are almost certainly unavailable in archival settings.<sup>18</sup> Measurement of such variables is more practical in experimental laboratory settings, which we discuss below.

Reflecting these and perhaps other considerations, we are aware of relatively few archival tests of the various economics-based budgeting predictions illustrated earlier. Considering the four analytical budgeting contexts described above, we are unaware of any empirical archival studies based on the models of capital budgeting and variance investigation. Models in both of these contexts do predict the form that budgeting practices (e.g., hurdle rates greater than the cost of capital, variance investigation followed by penalties for more risk-averse employees etc.) should take. However, a serious obstacle to archival testing is that these predictions depend on precise specifications of what owners and employees know about certain variables, as well as individuals' risk preferences, and as noted above, such knowledge and preferences are very difficult to measure in archival settings.

For the remaining two contexts of budget-based contracts and participative budgeting, we have identified three studies, which draw on the underlying economic intuition from the related models, although they do not test the specific predictions generated by the models. First, for the comparison of budget-based contracts to linear contracts, DF's analytical model demonstrates the role of budgeting in the key tradeoffs between incentives and risk-sharing that underlies incentive contracting in organizations. To motivate risk-averse employees to exert effort, owners use incentive contracts that impose risk on the employees. However, because the employees must be compensated for bearing this risk, owners choose the minimum amount of risk sufficient to produce the desired incentives.

Murphy (2001) and Indjejikian & Nanda (2002) are two archival studies that focus on budgeting practices. Both studies motivate hypotheses in terms of the tradeoff between incentives and risk-sharing. These studies document the role of performance goals (typically budget goals) in CEO and managerial compensation. Murphy (2001) finds that for his sample of large US corporations, budget-based measures are the most common goals in annual bonus plans.

<sup>17</sup>Archival data about budgeting in government organizations is more readily available. Using these data to test predictions based on agency models is problematic, however, because the roles and incentives of individuals in government organizations may not closely match those in the for-profit organizations represented in most agency models (e.g., owners who provide capital and have a residual claim on output).

<sup>18</sup>Lambert (2006) describes the sensitivity of agency theory results to specific individual parameters as "both a blessing and a curse". The blessing is the flexibility to explain various contract forms, while the curse is the difficulty of empirically measuring many of the parameters.

Consistent with results from analytical models, Murphy finds that organizations are less likely to use internal goals as performance goals when these goals contain more random variation (i.e., when the internal goals are “noisier”) and thereby impose more risk on risk-averse managers relative to external goals. Conversely, he finds no support for the prediction that organizations with greater investment opportunities will rely more on external goals because they face more serious dysfunctional consequences from managerial manipulation of internal goals.

Indjejikian & Nanda (2002) provide empirical evidence for their sample of managers at the CEO through plant-manager level showing that goal bonuses tend to be smaller when performance measures are noisier, but larger when organizations have greater growth opportunities and executives exercise greater discretion. Because these bonuses are often based on a comparison of actual performance to budget, the size of the goal bonus is an indicator of the amount of compensation that depends on the actual-versus-budget comparison. These results support the analytical prediction about limiting the risk imposed on risk-averse managers (but only for non-CEOs), as well as the notion that goal bonuses are positively associated with organizations’ growth opportunities.

In the participative-budgeting context, Shields & Young (1993) depart from the prior literature’s focus on the consequences of participative budgeting to identify the factors that determine when organizations will employ participative budgeting. They then draw on the analytical models’ prediction that managers’ possession of superior information is a necessary condition for participative budgeting to be valuable. Rather than controlling for all factors in the analytical model, they rely on capturing the essential economic intuition for the economic benefits of participative budgeting. They test this and other predictions using archival data and find support for the prediction relating managers’ superior information to organizations’ decisions to use participative budgeting.

*2.4.2.2. Experimental Research.* Laboratory experiments permit researchers to control environmental factors and thereby to investigate the response of individuals to environmental conditions that are difficult to measure in archival settings. With respect to the four budgeting contexts for which we earlier described analytical economic models, experiments have addressed budget-based contracts, participative budgeting, and capital budgeting, but not variance investigation.

With respect to budget-based contracts, Bonner et al. (2000) review results of 85 laboratory studies in managerial accounting and other literatures using various tasks and incentive schemes, and conclude that budget-based schemes are the most likely to produce positive incentive effects.<sup>19</sup> At a very general level, this result is consistent with DF’s finding that budget-based contracts dominate linear contracts. However, the result must be interpreted carefully because DF’s result holds only under specified conditions including unobserved employee effort and employee risk-aversion, whereas the studies reviewed by Bonner et al. typically do not reproduce these conditions. Further, DF’s comparison is from the agency perspective incorporating the welfare of the owner and employee, whereas “performance” (e.g., total units produced in a production task) is only a proxy for the welfare effects.

Participative budgeting and capital budgeting share the feature that the employee’s private information plays a central role, and a variety of experiments have addressed different implications of this private information. Studies have focused the most attention on how alternative budgeting and contractual arrangements affect the truthfulness of the employee’s communication. Various contract forms have been studied including truth-inducing and slack-inducing schemes in a single-agent environment, as well as the Groves mechanism with multiple agents. Experimental results have generally confirmed the predicted truth-inducing properties of budgeting practices identified by analytical models as inducing honest communication.

In contrast, experimental results have deviated more significantly from the predictions of economic models when the contracts give employees the incentive to misrepresent their private information. In particular, various experiments explore the extent to which individuals create the maximum potential budgetary slack through their budgetary report as the analytical models predict. Experimental results consistently find that individuals create significantly less budgetary slack than the models predict (e.g., Chow et al., 1988, 1994; Waller, 1988). Among the explanations offered for these results are that individuals’ preferences include not only wealth and leisure, but also equity or honesty, etc. (Stevens, 2002). In turn, Rankin et al. (2003) examine how such reporting behavior may influence the superior’s design

<sup>19</sup>Their terminology for budget-based schemes is “quota schemes,” but the criteria (Bonner et al., 2000, p. 26) correspond to our budget-based category.



of the budgeting contract. These significant deviations between assumed and actual communication behavior cast doubt about the optimality of budgeting arrangements designed around the assumption of wealth and leisure as the only important arguments in the utility function (Evans et al., 2001).

### 2.5. Causal-Model Form

The analytical budgeting models described earlier imply that the relations among budgeting variables and nonbudgeting variables reflect equilibrium conditions. Given the environments facing organizations, owners' design compensation and budgeting systems to maximize organization profits subject to various constraints. The constraints include ensuring that compensation and budgeting systems provide the employee with at least as much welfare as he would enjoy working elsewhere and that the employee has incentives to take productive actions and issue communications as the owner wishes. The analytical models are typically solved as mathematical programming problems in which various combinations of constraints may be binding in equilibrium depending on the conditions facing the organization. This implies that the equilibrium values of budgeting variables will be complex nonlinear functions of the nonbudgeting variables as well as the other budgeting variables. Even in a simple model of one owner and one employee in which the employee has only a few possible private information signals and a few possible effort-level choices, the number of variables (incentive payments and budgeting practices) in the solution grows exponentially with the number of effort levels and signals. Likewise, the solution must simultaneously satisfy a series of potentially nonlinear relations that may hold as equalities or inequalities, making it very difficult to find simple, explicit solutions in any but the most limited environments.

Part of the resulting complexity stems from researchers' desire to capture relations among such factors as the organization's structure and budgeting practices. If certain organizational features are allowed to be endogenous rather than taking them as exogenously fixed, then this has the attractive feature of recognizing interactions between variables that researchers believe to be important. At the same time, the cost of doing so is that the equilibrium solutions involve solving a system of equations to obtain results that are more complex and difficult to interpret.

In contrast to the complex nonlinear analytical solution forms that are very sensitive to individual risk preferences and beliefs about uncertain variables, the corresponding empirical tests typically assume unidirectional linear additive model forms. This

simplicity reflects at least two considerations. First, as illustrated in the preceding series of specific applications, the precise empirical implications of the analytical models are usually too specific for empirical testing. For example, consider the relatively precise prediction that participative budgeting is valuable when the employee has private information and is risk-averse. However, what researchers really want to compare empirically is situations with more private information versus those with less private information (as opposed to the extremes of some private information versus no private information). Therefore, researchers extrapolate from the extremes in the model to the qualitative relation between situations with more versus less private information, relying on the general economic intuition for the effect. However, this means that researchers can only make a simple directional prediction.

The second consideration is that researchers' ability to measure many of the variables such as risk preferences and private information is relatively limited. As a result, empirical research relies primarily on less precise, qualitative predictions concerning the relations among variables that can be measured as opposed to more precise predictions about variables that cannot be measured.

### 2.6. Summary

Perhaps the most distinctive feature of the economic perspective on budgeting is the simultaneous reconciliation of the interests of owners and employees. Researchers have employed theoretical, archival empirical, and laboratory experiment studies to examine why budgeting practices are used, the form these practices take, and how they affect reporting behavior (budgetary slack) and individual welfare. From an economic perspective, owners respond to incomplete markets by using budgeting practices within incentive systems to better inform decisions and to better align the incentives of decision makers with the owners' interests (a decision-influencing use of information). Analytical research shows how budgeting practices such as participative budgeting can be rationalized by its decision-facilitating contributions, while the investigation of budget variances creates value by enhancing the efficiency of incentives. Analytical research also demonstrates how capital budgeting practices may limit investments to discourage the creation of budgetary slack, and empirical research establishes that organizations choose budget goals in response to the relative level of noise in alternative goals. Finally, laboratory experiments confirm that individuals do respond to economic incentives, but that other considerations such as

honesty or fairness appear to significantly influence budgeting communications, thereby reducing the level of budgetary slack.

Opportunities for integrating the economic perspective with other theoretical perspectives can potentially take many forms. For example, the economics perspective might consider how to incorporate psychology's richer representation of how budgeting affects individuals. Second, economics could also recognize such organizational processes or constraints as whether superiors or subordinates initiate budget negotiations, the maximum length of negotiations, the impasse resolution process, etc.

### 3. Psychology Perspective on Budgeting

#### 3.1. Primary Research Question

The psychology-based budgeting research can be characterized by the distinguishing feature of psychology relative to the other social sciences, which is its focus on how individuals' minds (e.g., mental processes and states) are influenced by stimuli and influence their behavior (e.g., actions, communications).<sup>20</sup> The psychology-based budgeting research has focused almost exclusively on answering the following question: *How do budgeting variables affect individuals' minds and behavior?* In contrast, little research addresses the question: *How do individuals' minds and behavior affect budgeting variables?*

Early research on the effects of budgeting tested for unconditional (universal) effects of budgeting variables (e.g., whether participative budgeting or budget goal difficulty generally improved performance). Subsequent research refined the unconditional predictions by investigating interacting variables (e.g., uncertainty) that conditioned the effects of budgeting variables on individuals' minds and behavior. Recent studies have addressed inconsistent results in prior research by investigating the intervening mental states and processes that mediate between budgeting variables and individual behavior. (Section 3.5 provides more information on this historical reshaping of the research question in psychology-based budgeting research).

#### 3.2. Level of Analysis

Almost all of the extant psychology-based budgeting research is at the individual level of analysis,<sup>21</sup> because of its focus on how the effects of budgeting vary across individuals. Two caveats should be considered,

however. First, the focus typically is on a subordinate's budgeting-related mental states and behavior in the context of a superior-subordinate dyad (e.g., as they work together to develop a budget for the subordinate). Although the dyadic relation provides the budgeting context, this research usually does not investigate the causes or the effects of a superior's mental state or behavior, instead focusing only on the subordinate. Second, only a few psychology-based studies focus on budgeting at the subunit level with multiple subordinates (e.g., Daroca, 1984).

#### 3.3. Assumptions

Two assumptions are made in the psychology-based budgeting research. One is the assumption that behavior is boundedly rational.<sup>22</sup> The other is that individuals seek or desire a state of internal (single-person) equilibrium that is called *mental consistency*, but they are often in a state of disequilibrium.

Psychology-based research on budgeting assumes bounded rationality because complex and ill-structured problems like those related to developing and implementing budgets can exceed individuals' limited cognitive processing capacity. For example, when making judgments and decisions about budgets (e.g., searching for information, identifying alternatives, assessing the costs, benefits and probabilities associated with each alternative), the information gathering and mental costs of searching and processing information will often exceed individuals' mental capacity to consider all information about all alternatives and select the best alternative. As a result of being boundedly rational, individuals frequently will not consider all alternatives and all possible information about each alternative and instead will frequently select the first alternative identified that provides benefits above some aspiration level. The alternative selected does not necessarily represent the optimal tradeoff between the costs and benefits of searching and processing information; it is simply a satisfactory tradeoff. That is, the alternative selected does not necessarily maximize an individual's expected utility. Moreover, levels of aspiration tend to adjust to circumstances. In order to avoid mental tension between what individuals believe is achievable and what they prefer (i.e., to avoid cognitive inconsistency), they may adjust their preferences to feel better about whatever outcomes they believe are achievable.

The notion of cognitive consistency of an individual's mental state is an important assumption in psychology and is the basis for the psychological concept

<sup>20</sup>See Birnberg et al. (2006) for a detailed presentation of psychology-based research on management accounting practices.

<sup>21</sup>See Chenhall (1986) for an exception.

<sup>22</sup>For analysis and evidence on bounded rationality, see Conlisk (1996), Rabin (1998), and Shafir & LeBoeuf (2002).

of equilibrium. Cognitive consistency means that individuals' mental states (e.g., attitudes, beliefs, preferences) fit together harmoniously and do not conflict. When mental states are not harmonious or are in conflict (e.g., cognitive dissonance), then individuals are assumed to experience an unpleasant psychological state of tension, which causes stress, and stress then motivates individuals to reduce the stress by changing a mental state(s) to create cognitive consistency. "The inconsistent relation among cognitions is referred to [in various psychology theories] as cognitive imbalance ... asymmetry ... incongruence ... and dissonance" (Shaw & Costanzo, 1970, p. 188; see also Deutsch & Krauss, 1965).

### 3.4. Budgeting and Nonbudgeting Variables

The most frequently used budgeting variables in the psychology-based budgeting research are participative budgeting, budget goal difficulty, budget-based performance evaluation,<sup>23</sup> and budget-based compensation.<sup>24</sup> The most frequently used nonbudgeting variables are (1) mental states (e.g., attitudes, motivation, satisfaction, stress); (2) organizational context (e.g., task uncertainty); (3) behavior (e.g., effort, gaming, inaccurate communication); and (4) performance, usually individual managerial performance. Typical studies examine the effects of various combinations of participative budgeting, budget-based performance evaluation, and task uncertainty on stress and/or performance.<sup>25</sup>

### 3.5. Causal-Model Form

To examine the effects of budgeting variables, the psychology-based budgeting research has employed three causal-model forms, each for a different historical stage of this research. All three models are unidirectionally linear with budgeting variables as independent variables, but they differ on whether they are additive- or interactive-effects models and direct- or indirect-effects models. The remaining part of this section describes the casual-model form used in each stage to investigate the effects of budgeting and why each form is used.

<sup>23</sup>This variable is often called budget-constrained performance evaluation style, budget emphasis in performance evaluation, or reliance on accounting performance measures (RAPM) (Hartmann, 2000).

<sup>24</sup>Budget-based compensation means that an individual's compensation is influenced by the difference between actual and budgeted performance.

<sup>25</sup>See Shields & Shields (1998) for a review of the research on participative budgeting and Hartmann (2000) for a review of the research on budget-based performance evaluation.

#### 3.5.1. Stage One: Additive Model

The first budgeting studies sought to answer the question: What are the effects of budgeting variables on individuals' minds and behavior? This question arose in response to increasing awareness that successful budgeting depends on how budgeting affects psychological variables in organizations (e.g., cognitive consistency, stress) and not only on its technical correctness (e.g., mathematical correctness of calculations; adherence to policies concerning the timing, form, aggregation, and documentation of budgets; and the numerical consistency of budgets across organizational subunits in achieving organizational goals). Until the early 1950s the accounting literature and practice had largely treated budgeting as a technical phenomenon only. Practitioners increasingly noticed, however, that organizations with good technical budgeting sometimes experienced undesirable social-psychological consequences related to budgeting (e.g., interpersonal conflict). In response, the Controllershship Foundation sponsored a study by Argyris (1952, 1953) to increase understanding of budgeting's psychological effects.

##### 3.5.1.1. Participative Budgeting. Argyris' (1952, 1953)

field study, based on the human relations perspective (now called industrial and organizational psychology), sought to identify the nature and effects of these undesirable social-psychological consequences. He identifies several ways in which pressure to achieve budgets can create cognitive inconsistency in employees' minds (e.g., "I want to achieve my budget and be a good organization citizen but I can't achieve my budget if I were to follow organization policies."). This cognitive inconsistency results in stress, interpersonal conflict, and distrust, which in turn cause dysfunctional behavior (e.g., gaming, reduced effort, poor communications).

Argyris' principal recommendation for reducing these dysfunctional effects of budgeting is to use participative budgeting (i.e., a superior lets a subordinate be involved with and have influence on the setting of the subordinate's budget) and avoid pseudo-participative budgeting (i.e., a superior lets a subordinate be involved with but have no influence on setting the subordinate's budget). Using concepts from the human relations perspective, Argyris argues that participative budgeting would reduce or eliminate the conditions (e.g., budgets that employees believe are not achievable, too much pressure to achieve budgets) that lead to poor mental states (low motivation to achieve the budget) and dysfunctional behavior.

Argyris provided qualitative evidence that budgeting can adversely affect employees' mental states and behavior. This evidence highlighted how the success of budgeting for motivating employees and for planning depended on how budgeting influenced employees' mental states and behavior. Two subsequent studies, motivated in part by Argyris' evidence, had an important influence on the development of psychology theory-based investigations of budgeting. First, **Stedry (1960)** experimentally tested the effects of budget goal difficulty and individuals' motivation (level of aspiration) on their performance. **Stedry (1960)** predicts and reports experimental evidence that performance is an interactive function of the difficulty and the timing of an imposed budget goal. **Stedry (1960)** uses three levels of imposed budget goal difficulty (easy, medium, and difficult) and finds evidence that if individuals receive the imposed budget goal *before* setting their personal aspiration level, then their performance is highest with the difficult budget goal, because individuals adopt this goal as their own aspiration level. In contrast, if they receive the imposed budget goal *after* setting their own aspiration level, then the difficult budget goal does not result in higher performance than the medium budget goal, because individuals tend to retain the (lower) level of aspiration they chose initially.

In a second influential study, **Hofstede (1967)** uses interviews and surveys to investigate relations among many budgeting and nonbudgeting variables. His primary focus, however, is the effects of participative budgeting and budget goal difficulty. Using level of aspiration theory, Hofstede predicts and finds evidence that budget goal difficulty has a nonlinear effect on motivation to achieve the budget: maximal motivation occurs when budget goal difficulty is moderate (neither very easy nor very difficult). In contrast, Hofstede provides evidence that budget goal difficulty has no effect on job satisfaction. He also hypothesizes and finds evidence that participative budgeting has a positive effect on motivation to achieve the budget.

**Stedry (1960)** and **Hofstede (1967)** have an important impact on the research strategies of ensuing psychology-based budgeting studies. In reaction to the scope and complexity of these two studies (e.g., number of variables, causal-model form), most subsequent studies use simpler and more focused research designs. For example, like much of the research in organizational and social psychology, most subsequent budgeting studies use a small set of variables and examine simple causal-model forms, almost always hypothesizing and testing for direct linear additive effects of budgeting on individuals'

mental states and behavior. However, the results of many of these budgeting studies are contrary to prediction and inconsistent across studies: some studies find positive effects of a budgeting variable while others find negative or no significant effects (**Hopwood, 1976**; **Kenis, 1979**; **Shields & Shields, 1998**).

**3.5.1.2. Budget-Based Performance Evaluation.** Up to this point the budgeting research is primarily focused on the motivating and planning use of budgeting via participative budgeting. **Hopwood (1972)** extends the psychology-based study of budgeting by investigating whether the extent and style of managers' use of budgets to evaluate their subordinates' performance influences subordinates' mental states and behavior.<sup>26</sup> He develops three styles of evaluating performance: (1) budget constrained, in which budgets play a key role in evaluating performance and are used in a rigid manner such that failure to achieve budget goals results in poor evaluations regardless of the reasons for failure; (2) profit conscious, in which budgets provide goals for indicating whether performance is good or bad, but they are used in a more flexible manner and viewed as just one indicator of a longer-term concern with profits (i.e., spending over the current budget can be viewed favorably if it results in higher expected future profits); and (3) nonaccounting, in which budgets are of secondary importance and performance is primarily evaluated by reference to nonaccounting information. Hopwood argues that accounting and budget information for evaluating performance frequently provides incomplete, imprecise, or biased information about managers' behavior. When accounting and budget measures are used to evaluate performance, subordinates are likely to experience role conflict (a form of cognitive inconsistency) because they are not sure how their behavior affects these measures. This conflict results in stress, poor mental states (e.g., attitude about and dissatisfaction with budgeting, motivation), and dysfunctional behavior (e.g., gaming).

**Hopwood (1972)** hypothesizes and finds evidence that a budget-constrained performance-evaluation

<sup>26</sup>Motivating and evaluating may seem similar to some readers, but the psychology literature assumes that motivating can be achieved by stimuli other than financial rewards assigned during a performance evaluation (e.g., by influencing individuals' attitude, morale, or intrinsic interest in the task). Evaluating is not necessarily limited to assigning financial rewards based on performance (e.g., in many organizations performance evaluations are related to human resource management and include rating and ranking employees in terms of their value to the organization).

style, compared to the profit-conscious and non-accounting performance-evaluation styles, causes subordinates to experience stress, have poor relations with superiors (e.g., lack of respect and trust) and peers, and manipulate accounting data. He also presents evidence that the budget-constrained style is associated with lower budget-related performance. Otley (1978) sought to replicate Hopwood, but failed to do so, instead finding evidence, for example, that a budget-constrained style does not result in stress and is related to higher budget-related performance.

Hopwood (1972), Otley (1978), and other studies investigate whether budget-based performance evaluation has direct linear additive effects on individuals' mental states (attitudes towards budgeting, motivation, satisfaction with budgeting, stress) and behavior. Many of these studies, however, like the studies of participative budgeting, report evidences contrary to their predictions and are inconsistent with other studies: some studies report positive effects, some find negative effects, and some find no effects (Hartmann, 2000; Shields & Shields, 1998). To reconcile these inconsistent results for participative budgeting and for budget-based performance evaluation, psychology-based budgeting research began to modify the form of the question about the effects of budgeting.

### 3.5.2. Stage Two: Interaction Model

The mixed results of studies trying to answer whether budgeting has direct linear additive effects gave rise to the following modification of the original question: *What interacting variables condition the effects of budgeting variables on individuals' minds and behavior?* This question is suggested by Hopwood (1976) and Otley (1978) and elaborated on by Brownell (1982a). Since the studies related to the additive-effects question do not find that participative budgeting universally improves individuals' mental states and behavior, Hopwood (1976) argues that researchers should not expect the effects of budgeting variables like participative budgeting to be independent of other variables; instead, their effects should be expected to be conditional on other variables (e.g., task uncertainty). Otley (1978) proposes that the difference in results between his study and Hopwood (1972) could likely be attributed to differences in their studies' organizational contexts (profit vs. cost responsibility, interdependence, difficulty of operating environment, uncertainty). That is, Hopwood (1976) and Otley (1978) propose that the causal-model form be changed from additive to interaction. Brownell (1982a) identifies several potential interaction

variables (environment, organization, task, personal) and urges researchers to investigate which other variables "moderate" the effects of budgeting variables.

In response, many studies investigated various direct linear independent- and/or moderator-variable ordinal and disordinal<sup>27</sup> interaction models to try to identify which other budget and/or nonbudget variables could explain the inconsistent effects of budgeting variables detected in the studies answering the additive-effects question. The most frequently used variables in these studies testing interaction models are participative budgeting, budget-based performance evaluation, and task uncertainty as the independent and/or moderator variables and satisfaction, stress, and individual performance as dependent variables (Hartman, 2000; Luft & Shields, 2006; Shields & Shields, 1998). Overall, these studies did not provide consistent theory-based evidence that, for example, the effects of participative budgeting or budget-based performance evaluation on mental states and behavior are predictably conditional on other variables such as task uncertainty. In response, subsequent studies began proposing and empirically testing more complex interactions by including other budgeting variables and/or nonbudgeting variables. A key example from the literature provides an illustration.

Brownell (1982b) predicts and finds evidence that individual managerial performance is a disordinal interaction function of participative budgeting and budget-based performance evaluation: specifically, individual managerial performance is at a high level when participative budgeting and budget-based performance evaluation are both at high levels or at low levels. When either budgeting variable is at a high level and the other at a low level, then individual managerial performance is at a low level. Hirst's (1983) evidence is that stress (considered a predictor of or proxy for poor performance) is associated with a high level of budget-based performance evaluation only when task uncertainty is also high; when task uncertainty is low, stress is associated with a low level of budget-based performance evaluation (a linear disordinal interaction). Hirst's evidence promotes further research for two reasons. First, it suggests that Brownell's evidence might depend on the level of task uncertainty. Second, it is inconsistent with

<sup>27</sup>An ordinal interaction occurs when the strength, but not the sign of relation, between an independent and dependent variable depends on the level of another independent or moderator variable. In contrast, a disordinal interaction occurs when the sign (and usually the strength) of relation between the independent and dependent variables depend on the level of another independent or moderator variable.

Hirst's prediction of a convex relation between budget-based performance evaluation and stress independent of task uncertainty. In an attempt to resolve potential inconsistencies between these results, [Brownell & Hirst \(1986\)](#) predict that the disordinal relation found in [Brownell \(1982b\)](#) holds only for low task uncertainty, and that for high task uncertainty stress is negatively related and individual managerial performance is positively related to participative budgeting, independent of the level of budget-based performance evaluation. Their evidence is consistent with their predictions for stress but not for individual managerial performance.

These three studies illustrate the difficulty of conducting research on how the effects of a budgeting variable can be conditional on other budgeting and/or nonbudgeting variables. The number of budgeting and nonbudgeting variables that might plausibly interact is large, and therefore the number of potential significant interactions of various forms is very large. The underlying psychology theory does not seem sufficiently well developed to generate consistently supported predictions about which of these potential interactions have significant effects on specific individuals' mental states and behaviors. It is possible that important higher-order (e.g., four- or five-way) interactions are significant, but they would be difficult to predict, test, and interpret. In consequence, interest in seeking answers to the interaction-effects question has decreased.

Studies like [Brownell & Hirst \(1986\)](#) often use multiple dependent variables without explicitly investigating their relations, although the psychology literature theorizes causal relations among them. Because a better understanding of these relations can help to explain the inconsistent results for different dependent variables, the stage-three studies have begun to consider how various dependent variables—mental states and behavior—are related, and this has changed the causal-model form.

### 3.5.3. Stage Three: Intervening-Variable Model

As research pursuing the interaction question has decreased, research driven by a third question has increased and is emerging as a new focus of psychology-based budgeting research. This question is: What intervening variables mediate the effects of budgeting variables on individuals' minds and behavior? This question arises from the inconsistent answers to the first (additive-effects) and the second (interaction-effects) questions. Studies of direct interaction effects did not provide definitive explanations of the unexpected and inconsistent results of the studies that test

for direct additive effects of budgeting variables on individuals' minds and behavior. The intervening-variable-effect (indirect-effect) question employs a different strategy to attempt to explain the effects of budgeting variables. While previous research investigates a budgeting variable's effects on individuals' minds separately from its effects on their behavior, research on the third question seeks to trace how the effects of budgeting variables on individuals' behavior are mediated by their minds.

Research on the mediating effects of individuals' minds can help to explain the inconsistent evidence in prior studies. For example, for participative budgeting, studies report positive, negative, and no effects on behavior ([Shields & Shields, 1998](#)). The causal processes assumed in these studies vary and include exchanging task-relevant information and increasing motivation. The information-exchange explanation implies that the effect of participative budgeting will be through mental processes and states related to learning how to do the budget-related task better, thereby increasing individual performance; these mental processes and states include attention, memory, thinking, and learning ([Birnberg et al., 2006](#)). In contrast, the motivation explanation implies that the effect of participative budgeting will be through mental processes and states related to increasing motivation, thereby increasing individual performance: participative budgeting can increase motivation by providing difficult specific goals, reducing stress, increasing beliefs about equity, reducing cognitive dissonance, or increasing level of aspiration ([Birnberg et al., 2006](#)). An intervening-variable model can provide information about the process by which participative budgeting affects performance, thereby allowing for better explanations and predictions of how participative budgeting influences performance.

Research seeking answers to the intervening-variable-effects question uses an intervening-variable model (or a sequence of direct-effect models), which is consistent with the basic assumption in psychology-based budgeting research that stimuli like budgeting influence individuals' minds, which in turn influence their behavior. We next describe examples of recent studies using an intervening-variable model. [Shields et al. \(2000\)](#) predict and provide evidence that the performance effects of participative budgeting, budget goal difficulty, and budget-based compensation on individual performance are mediated by stress. In particular, they report that participative budgeting and budget-based incentives reduce stress and budget goal difficulty increases stress, and that stress has a negative effect on individual performance. [Nouri & Parker \(1998\)](#) show that the link between budget goal

difficulty and performance is mediated by organizational commitment: budget goal difficulty reduces organizational commitment and organizational commitment increases performance. Finally, two studies provide additional evidence on mental states mediating the participative budgeting-performance relation<sup>28</sup>: Chong & Chong (2002) show that participative budgeting influences budget goal commitment, which in turn influences the acquisition of job-relevant information, which then influences performance; Wentzel (2002) provides evidence that participative budgeting influences fairness beliefs, which in turn influence goal commitment, which then influences performance.

### 3.6. Summary

Psychology-based research on budgeting focuses on explaining the effects of management accounting variables, primarily participative budgeting and budget-based performance evaluation and secondarily budget goal difficulty and budget-based compensation. Although it is clear from the psychology-based research that these budgeting variables can have significant effects on individuals' minds and behavior, substantial uncertainty remains about the conditions under which, and the processes by which, these effects occur. Initial research attempts to show that budgeting variables (e.g., participative budgeting) have unconditional positive effects and therefore can be recommended universally do not yield consistent results. Subsequent research attempts to identify a few key interacting variables (e.g., uncertainty) that account for the inconsistent effects of budgeting variables also do not provide conclusive results. Some of the inconsistencies are due to the design of the empirical studies (e.g., different variables included, different operationalizations or measures of the same variable, different levels of analysis). Other inconsistencies are likely to be due to imperfect matches between theory and empirics. For example, a theory that specifies a causal mechanism linking budgeting and performance via information exchange will not predict well in settings where, for various reasons, the information exchange does not occur or does not significantly improve performance.

Better predictions can be facilitated by conducting task analyses to understand better how budgeting actually takes place, employing theories that address the specific causal processes and variables identified

in these analyses (see Birnberg et al., 2006), and testing intervening-variable models to match theory closely with observation. Psychology theories can continue to contribute to budgeting research by explaining the causes and effects of variables such as budget-related attitudes, stress, satisfaction, management styles, levels of aspiration, cognitive conflict, and commitment, which are likely to play a significant role in determining the effects of budgeting on behavior.

A key challenge in integrating the psychology-based budgeting research with the economics- and sociology-based budgeting research is the level of analysis. Most psychology-based research examines only individual subordinates' beliefs about, for example, budget-goal difficulty and participative budgeting. More might be learned about budgeting through attention to the dyadic and organizational context of budgeting. For example, how does budgeting affect superiors' minds and behavior and superior-subordinate interactions, or why does an organization use the budgeting practices it uses? Economics- and sociology-based budgeting research, which studies organization and subunits levels, can be informative on these issues, but care needs to be taken in bridging across these levels and correctly specifying the relations between individual- and organization-level variables.

## 4. Sociology Perspective on Budgeting

### 4.1. Primary Research Question

The sociology perspective on budgeting broadly refers to various sociological and organizational research traditions that have concerned themselves with budgeting issues within and across organizations. Wildavsky (1975, p. xii) succinctly captured the implications of this broader research perspective of budgeting when he states:

The reasons for studying budgeting ... are many. It exists. The people involved in it care about what they do. Their actions are important to many others... The bonds between budgeting and "politicking" are intimate. Realistic budgets are an expression of practical politics.

This rich characterization of budgeting implies multiple purposes and uses of budgeting to be considered from the sociology perspective. The bond between budgeting and politics suggests that budgeting serves not only to facilitate decision-making to identify optimal solutions in the planning and control of resources, but also to facilitate organizational political processes embedded in the competing values and plurality of interests inherent in complex

<sup>28</sup>Both studies find that although the direct participative budgeting-performance relation is not statistically significant, each bivariate link in their intervening-variable model is statistically significant.

organizational life. In short, the sociology perspective on budgeting explicitly addresses the tension in aligning individuals' goals and behaviors with organizational goals and objectives, as well as the role of individuals in shaping organizational goals and objectives through the budgeting process.

The sociology-based budgeting research has addressed the following primary research question: How does budgeting influence decision-making and bargaining processes among a plurality of interests pertaining to the planning and control of social and organizational resources? Two major research streams within the sociology perspective are included in this chapter: contingency theory of organizations and process theories of organizations.

Both research streams considered in this sociology perspective have common intellectual roots in March & Simon's (1958) decision-making model of organizations. March & Simon (1958) developed a macro-perspective on organizations (drawing from such sociologists as Parsons (1937) and Weber (1947)) that viewed organizations as repertoires of action programs, thus formulating a complex image of organizations as flexible systems in which human choice and voluntarism, and hence unpredictability, were major characteristics. This model of organizations stressed the importance of the formal organizational structure and of rules and routines such as budgeting that serve to bring order (align individuals with organizational goals) and minimize uncertainty for boundedly rational employees (optimize organizational decision-making).

Extending this line of research, early contingency theory scholars (e.g., Lawrence & Lorsch, 1969; Perrow, 1967; Thompson, 1967) focused on how organizational, environmental, and technological contingencies influenced the coordination and control of the organizational decision-making processes that March & Simon (1958) had depicted. Thus an important contribution of early contingency theory research was to enhance the predictive power of March and Simon's organizational decision-making model. In its focus on goal congruence and decision-making under uncertainty, contingency theory shares a tradition with economic and psychological perspectives on budgeting, which also investigate influences on the efficiency of organizational decision-making and the alignment of individual with organizational goals.

Other researchers developed March & Simon's (1958) organizational decision-making model in another direction, emphasizing the politics and power which surround boundedly rational decision makers. This perspective is more concerned with organizational decision-making *processes* than it is with

optimizing decision outcomes. These early process models of organizations (e.g., Cyert & March, 1963; March & Olsen, 1976; Pfeffer, 1981) extended the research of March & Simon (1958) by explicitly recognizing the manner in which politics and power could influence organizational decision-making processes, including the ability to optimize organizational decisions and to align individual with organizational goals. This concern for the power and politics of organizational decision-making processes eventually became a shared concern with institutional theory, which explicitly focuses on the symbolic roles of organizational rational decision-making tools such as budgets and the manner in which this symbolism promotes power and self-interest in decision-making processes. Because of this shared concern for power and process in organizational decision-making, we group institutional-theory studies with earlier studies of politics and power in budgeting under the common heading of "organizational process models."

Contingency theory research and organizational process models differ in a number of respects that are identified in more detail later in this section. However, both contingency theory and organizational process models have common historical roots and common themes which link them with the economics- and psychology-based research on budgeting in this chapter and differentiate them from the sociology-based research analyzed in other chapters (Abernethy et al., 2006; Cooper & Hopper, 2006; Miller, 2006).

#### 4.2. Level of Analysis

The level of analysis for the sociology perspective is organizational: the role of budgeting in interorganizational relationships (with other organizations in the broader social environment) and intraorganizational relationships (between subunits within the organization). Contingency theory and process models share common ground in focusing on the organizational level, but they make different assumptions and use different variables and causal-model forms. In the remaining part of the sociology section, therefore, separate analyses are presented for each theory.

#### 4.3. Assumptions

##### 4.3.1. Contingency Theory

4.3.1.1. *Rationality.* Contingency theory, following March & Simon (1958), assumes that individuals are boundedly rational and satisficing. In consequence, it is difficult to align individual behavior with organizational goals. (If individuals were perfectly rational, then they could achieve this alignment through incentives expressed in the organizational budget.) Designers of organizational structure and



processes can make mistakes, and employee behavior in response to organizational structure and process choices can be erratic and unpredictable. Contingency theory de-emphasizes individual volition and strategic behavior (Donaldson, 2001): failure of individuals to act in the organization's interest is expected to be unintentional, due to decision errors rather than to conflicts of interest between organization and individual (Thompson, 1967; Woodward, 1965).

*4.3.1.2. Equilibrium.* The contingency theory concept of equilibrium is "fit." In order to operate effectively, organizations are expected to fit their structure and process to three groups of contingencies—environment characteristics, organizational size, and technology (Lawrence & Lorsch, 1969; Perrow, 1967). "Fit" occurs when a combination of organizational and contingent characteristics produces higher organizational performance than alternative combinations. Contingency theory assumes that, although organizations must have good "fit" in order to survive, and competitive pressures will therefore move them toward equilibrium, disequilibrium occurs often because of individual bounded rationality and satisficing. Organizational disequilibrium can exist for long periods (e.g., ten years) as employees slowly learn from feedback and trial-and-error to bring their decisions into alignment with organization goals (Donaldson, 2001).

#### *4.3.2. Process Models*

*4.3.2.1. Rationality.* Organizational process models also assume bounded rationality and satisficing, but in contrast to contingency theory they assume that individual volition and choice are important and often in conflict with organizational goals. A variety of process models of organizations have developed from the basic organizational-theory research by March & Simon (1958). Such process models of organizations include the research of Cyert & March (1963) and other organizational research that has brought the politics of budgeting to the foreground (March, 1983, 1987; March & Olsen, 1976; Pfeffer, 1981; Pfeffer & Salancik, 1978). A critical argument in process models of organizations is that actions and outcomes vary depending on how decision-making and negotiation processes frame the notion of ambiguity (March & Olsen, 1976). The general insight offered by this literature is that ambiguity allows for wider action repertoires and often stifles attempts at rationally planned change while more forceful, directed action requires some framing of ambiguity.

*4.3.2.2. Equilibrium.* Process models assume ongoing tension and disequilibrium in organizations as a result of the potentially conflicting vested interests that individuals import into organizational life. Furthermore, since organizations differ in their propensities to conform to external environmental pressures, the degree to which organizations are able to comply with external social demands (or in the case of subunits, comply with broader organizational demands) through budgeting processes may serve as an important source of variation in their ability to achieve equilibrium (Oliver, 1991). This literature focuses on how rules and routines (such as budgeting) support power relationships by providing (1) the power to set premises and define the norms and standards that shape and channel behavior; and (2) the power to delimit appropriate models of bureaucratic structure and policy (March & Simon, 1958). Extending this point, March & Olsen (1983) argue that an important part of this organizational process is the development of meanings (symbols) or values attributed to expressions of rationality such as seen in budgeting.

On this point, Stinchcombe (2001, p. 129) emphasized the importance of budgeting in its role of providing "organizational fungibility." He stressed that the core document that reflects the decision of an organization to shift resources from one use to another is the budget. Moreover, the certainty of meaning in the budget, like the certainty of meaning in any formalized process, "amounts only to various current resting places in a process of improving that certainty by substantive debate, in appeals courts, in legislatures, or in administrative implementing regulations" (Stinchcombe, 2001, p. 4). In this regard, a dominant characteristic of budgeting is the fungibility in that it provides organizations the means for moving resources among departments in an ostensibly rational manner. Stinchcombe stressed that organizational flexibility at any given time depends on making believable commitments, or "earmarking," to resource holders and claimants, such as articulated in the budgeting process. Thus, deriving a useful metaphor for the role of organizational budgets and its ability to facilitate organizational equilibrium, Stinchcombe (2001, p. 132) stated that, "Organizational flexibility, then, depends on the structure of rigidities, just as running depends on a stable relation between flexible muscles and rigid bones."

#### *4.4. Budgeting and Nonbudgeting Variables*

##### *4.4.1. Contingency Theory*

Budgeting research based on contingency theory focuses on participative budgeting, budget-based

performance evaluation, budget importance, and the use of operating budgets for management control (Chapman, 1997). The nonbudgeting variables include organizational size, decentralization, technology automation, task interdependence, structuring of activities, and diversification strategy (see Chapman (1997) for a comprehensive summary of the important variables in contingency theory).

Research on the relations among these variables is grounded in contingency theory's explicit concern for issues of organizational coordination and control (Lawrence & Lorsch, 1969; Perrow, 1967; Thompson, 1967; Woodward, 1965). Thompson (1967), for example, attempted to link task environment and technological contingencies to various organizational arrangements, focusing particularly on the different mechanisms of coordination, which were appropriate for more complex, dynamic technologies, and task environmental conditions. Perrow's (1967) theory of technology focused on the congruence between different types of technologies and structured arrangements, emphasizing that more flexible, loosely structured arrangements were more appropriate for organizations with nonroutine technologies, while just the opposite type of organizational arrangements were more likely to fit routine technologies. Lawrence & Lorsch (1969) developed, in a related manner, the fit between organizational arrangements, including mechanisms of social and organizational control and coordination, and environments of organizations. In short, the two basic themes of early contingency theory research outside the accounting domain are (1) a given means of control can only be understood through reference to other control approaches used in an organization; and (2) tight control systems should be used in centralized organizations presumably faced with stable, simple environments, and loose control systems should be used in decentralized organizations, presumably faced with dynamic, complex environments. Consistent with this theoretical tradition, the contingency theory models of budgeting argue that there are no universally effective budgeting practices. The choice of effective budgeting practices will depend on the environmental and technological circumstances surrounding a specific organization.

#### 4.4.2. Process Models

Organizational process models-based research tends to focus on the budgeting process as a whole (which can be considered the budgeting variable of interest): the interrelated analyses, interpretations, and negotiations that constitute budgeting. Nonbudgeting variables include the symbolic value of accounting,

resource pressure and resource allocation problems, concealment of political (i.e., power and resource allocation) issues, and environmental and organizational change.<sup>29</sup>

The early administrative research of Simon (1957) and March & Simon (1958) emphasized the importance of the power to set premises in organizational relationships and to define the norms and standards (such as budgeting) that shape and channel behavior. Moreover, this early public administration research stressed the importance of recognizing that elites actively define appropriate models of organizational structure, policies, and processes such as budgeting that might go unquestioned for years after their initial implementation (March & Simon, 1958; Simon, 1957).

At stake in the creation and development of meaning around important organizational symbols such as budgeting are issues of power and politics. Pfeffer (1981) argued that a particularly effective way of influencing resource allocation decisions is to do so as unobtrusively as possible, such as through the apparently objective mechanism of the budgetary process, which tends to legitimate subjective and political decision-making. Pfeffer (1981) stated that budgets are theoretically important because they represent decisions that are both critical and contested within organizations, all revolving around money. On this point, Markus & Pfeffer (1983) argued that the increased importance of accounting systems derives from the fact that many decisions about the allocation of resources, formerly made across organizations through the operation of markets are now made within organizations using administrative mechanisms. Similarly, Howard (1997, p. 7) observed that public finance policies serve as intriguing units of analysis because once enacted, they "are allegedly removed from politics because they are immune from the annual appropriation process and insulated against other mechanisms of audit and oversight; this insulation is part of their appeal."

One organizational process model in particular—institutional theory—argues that an organization's survival requires it to conform to social norms of acceptable behavior as much as to achieve levels of production efficiency (Carruthers, 1995; Carruthers & Espeland, 1991; Meyer, 1986; Meyer & Rowan, 1977). For example, Zucker (1977) stated that the rationalization resident in such formal control

<sup>29</sup>See Covaleski et al. (1996) for more extensive development of the contributions of organizational political models to management accounting research.

systems as budgeting is an important part of a network of political and power relations which are built into the fabric of social life, and is complicit in transforming the moral into the merely factual. Meyer (1986) reasoned that if these rule systems make up an important part of the myths of the modern organizational world, then the dynamics of accounting might provide insight into the ongoing, politically charged institutional processes. Thus, many aspects of an organization's formal structure, policies, and procedures such as budgeting serve to demonstrate a conformity with institutional rules and social norms, thereby legitimizing it, to assist in gaining society's continued support (DiMaggio & Powell, 1983; Scott, 1987). This literature argues that budgeting is used to influence negotiating and bargaining around resource procurement and deployment, rather than to apply bureaucratically neutral decision rules to optimize organizational functioning as depicted in contingency theory.

Oliver (1991) reasoned that theories of competitive advantage should look beyond the resource and market characteristics of organizations, to society and interorganization relationships as important in influencing the variation in organizations' ability to earn economic rents. The process of acquiring resources depends fundamentally on the social context of resource decisions. Powerful external actors create heterogeneity within industries but also reduce heterogeneity by imposing common pressures or demands on organizations in the same industry. Since organizations differ in their propensities to conform to public interest group pressures, the degree to which different organizations choose to comply with public opinion, regulatory pressures, and social expectations may be an important source of organizational variation. In short, a critical point that Oliver (1991) makes is that an organization's ability to generate rents from resources will depend primarily on the organization's effectiveness in managing its social context, which includes the linkages between organizations around the budgeting process.

As Czarniawska (1997) suggests, institutional theory depicts budgeting as having a critical role in the expression of symbolic preference in a bargaining process rather than a formal structural control mechanism in a decision-making process; as a means of conversation rather than a means of control; and as an expression of values rather than an instrument for action. Consequently, institutional theorists considered budgeting as a socially constructed phenomenon, rather than a technically rational function driven by and serving the internal operations of the organization. Moreover, these perspectives recognized that once a budgeting system is implemented,

what it accounts for shapes members' views of what is important and, more radically, what constitutes reality. Budgeting is not only a language of numbers (rationality), but is also a language of consensus, which permits the handling of potential conflicts without confrontation (Czarniawska-Joerges & Jacobsson, 1989). Budgeting, then, has been recognized as implicated in the construction of social reality, rather than being the passive mirror of a technical reality.

#### 4.5. Causal-Model Forms

##### 4.5.1. Contingency Theory

Contingency theory research identifies three kinds of fit between organizations and their contingencies. The two types of fit that have been used in budgeting research—selection and interaction—imply different causal-model forms (Donaldson, 2001).<sup>30</sup> Selection fit is the congruence between organizational characteristics (e.g., decentralization, budgeting practices) and the organization's contingencies (e.g., uncertainty), and interaction fit is the organizational performance difference between organizations with higher and lower levels of selection fit. Tests of selection fit use unidirectional direct linear additive models, with contingency variables such as organization size and technology as independent variables and budgeting practices as dependent variables. In contrast, tests of interaction fit use unidirectional direct linear interaction models, usually with organizational (or subunit) performance as the dependent variable and budgeting and contingency variables as independent variables.

Numerous selection-fit studies have investigated contingency variables that influence budgeting. Amongst the earliest managerial accounting research which adopted a contingency perspective was Hofstede's (1967) classic field research, which found that economic, technological, and sociological considerations have a significant impact on the way budgeting systems function, concluding that managers used budgetary information in difficult economic environments to pressurize workers; but in more lucrative environments, the budget was used more in a problem-solving mode. Golembiewski (1964) was also among the earliest to explicitly examine various aspects of organizational structure in relationship to the use of budgets. In this tradition, Bruns & Waterhouse (1975) show that structuring of activities leads to

<sup>30</sup>See Chenhall (2006) for a more extensive analysis of recent research in the contingency theory tradition. Systems fit has not been used in budgeting research. See Donaldson (2001) for an analysis of systems fit.

more participative budgeting. Hayes (1977) investigated the appropriateness of management accounting systems for measuring the effectiveness of different departments in large industrial organizations, finding that contingency factors proved to be the major predictors of effectiveness for production departments.

Merchant (1981) provides evidence that organizational size and diversification strategy are associated with managers' beliefs that budgeting is more important; and decentralization, diversification, and organizational size are associated with more use of participative budgeting. Technology also was specifically introduced as a major explanatory variable of an effective accounting information system by Daft & MacIntosh (1981). Extending this perspective, MacIntosh & Daft (1987) show that subunit interdependence results in more use of operating budgets for management control. Others have articulated more subtle relationships between contextual factors, structural characteristics, and control system design (Gordon & Miller, 1976; Khandwalla, 1972; Waterhouse & Tiessen, 1978).

Tests on the interaction fit of budgeting practices have also been conducted. For example, Merchant (1981) finds that the effects of participative budgeting and budget importance on organizational performance are moderated by organizational size, and Merchant (1984) reports that participative budgeting and organizational size interactively affect organizational performance.

#### 4.5.2. Process Models

Studies employing process models of organizations have investigated the causes of budgeting using a unidirectional direct linear interaction model. The effects of budgeting have also been investigated but with different causal-model forms: unidirectional and bidirectional cyclical, linear direct and indirect additive and interaction.

The complexity of causal relations is particularly implied by institutional theory approaches. For example, a study by Covaleski & Dirsmith (1988a, 1988b) adopts an institutional perspective to examine the manner in which social norms of acceptable budgetary practices are articulated, enforced, and modified during a period of organizational decline. They note that, consistent with the general theme of the institutional perspective, an organization's survival requires it to conform to social norms of acceptable behavior. They trace and examine a university budget category through its development, transformation, and eventual decline. Covaleski & Dirsmith (1988a, 1988b) describe the process of how

a university challenged and rejected a traditional budgeting format and protocol between state agencies and the state for allocating state funding (i.e., the institutionalized budgetary framework) when this framework became inconsistent with the university's goals and interests. Consistent with this institutional perspective of budgeting, Covaleski & Dirsmith (1988a, 1988b) find that the self-interest of the plurality of organizational decision makers (the university, different parties within the university system, the various state agencies, and the legislators) is foremost in the minds of the various parties involved in the budgeting process. They conclude that the common and legitimate language of budgeting is an important vehicle through which societal expectations are enforced and reproduced.

Ansari & Euske (1987) also drew from institutional theory to examine the role of accounting information in the public sector, identifying this role in terms of documenting institutional compliance, that is, seeking external legitimation or masking underlying sociopolitical reality. They examined the manner in which cost information is used in the Department of Defense, finding disparity between the formally stated objective of the system to improve organization efficiency, and the lack of accounting system used for this purpose. Similarly, Boland & Pondy's (1983, 1986) accounting studies highlight the ceremonial, seemingly irrational aspects of resource-allocation activities. For example, they found that in a university case, the budget provided a context for state agencies to exercise their legitimate authority in allocating funds to particular priorities. At the same time the underlying flexibility was such that funds could be diverted from one program to another at will. In short, this research placed a strong emphasis on the role of political language, particularly in budgeting process. Finally, a study of the U. K. National Coal Board (Berry et al., 1985) finds that accounting information serves a variety of roles including to enhance ambiguity or to provide legitimacy in intra and interorganizational relationships. In serving such organizational roles, accounting information facilitates an organizational structure, which is loosely coupled, thereby insulating the various organizational units from each other, as well as from external and internal pressures for change.

In the public administration literature, Campbell (1993) stated that it is important to consider how public finances affect and are affected by a wide range of political, economic, cultural, institutional, and historical factors. He argued that institutional theory offers an opportunity to examine a variety of non-economic causes and consequences that are complicit

in public financing decisions, thus focusing “explicitly on the complex social interactions and institutional and historical contexts that link state and society in ways that shape fiscal policies and their effects” (Campbell, 1993, p. 164). In short, an institutional perspective of public finance “brings people back in” to the study of public administration (Levi, 1988, p. 7).

Moreover, Thelan & Steinmo (1992, p. 25) observed that, “The specific mechanisms [such as budgeting] for integrating or adopting new ideas into the political arena are critical in shaping the interpretation and meaning behind those ideas.” On this point, Clemens (1999) argued that it is important to monitor a prominent dimension of institutionalization—the quality of “taken-for-grantedness”—in political decision-making. Externally legitimated, formal assessment criteria such as budgeting play a particularly heightened though ritualistic role in the poorly structured settings found in the public sector. Thus, as summarized by Steinmo (1993, p. 12), “political institutions operate within—and must be understood in the context of—the broader social, economic, and political setting in which they are embedded.” This critical point is at the heart of the current recognition within institutional theory of the significance of institutional context in terms of the manner (through symbols and taken-for-granted mechanisms) in which it mitigates the dynamics between an organization and its environment. For example, Oakes et al. (1998) examined new public management in action and how private and public sector values intertwine and are given shape in reform processes. They focus on the function that business plans and accounting information played in the provincial museums and cultural heritage sites of Alberta, Canada. In this setting, language and power are central to an understanding of control where power lies in actors’ complicity in their own control, not only changing themselves but also what is valued in the field in which they operate. The authors show that the attempt to name and legitimate practices is embedded in the business planning process and related accounting information.

#### 4.6. Summary

The sociology perspective on budgeting examines the manner in which organizational structure and processes such as budgeting serve in the control of boundedly rational and satisficing employees within organizations. The predominant deterrent to the achievement of such organizational goals is that these relatively nonvolitional, yet malleable, employees are limited in their capabilities (i.e., boundedly rational) to achieve organizational outcomes. The articulation of how organizational structure and

processes serve to influence these employees should enhance our understanding of how budgeting influences organizational decision-making pertaining to the planning and control of resources.

However, from an organizational theory perspective, these employees are capable of volitional strategic behavior, including efforts to attach meanings to these various organizational tools such as budgeting to advance their own agendas. As such, they might attempt to define the meaning attached to the budgeting process beyond the formal role of coordination and control that it has been given in the contingency theory approach. More political organizational process models (and, more specifically, institutional theory models of organizations) have directed attention to the importance of symbolic aspects of organizations and their environments, reflecting a growing awareness that besides being technical systems, organizations also exist in a broader social environment that defines their social reality. Thus institutional theory provides a model to more explicitly address the volitional role of the plurality of interests pertaining to the planning, control, and bargaining processes such as budgeting around social and organizational resources.

A major contribution of the sociology perspective to budgeting research is its level of analysis: the role of budgeting in interorganizational relationships as well as in relationships between subunits within the organization. Although the different views within the sociology perspective characterize organizational relationships in different manners (e.g., the relatively nonvolitional, malleable employees in organizational decision models such as contingency theory versus the more volitional behavior in organizational political models such as institutional theory), these models remain somewhat limited in that they are primarily based upon assumptions about, rather than detailed investigation of, individual behavior. More might be learned from systematic study of the behavior of individuals such as offered by economics- and psychology-based budgeting research. The more theoretically informed analysis of individual behavior presented in budgeting research from economics and psychology perspectives provides an opportunity to combine such insight with more macro models in sociology-based budgeting research to potentially capture the richness of the budgeting phenomenon.

#### 5. Selective Integration in Budgeting Research: Criteria and Example

Research on budgeting from the three theoretical perspectives provides a variety of explanations for the causes and effects of a common set of budgeting

practices (e.g., participative budgeting, the use of budgets in performance evaluation and compensation). When these are competing and mutually exclusive explanations<sup>31</sup>—when, for example, both psychology- and economics-based explanations of the same practice cannot be valid—then integrative research is needed to decide which explanation (if either) is valid. When the different perspectives provide compatible explanations, then integrative research is needed to determine if and how they can be combined into more complete explanations.

Compatible explanations can be combined in a variety of ways. For example, in some instances, research in different perspectives may identify multiple independent causes of a particular budgeting practice; combining these causes into a single model simply increases the model's explanatory power. In other instances, research in different perspectives may provide evidence on budgeting practices in different settings (e.g., executive versus lower levels of an organizational hierarchy, government and nonprofit versus for-profit organizations), and the same practice can have different causes and/or effects in these different settings. In this case, integrative research can add value by explaining *why* the change in setting alters the causes and/or effects of the particular budgeting practice. In still other instances research in one perspective may, for convenience, treat a particular budgeting practice as exogenously given and examine its effects, while research in another perspective examines the causes of this practice (thus treating it as endogenous) without gathering direct evidence of its effects. In such instances, integrative research that links cause and effect explanations can be valuable: for example, a better understanding of the causes of a practice's adoption can sometimes help explain its unexpected effects, and identifying an unexpected effect of the practice can suggest a previously unknown cause for adopting (or not adopting) the practice.

This concluding section identifies four important interrelated criteria to employ in designing and evaluating research that integrates selected cause-and-effect explanations from different theoretical perspectives. These criteria can help researchers to determine whether explanations are competing or compatible and how to combine compatible explanations. In the description of these criteria we use participative budgeting as an example, for two reasons. First, it has been studied in all three perspectives and thus

provides numerous opportunities for comparing research on the same practice from different perspectives. Second, participative budgeting research has addressed fundamental questions about how resources are allocated and how information is communicated in budgeting. These questions are still of urgent interest to practitioners, although they are now often described in terms of “top down” budgets versus “empowerment” and “devolution,” rather than “participative budgeting” (Hansen et al., 2003). Of course, we are not implying that participative budgeting should be the dominant topic of future budgeting research. The example can easily be extended to other budgeting practices.

These integrative-research criteria can also be relevant when budgeting (or other management accounting) research draws on previously unused theory in economics, psychology, and sociology, as well as when it integrates explanations from multiple theoretical perspectives. As we noted in Section 1, budgeting research has tended to rely on agency theory from economics, motivation- and social-psychology theory from psychology, and contingency and institutional theories from sociology. Budgeting research has made comparatively little use of other theories such as the economics of complementarities, adaptive learning in games, cognitive psychology, or population ecology. If researchers use such theories to challenge or extend existing budgeting research, then the criteria below will also be relevant.

### 5.1. Four Interrelated Criteria

When researchers compare studies from different theoretical perspectives in order to decide between competing explanations or to combine compatible explanations, the following four interrelated criteria should be addressed.

#### 5.1.1. Are Variable Names and Meanings Consistent Across Theoretical Perspectives?

For example, if participative budgeting does not have the same meaning across different theoretical perspectives, then different explanations of participative budgeting are not competing, and thus no attempt should be made to test them against each other. Moreover, they cannot be combined into a more powerful single explanation of participative budgeting because they do not explain the same practice. Conversely, explanations of participative budgeting that appear different may merely be using different names for the same conceptual variable. For example, information asymmetry is an important cause of participative budgeting in the economics-based literature, while organization size and diversification are

<sup>31</sup>“Competing” is used hereafter to mean competing and mutually exclusive.

important causes of participative budgeting in the sociology-based literature. These are not necessarily competing explanations, however, if size and diversification are proxies for information asymmetry.

### 5.1.2. Are the Explanations of Causal Process Underlying Models from Different Theoretical Perspectives Consistent with Each Other?

The explicit model that guides evidence collection in a particular study may consist of only a few variables (e.g., participative budgeting leads to improved organizational performance by reducing *ex ante* information asymmetry). But underlying the model is an explanation of causal process, specifying in greater detail who does what, how, why, where, and when, in order to create the relations in the model (i.e., how does *X* influence *Y*?). Causal-process explanations underlying similar-looking models from different theoretical perspectives can be inconsistent with each other. For example, the economics-based research assumes that subordinates communicate valuable private information only when they are rewarded more for doing so, while psychology-based research sometimes assumes that subordinates communicate valuable private information because they respond to the trust implied by the superior's request for their input into the budget. In such cases, before models from different perspectives can be combined, a researcher must resolve the inconsistencies in their underlying causal-process explanations. For example, in the context described above, a researcher might introduce a more general model in which individuals' preferences include both wealth and trust.

### 5.1.3. Is Research from Different Theoretical Perspectives at the Same Level of Analysis?

Research on participative budgeting has been subject to the same ambiguities about the level of analysis as research in participative decision-making in other fields is. For example:

Is worker participation an individual-level phenomenon, describing the influence an individual exerts in unit decisions? Or is worker participation at the unit level, describing a set of formal structures and work practices (for example, quality circles) characteristic of units, not individuals? (Kozlowski & Klein, 2000, p. 27)

If explanations are not at the same level, then they may differ without being competing: reasons why different individuals participate more or less within the same organization (e.g., individuals with higher past performance participate more in budgeting) are not necessarily the same as the reasons why budgeting

is more participative in one organization than in another (e.g., more participative budgeting in larger organizations).<sup>32</sup>

### 5.1.4. What Constraints on Causal-Model Forms are Implied by the Theoretical Perspectives Used in Integrative Research?

Different theoretical perspectives place different constraints on the empirical causal-model forms used to investigate budgeting, and research that draws on multiple perspectives must attend to these constraints. For example, economic agency theory assumes that budgeting and compensation practices are chosen simultaneously, while sociology contingency theory assumes that organizational practices like budgeting and compensation adjust to each other gradually over time (Donaldson, 2001). Simultaneous choice and gradual mutual adjustment imply different bidirectional causal-model forms (reciprocal non-recursive and cyclical recursive, respectively; see Luft & Shields, 2006). Thus, an empirical study of gradual mutual adjustment could not be motivated solely by agency theory. Different theoretical perspectives can also put other specific constraints on the linearity, additivity, directness, and directionality of causal-model forms (see below for examples).

These four criteria are not independent of each other. Specifying the exact definition of the variables under investigation has important implications for causal-process explanations, levels of analysis, and causal-model forms; and valid integrative research must satisfy all four criteria. Next, we develop a multiperspective description of participative budgeting research, showing how the four criteria are related to each other and how they can be used to generate new research questions and insights.

## 5.2. Example of Applying the Criteria

This example is developed in two parts. The first part focuses on the effects (mostly performance effects) of participative budgeting as described by research in the three theoretical perspectives. Cross-perspective differences in proposed effects are related to cross-perspective differences in the meaning of participative budgeting (criterion 1) and the causal-process explanations of its effects (criterion 2). We suggest that resolving these differences, either by choosing between competing explanations or combining compatible explanations, will often require examining

<sup>32</sup>For expositional convenience, "organizational level" is used in this section to include both subunits and organizations.

specific details of budgeting practice that have received little attention in research thus far.

The second part of the example focuses on the causes of participative budgeting, that is, why budgeting is more participative in some organizations than others. Cross-perspective differences in the nature or extent of these explanations are often related to cross-perspective differences in level of analysis (criterion 3) and causal-model form (criterion 4). To conclude, we discuss causal-model form issues that arise in integrating cause and effect explanations across the three research perspectives.

### 5.2.1. What is Participative Budgeting and by What Causal Processes Does it Affect Performance?

Hopwood (1976, p. 74) observed, “Unfortunately, the arguments in favor of participation are so varied and so vague that one might justifiably question what useful purposes such a concept is capable of serving ... it appears that participation might mean almost anything to anyone.” Although the arguments have become less vague in the last 30 years, they have probably become more varied.

In economic models such as Baiman & Evans (1983), a subordinate participates in budgeting if he or she provides private information that a superior uses to formulate the budget. Participative budgeting is expected to improve organizational performance by making it possible for the superior to allocate resources more efficiently. This explanation suggests that participative budgeting will improve organizational performance more when organizational performance is more dependent on making the “right” resource-allocation decisions (e.g., when there are more competing uses for organizational resources and/or larger differences in the returns from these competing uses), and when making the “right” decisions is more dependent on information the subordinate has and the superior (*ex ante*) does not.

In contrast, in the psychology-based research, subordinates participate if they believe they are involved in the budgeting process and have influence over it (Milani, 1975). Such involvement and influence can occur even if subordinates do not have private information. Participation in this sense can improve performance by providing a forum for the superior to communicate information to subordinates that they can use to coordinate their efforts with others or choose actions with higher returns (Kren, 1992; Locke et al., 1997). Participation can also improve performance by establishing trust and organizational justice, which can stimulate employee effort in addition to the effort that can be monitored and enforced

through incentive contracts (Organ, 1988; Podsakoff et al., 2000). Both of these causal-process explanations suggest different predictions about participative budgeting than the economics-based causal-process explanation. For example, they suggest that participative budgeting can have value even when subordinates are not better informed than superiors. Also, because the psychology-based explanations depend on the performance effects of employees’ action choices or effort that may be too costly to monitor, they suggest that participative budgeting will lead to larger improvements in organizational performance when subordinates have more freedom of action and their individual actions have more influence on organizational performance.

An early study that influenced the sociology-based budgeting research defines participation differently, as group discussion that “... provides the opportunity for enough interaction that a cohesive group [of subordinates] can emerge ...,” and the cohesiveness reinforces adherence to a common goal (Becker & Green, 1962, p. 397). Participative budgeting in Becker and Green’s sense of group interaction among subordinates is logically impossible in a single-agent model, and its full effects are not included even in multiagent economic models (e.g., Kanodia, 1993), in which the agents typically communicate with the principal but not with each other.

Participative budgeting as group interaction can have either positive or negative organizational-performance effects, which Becker & Green (1962) suggest but do not develop in detail. “Group cohesion” can work through incentive and preference-formation processes: subordinates can infer that their peers will sanction them for not meeting a goal that the rest of the group accepts or meeting a goal that the rest of the group rejects; or subordinates can be initially uncertain about their own preferences and reduce this uncertainty through social interaction with others.

Sociology-based research also raises the possibility that the social interaction involved in participative budgeting affects organizational performance by facilitating the formulation and sharing of simplified, stable representations of organizational-decision problems. In a world of boundedly rational individuals with unstable preferences, the role of participative budgeting can be more one of enabling individuals to coordinate on a satisfactory or stable outcome, rather than driving an organization to the most efficient outcome. This view of the role of participative budgeting is consistent with the institutional theory orientation within sociology-based research, which argues that an organization’s ability to acquire resources depends on its conformity to norms



of socially acceptable behavior—in this case, satisfactory or stable outcomes—as much as on its achievement of optimal levels of production efficiency (Covalesski & Dirsmith, 1988a, 1988b; Czarniawska, 1997; Meyer & Rowan, 1977; Oliver, 1991).

If the definition of participative budgeting as social interaction is linked with the psychology-based concept of individual equilibrium, then it raises the possibility that participative budgeting could create disequilibrium within individuals and increase dysfunctional behavior. For example, social pressure could support a preference for one budget goal (Young, 1985) while purely individual interests support a preference for a different goal. In contrast to the economic assumption "... that a person is given one preference ordering which is supposed to reflect his interests, represent his welfare, summarize his idea of what should be done, and describe his actual choices and behavior," (Sen, 1990, p. 37) psychology and sociology assume that individuals may experience internal conflicts between multiple preference orderings, and that this internal conflict can reduce the quality and timeliness of organizational decision-making (March & Simon, 1958).

Integrative research can help to sort out this multiplicity of definitions and causal-process explanations of participative budgeting. Some of the causal-process explanations suggested above may prove invalid; some processes may have stronger performance effects than others, with one effect counteracting another if they have opposite signs; and both the existence and effects of these participation processes may depend on context. An important requirement of such integrative research will be attention to the specific details of budgeting practice.<sup>33</sup> Participation in budgeting, in the broad sense of involvement and influence, might consist of reporting by the subordinate to the superior, bilateral negotiation, social interaction among groups of subordinates, or delegation of some decisions to the subordinate (e.g., more extensive rights to transfer funds between line items during the budget period, more extensive rights to adjust total budget amounts if unexpected events occur, or fewer constraints on subordinates' initial budget proposals through organizational policy and budgeting formulas) (Hopwood, 1976; Umamathy, 1987). These choices of the specific budgeting practices can have

different effects on the economic efficiency, psychological satisfaction, social acceptability, or power-distribution effects of budgeting.<sup>34</sup> Existing empirical research on participative budgeting has extensively examined subordinates' beliefs that they participate, but has done much less to identify the specific budgeting practices that influence these beliefs, or to examine the differing costs and benefits of alternative specific practices.

Study of these specific budgeting practices could help to resolve cross-perspective differences in the meanings of participative budgeting and the explanations of its effects, as well as the effects of other budgeting practices. Such research could also inform managers who want to change the level of participative budgeting in their organizations. Managers cannot directly choose their subordinates' beliefs, which are the subject of much of the existing empirical research on participative budgeting, but they can choose the specific details of budgeting practice that influence those beliefs.

#### 5.2.2. *What are the Causes of Participative Budgeting?*

The three theoretical perspectives differ in the nature and extent of their explanations of the causes of participative budgeting, that is, why it differs across organizations or individuals. Economics-based research assumes that the individuals who make up an organization choose participation only if it has economic value, because they *know* whether it has economic value (i.e., whether it increases the expected welfare of at least some individuals in the organization without reducing the expected welfare of others). The agency model's rationality assumptions imply that individuals can judge the economic value of participation correctly and implement the optimal (equilibrium) practice promptly, without prolonged trial-and-error adjustment of organizational practices to each other and to the environment, and without prolonged interpersonal conflict arising from different beliefs about what practices are optimal.

Contingency theory, like economics, has an organizational equilibrium concept and assumes that organizations will tend to adopt practices that improve organizational performance in the particular environment in which the organization operates.<sup>35</sup> Unlike economics, however, contingency theory assumes

<sup>33</sup>Sociology-based studies that do not lend themselves readily to the selective integration described here often provide valuable accounts of the specific detail of budgeting practice (e.g., Berry et al., 1985; Boland & Pondy 1986; Preston et al. 1992).

<sup>34</sup>For example, see Fisher et al. (2000, 2002) on the effects of negotiation rules on budget targets.

<sup>35</sup>A "good fit" might mean satisficing rather than optimizing, and might include considerations outside the standard agency model such as conformity to social norms.

that disequilibrium is common: major changes in organizational practice can take years to complete (Donaldson, 2001), and during this time, the environment can change again, so that the changed practice is no longer a good fit to the current environment. In this view, the explanation of budgeting practice in an organization depends not only on what practice fits a given environment but also on how long it takes the organization to adapt to environmental change. The speed of change can depend on factors not included in conventional economic models of budgeting, such as the cognitive difficulty of solving the problems posed by a changed environment or the intrapersonal and interpersonal conflict generated by the change. Organizational participants may construct an understanding of the changed environment and its implications slowly, trying out and negotiating a variety of such understandings over time (Czarniawska, 1997).

Psychology-based budgeting research does little to address the question of whether optimal budgeting practices are always chosen and if not, why. The psychology-based research provides evidence that low levels of participative budgeting can result in stress or low individual performance, but it does not provide evidence of whether the participation levels that induce stress and low performance are chosen mistakenly by boundedly rational individuals or chosen deliberately because the costs of some employees' stress and low performance are offset by other benefits (perhaps because superiors are better informed than subordinates and thus make better decisions if they do not use subordinates' information, or perhaps because of a need for simplicity and uniformity in an organization-wide budget system that is used by many employees and only stresses some), or because it is preferred by more powerful members of the organization in spite of its costs to subordinates.

These different accounts of the causes of variation in participative budgeting highlight important distinctions between the three theoretical perspectives. The economics-based research has a precisely specified model of how individual-level differences (differences in superiors' and subordinates' information and risk preferences) cause organizational-level phenomena (budgeting practices), but it is doubtful that this model provides a consistently accurate description of practice, given its assumptions of near-constant equilibrium at the organizational level driven by perfect rationality at the individual level.

Psychology may provide a more accurate description of individuals, but it has not provided much explanation of how individual-level differences (e.g., superior-subordinate differences) are resolved or

combined in organizational-level budgeting practices. Sociology-based research has examined budgeting at the organizational level, but often without providing causal-process explanations at the individual level. Because organizations are composed of individuals, this lack of individual-level theory can limit organizational-level explanations. For example, contingency theory argues that participative budgeting is valuable in an environment of high uncertainty, but contingency theory does not specify the causal process by which boundedly rational individuals determine that they are in a high-uncertainty environment and agree on how to budget in such an environment. Thus contingency theory cannot explain whether or when an organization will succeed in adopting budgeting practices that fit its environment and align individual actions with organizational goals. Furthermore, while institutional theory has a particular concern for the role that budgeting has in organizations reflecting conformity to the demands of their external environments, there is limited insight at the individual level to predict or suggest propensities to use budgeting in this symbolic and political manner.

Research that links individual- and organizational-level explanations without economics' strong assumptions of equilibrium and rationality could add to our understanding of the causes and effects of budgeting practices. The concluding discussion below is organized around questions of causal-model form that need to be resolved in conducting such integrative research.

### 5.2.3. *The Shape of Integrative Explanations: Causal-Model Forms*

Integrative research on both the causes and the effects of budgeting practices poses two sets of questions about causal-model forms. First, insofar as explanations from different theoretical perspectives deal with different levels of analysis, researchers cannot choose between or combine them without specifying the relations between levels, that is, using a valid cross-level model. Second, differing assumptions about rationality and equilibrium put different constraints on the form of valid empirical models even within a single level of analysis.

5.2.3.1. *Cross-Level Models.* Figure 1, Panel A shows a simplified generic model, intended as a template for developing more specific models. This model highlights the basic causal relations between organization variables at the organization level and individuals' minds and behavior at the individual level, while

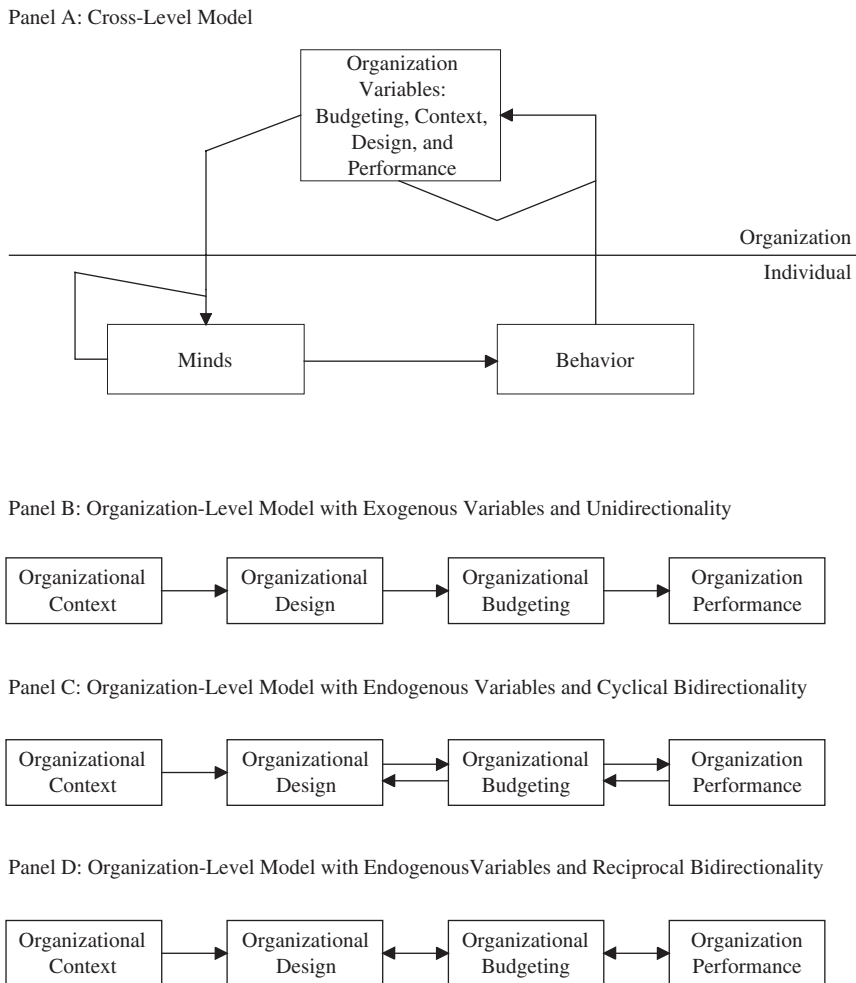


Figure 1. Causal-model forms.

suppressing the complexities of causal relations within each level.<sup>36</sup>

This generic model has both top-down and bottom-up links. For example, it shows that individuals' minds (e.g., beliefs, preferences) influence individual behavior (e.g., effort). The bottom-up link represents how individual-behavior variables affect organization-level variables like the design of a budgeting system, the construction of a specific budget, or re-designing an organization (e.g., decentralization, formalization, structure). A valid cross-level link between individual behavior and organization-level variables must include an interaction at the level of

the dependent variables (Klein et al., 1994; Luft & Shields, 2006).<sup>37</sup> For example, in the development of a budget, individual mental states (e.g., beliefs about future financial performance) interact with an organization-level variable (e.g., the organization's rules for budget negotiation, which can limit the effects on the

<sup>37</sup>The graphical convention for an interaction is a "Y" shape in which the interacting variables are at the ends of the two upper legs and the dependent variable is at the end of the lower leg. Because the organization-level variables in Panel A are combined in a single box for simplicity (in contrast to their separation in the other Panels), the "Y" shape is ill-formed. This model is intended to show an organization-level variable (e.g., negotiation rules) and individual behavior interacting to affect another organization-level variable (e.g., a budget, budgeting system, organization design).

<sup>36</sup>Also, for simplicity, subunit levels between individual and organization levels have been omitted.

budget of some individuals' beliefs) to influence the development of the budget.

In the top-down link in Panel A, organization-level variables influence individuals' minds. Like the bottom-up link, a valid top-down link must include an interaction at the level of the dependent variable.<sup>38</sup> Thus, for example, a given organization-level budget could influence individuals' minds differently because of individual differences in preferences or knowledge.

In constructing and using cross-level models, it is important to remember that the organization level is not to be identified with owners or upper-level managers, who are individuals. An organization-level variable represents cross-organization variation in patterns of actions or relations among multiple individuals, such as cross-organization variation in the terms of agreements that resolve conflicts of interest among individuals or cross-organization variation in organizational routines in which individuals play interdependent roles. Similarly, an individual-level variable is one in which there is variation of interest across individuals. Thus, for example, to explain that an organization uses optimistic budget goals because every individual in it is an optimist is not a cross-level explanation: the individual and organizational levels are confounded in this example.

Using individual-level variables to explain an organizational-level budgeting practice therefore means explaining the practice as the consequence of individual differences. The agency-model explanation for the use of budget goals in incentive contracts can be seen as an example of this form of causal model. The incentive contract, which both owner and manager agree to and which determines payoffs for both, is at the organizational level. Organizational-level variation in incentive contracts—that is, whether or not they include budget goals—depends on the presence or absence of several sets of individual-level differences: differences between owner and manager in risk preferences, effort preferences, and knowledge of the manager's actions. A cross-level interaction is present because the effect of these individual-level differences on incentive-contract design depends on organizational-level variables such as the uncertainty both owner and manager face. (If uncertainty is virtually nil, then the use of the budget goal would have little value even if the owner's and manager's risk preferences differ.)

Agency models can also be seen as including a top-down interaction effect. For example, the effect of a budget-based incentive contract (organizational level) on individual behavior depends on an interaction between the contract terms and individual variables such as effort and risk preferences, knowledge, and skills. In this instance, the protection against risk provided by the budget-based contract will have more influence on the minds and behavior of more risk-averse individuals.

Although the cross-level model form is consistent with explanations based on economic theory, it can also be used with theories that make less stringent assumptions about rationality and the absence of disequilibrium. For example, economics assumes that individual preferences are exogenous, not influenced by organizational design, but psychology and sociology leave open the possibility that organizational-level practices like budgeting can influence preferences (e.g., values, intrinsic motivation).<sup>39</sup> Cross-level models could be used to combine compatible explanations at different levels in the psychology-based and sociology-based research. Choosing between economics-based and sociology/psychology-based explanations raises other important causal-model form issues, however.

A single research study typically does not (and probably should not) attempt to examine a complete cross-level model (including all relevant organizational and individual variables) but focuses only on some portion of it. Sometimes a theoretical model that is fully cross-level is examined empirically only at the organizational level. For example, researchers may provide evidence on whether differences in organization-level uncertainty are associated with differences in organization-level budget-based compensation, without providing evidence on the individual-level variables that explain the organization-level relation; individual-level variables like risk and effort preferences are often more difficult to measure, and researchers assume that they are similar across organizations with different levels of uncertainty.

*5.2.3.2. Single-Level Models.* Sociology- and economics-based research both test organizational-level empirical models, but they make different assumptions about how evidence on performance effects of

<sup>38</sup>As with the bottom-up model, the "Y" form of this interaction is ill-formed because this model has all mental states in the same box. Thus, the model is intended to indicate that, for example, an organization-budget variable interacts with a mental state to influence another mental state.

<sup>39</sup>Economic theories predict that individuals with different preferences will be attracted to work for organizations with different designs and policies, resulting in an observed association between organizational characteristics and individual preferences. But economic theories typically do not predict that individuals' preferences will be changed by organizational characteristics.

budgeting practices can be provided. Contingency theory researchers in sociology are accustomed to showing the value of a budgeting practice for a particular type of organization by providing evidence that organizations of this type perform better if they use the practice than if they do not. The researchers may also show that organizations of a different type, for which the practice should not be valuable, do not improve performance if they use it. Such “interaction fit” (Donaldson, 2001) evidence cannot be gathered unless some organizations are in equilibrium (using the practice only if it creates value for them) and others are not. These interaction models of organizational performance are therefore incompatible with the assumption often made in economics that organizations are normally in equilibrium. A sociology-based researcher who wants to use an economic-theory explanation of the value of a budgeting practice should not use it in an interaction fit test unless the theory can be modified to be consistent with some organizations’ being out of equilibrium. These alternative assumptions about the prevalence of equilibrium are consistent with alternative theories about what causes organizations to adopt participative budgeting and how rapidly these causes are likely to operate.

Different assumptions about the direction and speed of influences among organizational-level variables raise additional single-level causal-model form issues represented in Panels B–D of Fig. 1. These diagrams represent differences in causal direction and speed only, suppressing other potential complexities (e.g., causal relations among multiple organizational-design or budgeting variables, interactions among the variable types shown, or direct paths from organizational context and design to performance). Panel B shows a unidirectional model form. In this model, organizational context (e.g., uncertainty) is taken as exogenous. It influences organizational-design choices like decentralization; budgeting practices are second-order choices that are influenced by, but do not influence, organizational-design choices. Budgeting in turn influences organizational performance.

Unidirectional models like those in Panel B, while convenient for statistical testing, preclude researchers from simultaneously considering the influences of organizational performance on organizational budgeting practices and influences of organizational budgeting on organizational design. Bidirectional models like those in Panels C and D are required to represent these potential mutual influences. Panels C and D represent causal influences in the same directions but at different speeds. If organizations adapt relatively slowly to their environment, then the process will be as shown in Panel C. A change in the

organization’s context will result in an initial change in organizational design and then budgeting; if these changes do not have satisfactory performance effects, then they will be modified in a continuing trial-and-error process of mutual adjustment. In contrast, in Fig. 1, Panel D, the endogenous elements of organizational design and budgeting are chosen simultaneously, and performance follows as a consequence of these choices (and of various exogenous environmental factors not shown in the model).

The choice between the models in Panels C and D depends on assumptions about rationality and equilibrium. Panel C is consistent with prolonged disequilibrium that occurs because boundedly rational managers are slow to solve complex optimization problems involving multiple organizational designs and budgeting variables (or perhaps never solve them correctly). Managers may therefore simplify these problems by changing one variable at a time or by making repeated trial-and-error changes of multiple variables. The model in Panel D is consistent with a simultaneous choice of multiple variables which, because it is made by perfectly rational managers, is the best choice for the existing conditions and will not be changed unless conditions change (i.e., it is an equilibrium choice). Thus, the choice among the organization-level models in Panels B–D depends on researchers’ assumptions about the full cross-level model in Panel A. For example, how closely do individuals’ minds in Panel A approach the unbiased judgments and costless calculation required to generate prompt optimal solutions to organizational design and budgeting problems?

These issues of causal-model form choice highlight the potentially complementary nature of budgeting research in the three theoretical perspectives. Economics-based research has focused on the relation between individual and organizational levels, showing how variation in individual-level characteristics like risk preferences drives variation in organizational-level characteristics like budget-based compensation. However, economics-based research has simplified away many characteristics of individuals and organizations that may influence budgeting practice, such as individual preferences other than wealth and leisure, and the existence of organizational complexity that blocks or delays optimization.<sup>40</sup> Psychology-based research has focused on

<sup>40</sup>Some nonbudgeting economics-based research has modeled situations with “blocked communication,” which arise because some messages are too complex to communicate to the relevant individuals and hence are blocked by the prohibitive cost (e.g., Demski & Sappington 1987).

individual-level characteristics without fully explaining their relation to organizations, and sociology-based research has focused on organizational-level characteristics without fully explaining their relation to individuals. More complete and valid explanations of how budgeting practices come to exist in organizations and how they affect organizational performance and individual welfare can usefully draw on research from all three theoretical perspectives.

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# Management Control of the Complex Organization: Relationships between Management Accounting and Information Technology

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**Abstract:** In this chapter we discuss the relations between information technology, information systems and management control. We argue that important issues can be learned about management accounting and control as we study its relations to information technology. Such relations are many times not only complex but also problematic: information technology is simultaneously a challenge and a resource for management control. Being integral parts of the emergence of complex organizations, new information technologies also produce new images of what and how something can be modeled, and therefore also of how something can be calculated and accounted for. Management accounting/control can easily be seen to be dependent on information technology, but as we demonstrate information technology cannot present its own case. Accounting is a key metaphor in many applications, and distinctions between various kinds of performance relate back to prior discussions in the accounting field. The intermingling of information technology and accounting is therefore important. And yet, the benefits for accounting from information technology may materialise only in uncertain and surprising ways and typically only after long implementation barriers. There is thus a relationship but it is one to be untangled rather than to be assumed. The research needed to develop insights into this relationship is significant because it concerns the principles about how organizations choose to coordinate their increasingly complex activities.

## 1. Introduction

Information technology is involved in most affairs in modern organizations. It is indispensable in relation to most tasks that involve the analysis and presentation of information and as such it is virtually required to enable management control in modern organizations. Information technology allows complex organizations to arise because it not only stores information and knowledge, but also develops information and knowledge so that new insights into the functioning and performance of the firm are made possible. Information technology is therefore an integral part of the emergence of complex organizations. However, information technology is not a solution to all problems; it also creates new problems many of which can be found in its relationship with information systems (IS) generally and systems for management control

more specifically. The technology can create new connections between people and organizations, but it cannot provide the content of these connections. The content is formulated outside technology and in relation to information and management control. There are thus open relationships between technology on one side, and systems and management control on the other. This means that the relationship between technology and its use is to be developed in each situation, and therefore information technology is simultaneously a challenge and a resource for management control. In this chapter we discuss the relations between information technology, IS and management control. This is often related to the development of complex organizations where information is increasingly used to connect and coordinate various organizational entities and various markets, customers and

products. In the remainder of this chapter we discuss this theme.

There is an emerging literature about the relations between information technology, IS and management control (see Chapman, 2005; Granlund & Mouritsen, 2003; Hunton, 2002; Sutton, 2005). This literature suggests that this theme makes it possible to develop a nuanced view of the possibilities for control in new complex organizations. To frame the relationship between IS and accounting-based management control systems it is useful to draw on Boland (1999, p. 239) who makes a distinction between the two domains in the following way:

Whereas accounting is concerned with specific types of representations and the ways to 'get them right', information systems is concerned with representation in general. Information systems professionals are concerned with constructing representations, but they tend to be one-off, ad-hoc responses to requests of the managers or staff being served by a system.

For accounting, the stability of representations lies in economic categories and key ratio systems based on balance sheets and income statements that are concerned with visibility and transparency of organizational entities, products and processes. For IS, the objective is to connect people and activities. Where accounting research focuses on 'getting things right' in relation to visibility and transparency, IS research is concerned with 'getting users connected' by means of requirement analysis, system-building and project management. It is possible to develop this distinction along a number of dimensions as illustrated in Table 1.

Accounting and IS are represented as distinctly different in Table 1 which is probably an exaggeration, but it does illustrate differences that may

otherwise easily be overlooked when new information technologies seduces not only users, designers and implementers but also researchers (Weber, 1987). When surveying contemporary topics in IS research, it is striking that accounting information systems (AIS) are rarely in focus. This research concentrates on e-business solutions, IS implementation in various organizational contexts, IS security, etc. Research is needed which can add to our knowledge of management control processes, management control system design and the mobilization and use of management control systems in different organizational environments. Accounting researchers can profit from following the speedy development of IT investigating its relation to management control because it is possible that technology can develop a host of complex issues that never existed in the past (cf. Chapman, 2005; Hunton, 2002).

Currently, the premier research stream showing an interest in the relationship between accounting and technology is AIS research. This approach emphasizes connections between information technology on one side and transaction processing systems, financial accounting ledger systems, IT in auditing processes and conceptual accounting system design (e.g. semantic modeling of economic Resources, Events and Agents (McCarthy, 1982)) on the other. Only rarely is management control discussed in this type of research (Mauldin & Ruchala, 1999; Sutton, 1992, 2005). As noted by Sutton (2005), even if corporate wide enterprise systems technology may be related to new forms of control, user responsibilities and accounting information processing, this research theme has been largely neglected. Even though the AIS research discusses implementation and integration, it rarely problematizes how new technology intertwines with the

Table 1. Accounting and IS representations.

Accounting crafting representations for visibility and transparency in firms and for capital markets	< >	Information systems crafting representations of virtual networks and connections between people inside and outside the firm
Capital markets and management control concerns	Environment	Possible virtual networks within and beyond the enterprise
Balance sheet, income statement, management accounting reports	Context	Requirements analysis, systems design, project management
'Getting them right'	Purpose	'Getting them connected'
Form and function of analysis	Focus	Implementations design
Transparency of organizational spaces and products	Ideal	Alignment of people and technology
Activity-based costing, balanced scorecards, value-based management	Recent applications	Object-oriented approaches, corporate infrastructure modelling tools, distributed architectures

logic of management control, or asks questions about how technology may motivate management control problems and solutions.

Yet, many new themes are emerging in relation to new technology, and these themes are relevant to management control. These themes often concern sometimes overlapping questions of implementation vs. use, project vs. practice modes or phases, automation and standardization of work processes, integration of data and the firm's activities, complexity in organizational decision making, connectivity between entities and people, organizational (de-)centralization and transformation of organizational structures as well as flows of information. Therefore, in the next sections we discuss the development of IT and its impact on IS used for management control. We argue that IS solutions should be studied in the management control context and point out themes that tie them together. We debate a recent stream of management control research that has started to discuss the ties between IS and accounting (e.g. Caglio, 2003; Dechow & Mouritsen, 2005; Granlund & Malmi, 2002; Hyvönen, 2003; Hyvönen et al., 2005; Lodh & Gaffikin, 2003; Quattrone & Hopper, 2005; Scapens & Jazayeri, 2003). They have shown how IT can be used to change relations between people and organizational entities. This power is, however, not automatic and it is predicated on how information technology has been equipped with a domain such as accounting. This research also suggests that information technology (ICT, data processing, databases) only becomes an IS when specific meaningful data is stored in the database and it is analysed via standard queries or dedicated analytical software. Therefore, an important element of an IS is the discourse or attention it creates in addition to the discourses and attention created by one or groups of users of the systems. It is not enough that technology works; it also has to be useful.

In addition, modern management accounting can hardly be understood without its relationship to information technology because it carries the databases that can make complex accounting calculations possible; databases allow insights from various otherwise decoupled IS to interact and integrate. IS research and accounting research therefore may not only share a good deal of concerns and problems; they may also help to constitute each other.

On the basis of these reasons for studying the relationships between IS and accounting, the following section discusses the evolution of IT and IS vis-à-vis accounting and management control. Our aim is to explicate the evolution of IS-related problematizations of control in the modern or complex organization.

## 2. The Evolution of IT/IS vis-à-vis Accounting and Management Control

The pace of development in IT during the last 10 years has been immense. The use of information technology to support business processes has increased dramatically with the advent of Internet, communication, software and database technologies (see the Appendix). These developments have enhanced the possibilities of global operation since local systems have been transferred into global databases and corporate computing (Enterprise Resource Planning systems, ERPS; see, e.g. Davenport, 1998), and it has become possible to separate data input and information output which can be drawn from any place at any point of time. These developments are accompanied by software rental (Application Service Provision/Provider, ASP) and the development of standard models for data representation for quick and easy analysis of data in electronic form (eXtensible Business Reporting Language, XBRL; see Debreceeny & Gray, 2001). Changes have also taken place with regard to programming needs so that firms increasingly purchase package software instead of developing application software by separate programming. The ambition is to develop IS faster yet at lower costs. All these developments support the idea of virtual firms where organizational forms and responsibilities can be changed all the time (e.g. Quattrone & Hopper, 2001, 2005).

Most uses of technologies in modern organizations are aimed to be inexpensive, ubiquitous and easy-to-use infrastructure that will allow them to develop new applications to support business and consumer needs rather than only technologically feasible solutions—this vision is called the 'content specific era' (MoscHELLA, 1997). Technology mediates the relationship between IS and accounting. In the previous era of ledger systems no one paid much attention to IT. However, in the present era of ERPS that can standardize and integrate data and render information integrated, up-to-date, available and shareable in real-time technology have become a visible player that can help develop a firm's management control ambitions. Studies have shown that data integration is very difficult and that sometimes information-based integration is possible only when firms are willing to throw data away and integrate less information. Yet, these effects become visible only when the relationship of IT and accounting is entangled through the analysis both of technical infrastructure and its organizational mobilization (Dechow & Mouritsen, 2005). In spite of the possible reduction of amount of data, the very possibility of integrating the remaining data can install new debates about management control because new

visibility and transparency are possible depending a bit on the sophistication of implemented data-warehouse technologies. One effect of this is the metaphor of 'dashboard navigation' used for example by Kaplan & Norton (1996, 2001, 2004) to illustrate how top managers can have virtually all aspects of the firm in vision all the time.

The aim of Fig. 1 is to (roughly) illustrate how different technologies create attention to and for accounting and management control. Technology is concerned with hardware and software, but it also helps to define and curtail ways in which accounting and IS can be related. Each generation of technology changes the focus of this relation. Ledger systems, ERPS, data-warehousing and XML/XBRL (eXtensible Markup Language, XML) each in their way put technology in control of management control. The focus provided by management control is an effect of the technologies used and so the most interesting feature of XBRL may prove to be that its XML makes standardization of accounting language a relevant aspect in information management control. This means that the *production* of information in itself rather than the information *per se* has increased in significance when systems of management control are laid out.

The concerns about the production of information are related to the expansion and application of information technology. IT has taken a role of its own in shaping organizational arrangements (e.g. Orlikowski, 1992) and accounting is increasingly seen as not possible without information technology, and today information technology is simply the platform for accounting (Granlund & Mouritsen, 2003).

The interest in Internet reporting, outsourcing (of also accounting activities), establishment of shared service centres (for accounting activities) and ERPS directs attention to how information technology promises to be a platform for the management of the whole business rather than merely about the management of certain parts of the business. ERPS drive questions

about integration, standardization and centralization (Chapman & Chua, 2003; Granlund & Malmi, 2002; Scapens & Jazayeri, 2003), and their management control implications go beyond the design of the management accounting system. At the same time as they make certain some courses of action possible, they also constrain other courses of action in on-going management control practices (Dechow & Mouritsen, 2005). Because of technological flexibility, ERPS have multidimensional and surprising effects because managers located in one place can mobilize information entered at a different place. In principle, all can speak for the firm through the local configurations of information defined there. In this way, ERP has made the relationship between IS and management accounting or management control visible and shown its many possibilities and problems.

New technologies (see Appendix again) produce new images of what and how something can be modeled, and therefore also of how something can be calculated and accounted for. Technologies such as e-business, customer relationship management (CRM) and ERPS solutions aim to automate and informate business processes by first modeling and then by representing them in systems, and this not only describes but also develops and alters business processes. To accountants and to management accounting this is important because the technological possibility of and perhaps even push towards new business models make important questions about how to account for this new process and how to develop new performance indicators and thus how to change the focus of a management control problem. The more technology the more lateral thinking in the firm and the less attention to hierarchical accountability alone. Lateral accountability across organizational entities may become more important and it is not clear whether presently there is a good management control system for such a situation.

Yet, there are ways to understand this complexity. Dechow & Mouritsen (2004) suggest that complexity

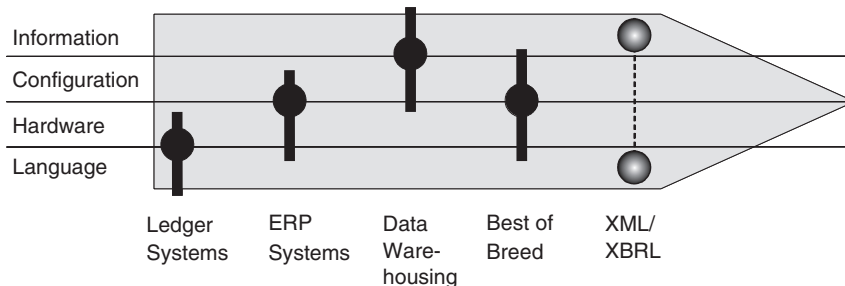


Figure 1. A timeline of technology in control.

can be understood if we focus on how IS borrow from accounting to provide ‘relevance’ and how accounting borrows from IS to provide ‘connectivity’. Before discussing this, we first analyse certain parts of IS and management control literature that enables these two domains to borrow from each other. In the following section we therefore provide a selective overview of central points in the two domains of management information systems (MIS) and management control (MC) literature.

### 3. Literature Overview

#### 3.1. Central Points in the MIS Literature

A large body of MIS literature discusses ways to handle the complexity following from increasingly sophisticated information technologies. A common problem is their way of bringing ‘structure to ill-structured problems’ (Preston, 1991) by means of putting organizational problems on a programmable form. In his discussion of this problem, Boland (1987) says that too often has the model been mistaken for the complex world it attempts to describe. This shows the importance of understanding the characteristics of IT ‘infrastructure’ or models when we try to learn about the possibilities for accounting calculations through MIS research. The point clearly says that infrastructure is no 1:1 mapping of the organization and for the organization to be made sense of we have to understand the ‘extrastructure’ around the infrastructure that makes organizing possible partly—not completely—through the infrastructure.

The first point is that much MIS literature is concerned with ‘*project management*’. Traditionally, the primary concern in this literature was with ways to effectively estimate and monitor a project (e.g. Van de Ven et al., 1976; Zmud, 1980) and the skills needed for this task (e.g. Curtis et al., 1988; Keil, 1995; Kirsch, 2000; Kraut & Streeter, 1995). More recently, this literature discusses relationships between internal users, external system vendors and consultants (e.g. Bancroft et al., 1996; Lozinsky, 1998). This literature suggests that organizations before implementing new and complex IT first need to explore the extent to which they have the expertise to monitor and direct the implementation. This expertise is less about ability to program and ‘write code’ and more about knowing how to configure precoded systems and knowing the implications of various configuration choices. For example, when implementing SAP R/3 organizations usually will have to choose between the two system-setups: one that prioritizes logistical integration and one that emphasizes accounting integration (Dechow & Mouritsen, 2004). Implementation of complex IT applications usually is framed

by the compromise between the desirable, the achievable and the affordable (Bloomfield & Vurdubakis, 1997, p. 656).

A second and related point is that the MIS literature is concerned with ‘*implementation strategy*’. It draws a distinction between ‘big bang implementations’ and small bang or ‘step-by-step implementations’ and ‘prototyped roll-out implementations’ (e.g. Bancroft et al., 1996; Reijers et al., 2003; Welti, 1999). The difference between these implementation approaches is the level of risk an organization takes upon itself vs. the opportunity for minimizing or even eliminating data clutter resulting from incompatible IS. A ‘big bang implementation’ offers an organization the opportunity to switch from one system to another without any interface problems. This opportunity comes at the risk that the new system will have to be fully functional from its first day of operation, when IT ‘goes live’. In contrast, a prototype-based roll-out strategy reduces risk because most problems and errors will have been caught in the prototype system. Yet, the cost of reducing risk is a longer period during which the new IS is under implementation, and it may be that all entities will never actually become connected. In current MIS research the latter approach is weighted to be superior (e.g. Ahituv et al., 2002) both in terms of the extent to which the system is actually coherent and in terms of the extent to which it allows the organization to adjust to new ways of processing data. The challenge is that there is a trade-off between organizational and technological concerns. From a purely technological point of view, a ‘big bang implementation’ appears to be superior over the other approaches. However, this choice comes at an organizational cost whose magnitude can be difficult to assess and account for.

‘*Process (re)organization*’ is a third point in the MIS literature that is closely related to the previous point. The process (re)organization literature looks at lateral thinking (e.g. Hammer, 1990; Hammer & Champy, 1993). Largely, current IS literature justifies restructuring by referring to the potential for streamlining processes and ensuing cost saving. The lateral orientation is, however, also dictated by the ways new information technologies promote the lateral perspective through its database technology and its methods of describing organizational problems. Object-oriented approaches impose representations that prioritize the lateral flows in organizations (Alvarez & Urla, 2002; Westrup, 1995).

Finally a fourth point in the MIS literature is concerned with ‘*strategic alignment*’ which has been debated in the literature for more than 20 years (e.g. Brancheau & Wetherbe, 1987; Chan & Huff, 1993;

Table 2. A five-stage strategic alignment taxonomy (Synnott, 1987, p. 313).

1 No planning	No formal planning either for the business or for the information system
2 Stand-alone planning	The company may have either a business plan or an information systems plan, but not both
3 Reactive planning	A business plan is prepared and the information systems function reacts to it. This is a traditional passive systems role
4 Linked planning	Business planning is interfaced with information systems planning. Systems resources are matched against business needs
5 Integrated planning	Business and information systems planning have become indistinguishable. Both occur simultaneously and interactively

Henderson & Venkatraman, 1990, 1996; Luftman & Brier, 1999a, 1999b; McLean & Soden, 1977; Parker & Benson, 1988). It concerns the ways in which IS strategy supports and is supported by business strategy; a central problem in this literature is to identify alignment ‘enablers’ for and ‘inhibitors’ to ‘business execution’, ‘IT potential’, ‘competitive potential’ and ‘service level’ (Henderson & Venkatraman, 1991). Several stage maturity models have been suggested by researchers in this field, for example the five-stage taxonomy represented in Table 2.

Building on such taxonomies, this literature discusses how to achieve and sustain harmonious or aligned interaction between the business and IT and evaluate the consequences of misalignment (Papp & Luftman, 1995). The conclusions of this research are that alignment is difficult to understand generally but there may be local alignments.

The four points see IS as devices that confront organizations with choices that in practice—if not also in principle—are often mutually exclusive. For example, the literature tells us that organizations will have to make a choice between an accounting-based vs. a logistics-based integration already before an ERPS is implemented. The literature also informs us that the choice of implementation strategy involves a trade-off between organizational risks and technological gains, and it suggests that the process-based modeling is a representational practice with the potential to change conceptions of work. IS can enable and/or inhibit firms’ ability to define and execute its business.

The four points illustrate that IS are not passive platforms in support of accounting. They take part in the constitution of control; IS exert power in relation to organizations, which for example leads Arinze & Andandarajan (2003) to conclude that only small-to-medium-sized firms are strong enough to engage with

a ‘big bang implementations’. Larger firms fare better with a ‘step-by-step approach’. And Latour (1995) says: ‘*it is no longer clear if a computer system is a limited form of organization or if an organization is an expanded form of computer system*’. IS inscribe organizations by rendering business into a choice and design vocabulary. Leigh-Star (1999, p. 375) suggests that what we often think of as ‘boring things’ is the starting point for understanding how things become accounted for in the modern complex organization:

Study an information system and neglect its standards, wires and settings, and you miss equally essential aspects of aesthetics, justice, and change. Perhaps if we stopped thinking of computers as information highways and began to think of them more modestly as symbolic sewers, this realm would open up a bit.

The question then is: what is the role of IS in the management control literature?

### 3.2. Central Points in the Management Control Literature

Dechow (2001) illustrates on the basis of a reading of formal papers about the ERPS SAP R/3 (including add-on packages: see the Appendix for definitions of SEM, CPM and BPM; see also Brignall & Ballantine, 2004) how the firm SAP gives meaning to its ERPS. It mobilizes eight management concepts to illustrate how the ERPS can make sense to the management of the firm. In this way, SAP translates a database technology into purposes and this addendum produces a prescription of how the ERPS can be put to work and function in the interest of the firm.

Table 3 summarizes how each of the eight concepts discussed give meaning and purpose to technological integration. Each speaks to managers in finance and operations functions, and the eight concepts offer two alternative ways to focus on work (W), two ways to

Table 3. Management concepts serving technology: accounting and operations views.

		Management Concepts					
KM	SVA	BSC	ABC	BPR	TQM	SCM	CRM
Royalty	Maximization	Navigation	Segmentation	Cooperation	Conformation	Regulation	Loyalty
With activity based costing, integration is about the relation of strategy design and business workflow				With business process reengineering, integration is about the alignment of the organization in relation to a customer			
With balanced scorecards, integration is about the relation of the horizontal and the vertical organization				With total quality management, integration takes place in episodes based on the notification of the 'right' people			
With shareholder value analysis, integration is about the alignment of management by means of a calculation				With supply chain management, integration is about the allocation of centers of calculation and global process-ownership			
With knowledge management, integration is about the cost-oriented exploitation of data				With customer relationship management, integration is about the capability-oriented exploration of data			
R	B	P	W	W	P	B	R

understand performance (P), two conceptualizations of firm boundaries (B) and two ideas of resources (R). They tell stories about what technological integration can achieve. The significance of these eight perspectives is that it is suddenly possible to prescribe organizational actions and ambitions because the database which may connect people has been translated into management problems and their corresponding solutions. The eight concepts prescribe action and describe organizational roles in relation to the IS in question.

Table 3 identifies eight management concepts—four from the accounting domain and four from the operations domain—that are paired according to what they attempt to make of the firm. Each of the management concepts provides a narrative that can handle the *entire* organization by pointing out what integration can be. They are competing explanations. Both activity-based costing (ABC) and the business process reengineering conceptualize technology as a 'work' centric device (W) which is concerned with the processes of making activities happen in the firm. Where ABC focuses on segmentation between products and markets, BPR focuses on lateral cooperation. Likewise, both the balanced scorecard (BSC) and total quality management (TQM) conceptualize the IS as a 'performance management tool' (P) with a view to finding leading and lagging indicators even if possibly the TQM is concerned to establish general benchmarks for good performance and BSC a local identification of causal links. Shareholder value analysis and supply chain management (SCM) establish corporate 'boundaries' (B) so that the firm as an entity can be manoeuvred in relation to its environment even is shareholder value analysis may concentrate on

the separation of the firm from its environment and SCM may integrate the firm with its environment. Finally customer relationship management and knowledge management focus on corporate resources (R) so that access to valued and intangible resources can be made possible. While knowledge management may be concerned primarily with tacit and codified knowledge, CRM may be more concerned with relationships and brand value. Table 3 then speaks of different types of users—in relation to accounting and operations domains—and identifies the arguments each may find useful in devising the purposes that an ERPS can have. The management concepts, which are central to much thought in management accounting research, produce the justifications for the ERPS. They focus on 'getting things right' for management purposes and in this way they transform the IT orientation of 'getting things connected' in actionable propositions and business strategies.

The resulting degree of plura-vocality (Thachankary, 1992) invites the reader to participate in the construction of the firm's future. By offering a selection of possible uses of the technology, accounting helps IS which then in return allows accounting to engage in creating the story of organization performance through multiple possible meanings at the same time (Boje, 1995). Accounting—and operations—can suddenly participate in creating different possible futures. The objects of the data-based process may be incomplete but they can stand in for the actual workflows and, in principle, allow accounting concepts to speak more clearly about the role of actors, their competences and how to sanction them.

In practice, the extent to which technology conforms to these narratives is a separate problem



that—as SAP AG informs us—depends not only on the specific technology but also on its specific technical configuration:

Many of the common management theories developed in recent years (Business Process Reengineering, Total Quality Management, Lean Management, and so on) have as their goal the optimization of the business system within an enterprise... To optimize the business system, you must take into account the mutual dependence between the organizational structure and the process structure of the enterprise. ‘Re-engineering’ the business processes of a company can require the adjustment of the organizational structures. (SAP AG, 1997, CA Consultants Handbook, pp. 2–6)

The concepts hosted by the SAP R/3 system give purpose to enterprise resource planning. Management control literature writes about possibilities free of technological constraints and this may be advisory in a project mode full of opportunity but typically not in a practice mode where the configuration choices the IS literature speaks about have been made. Accounting presents possibilities and ambitions.

#### 4. Understanding Accounting-IS Relationships as ‘Mutual Borrowing’

The accounting domain makes well-known practices around the balance sheet and profit and loss account relevant to corporate concerns. The domain of IS considers shifting technologies. They are both interested in representations that complement each other rather than compete with each other. This proposition allows us to develop an understanding of the connection between the two domains. In order to render this connection explicit, Dechow & Mouritsen (2004) introduce Latour’s (1992) distinctions between different types of manuscripts (see Table 4).

These four types of manuscripts help us to understand the different modes of action that need to be mobilized to understand information technology. The first two modes—descriptions and prescriptions—concern the representation of the subject matter to be managed, while the last two modes—circumscriptions and conscriptions—are about the

mechanisms of organizational alignment that make a firm coherent. All four are therefore part of a programme of action and we understand that neither of them can function without the others. These dimensions can help us explain what happens when IS meet accounting through four types of interactions and displacements. A point is that accounting research is concerned particularly with description and prescription because accounting has a series of distinct modes of representation that are tied to a concern about decision-making or control. Descriptions define cost relationships and ideas of profitability and performance. These ideas are pointed out by prescriptions that define under what conditions a particular choice of accounting calculation is useful and relevant. Description and prescription are central to accounting representations.

In contrast, circumscriptions and conscriptions are favoured by IS representations. Circumscriptions happen through models of relations, functions and processes through abstract questions about what should be done, when something should be done, who should do something and what information is necessary to do something? Conscriptions happen through the technology itself where resources are enrolled and represented in technology. This is to hold events and activities together technologically.

Table 5 illustrates how the domains of accounting and IS mobilize management control (Dechow & Mouritsen, 2004, p. 109). Accounting adds voice to the relational database and empowers it to speak a story about managerial decision-making. It also provides the action that tells how an optimal decision looks. Accounting creates visibility and transparency through descriptive and prescriptive texts about cost and revenue relations and about optimal decision-making activities. Accounting helps to explain the purpose of IS and assigns them with procedures to make them workable in a technological representation. Structure is provided more by IS that creates relations between technology and people in circumscriptive texts about how people and technology work together, and conscriptive texts about how people are expected to behave given the system

Table 4. Four types of manuscripts (Latour, 1992).

Descriptions	Define actants, endow them with competences, make them do things and evaluate the sanction of these actions.
Prescriptions	Define what is presupposed from those social and technical actors that are transcribed by the description.
Circumscriptions	Organize resources in the setting of their own limits and demarcations.
Conscriptions	Mobilize well-aligned resources to render their behaviour predictable.

Table 5. The dimensions of management control and information systems.

Technology	Event-driven process chains	Accounting concepts	Relational database technology
Voice		Descriptive text	
Structure	Circumscriptive text		Conscriptive text
Action		Prescriptive text	
<b>Production</b>	<b>Involvement</b>	<b>Transparency</b>	<b>Alignment</b>

presents a set of options to respond to systematically and predictably.

The four types of text are not only related in their roles as voice, structure and action of a manuscript. They are also related in the *technologies* (which in the case of an ERPS comprises event-driven process chains, accounting concepts and relational databases) and in the *production* of involvement (length of the relations held by the ERPS), transparency (object of management processes) and alignment (reproducibility of relations).

Once technology has been aligned it can only create certain types of transparency and involvement. When technology has been configured, generic demand prescriptions can no longer interact flexibly with the circum- and conscriptive text of IS. In a real-life on-going configuration, transparency (object of management processes) depends both on alignment (reproducibility of relations) provided through the configuration of the relational database technology and the involvement following from the design of organizational processes. When, for example, initially, the ERPS idea introduces itself in documents about its potentialities it creates promises of an open future because its four types of manuscripts are flexible in relation to each other. Later, however, when technology has been laid out and the design choices made—at the point where and when its text is in screen fields, data drills, standard reports, etc.—the chosen system architecture and processes bind the user into an effort to keep IT together. At this point, finally, choices once during the implementation realized as gains, now eventually show themselves sometimes as a challenge and sometimes even as a loss when certain queries prove difficult or perhaps even impossible to perform given the system architecture in place. In practice, there is therefore a limit to how effective this mutual borrowing is. It may be that strong configurations of accounting and IS are those that draw on and yet transcend both disciplines (Dechow & Mouritsen, 2005). On this basis, the purpose of the following section is to sample a variety of issues that can help to identify how information technology and accounting enable or constrain each other.

### 5. Information Technology and the Roles of Accounting: Enabling and Constraining

Representation and performance are constructed in IS, and in turn IS make these more efficiently reported and also hard to change (e.g. Hyvönen et al., 2005). Information technology takes on some kind of actorhood as it allows and constrains accounting practices at the same time. It is this dual effect that makes representation and performance both possible and problematical at the same time.

It has long been noted that accounting cannot be practiced without IT. Whilst IT has developed during years, so has accounting. As the field of accounting is very broad and the motives behind the areas different, it requires also diversity and flexibility from IT/IS solutions to meet the current requirements of accounting. For example, it requires quite different accounting and information technology to produce business relevant managerial information such as segmented customer profitability calculations or financial accounting statements to meet the requirements of law and shareholders, although the basis could be partly the same transaction processing system(s). Typically, such outputs require different informational input.

Developments in IT have increased the versatility of accounting. Internet, ASP technology, data warehousing, etc. have made it possible to organize and practice accounting flexibly and efficiently and it has been suggested that developments in IT/IS—increasing automatization of routine tasks—have facilitated a role change of accountants from bean-counters to business analysts (Caglio, 2003; Granlund & Malmi, 2002; Scapens & Jazayeri, 2003), although this prediction may have materialized only to a limited degree or with considerable time lag and under certain circumstances (Granlund & Malmi, 2002). This more analytical role is related to developments in specific technologies, such as data warehousing and analytical tools (OLAP, data mining, business intelligence), which have given new opportunities for accounting experts to make sophisticated multidimensional financial and nonfinancial analyses.

New IT has enabled automatic bookkeeping entries at the factory floor level (Granlund & Malmi,

2002; Quattrone & Hopper, 2005), as well as it has allowed user-friendly budget analysis, for instance, for line managers (Scapens & Jazayeri, 2003). In general, new IT has opened the discussion of who practices accounting (e.g. Caglio, 2003). Although salesmen and store-people produce more bookkeeping entries in an ERP environment than accountants, they are hardly accounting professionals capable of organizing accounting processes, nor are they managers even if they are granted access to databases. This does not lead to a situation where comprehensive accounting skills would no longer be needed (Granlund & Malmi, 2002). Perhaps on the contrary, since the amount of data in the databases is huge and managers typically do not have time and/or skills to analyse it systematically, experts with comprehensive analytical skills are needed to take advantage of the databases. However, some of these experts may not have to be accounting professionals (Chapman & Chua, 2003).

IT may also be a constraint to developments in accounting. Sometimes the espoused benefits are not feasible because the very integration so much sought for may hinder the calculations normally used in the firm. When all information is integrated certain kinds of analyses may be made difficult and therefore local additions are developed in the form of spread-sheet solutions or in stand-alone financial systems. Such supplements happen very often (e.g. Granlund & Malmi, 2002; Hyvönen, 2003). It is difficult to keep the central database in place particularly if it has to have too many purposes around the firm. Often the design is not rotating around accounting but around manufacturing and logistics and therefore it may be that some accounting objectives cannot be fitted into the design of the technological infrastructure. Instead, additional soft- and hardware is supplemented on an *ad hoc* basis thereby not only adding technical complexities but also socio-technical 'extrastructure' to the system-based infrastructure. As Leigh-Star (1999, p. 387) reflects:

One way to explain this magnification process is to understand that in fact two processes of work are occurring simultaneously: Only one is visible to the traditional analysis of user-at-terminal or user-with-system. That is the one that concerns keystrokes and functionality. The other is the process of assemblage, the delicate, complex weaving together of desktop resources, organizational routines, running memory of complicated task queues... and all manner of articulation work performed invisibly by the user.

In sum, the linkages between information technology, management accounting and management control

are thus often uncertain, even surprising, and therefore unidirectional assumptions in this regard may prove to be misleading. The following three questions/hypotheses about those relationships suggest—on an illustrative basis, only—some entry points for innovative research to take on further explorations of paradoxical situations arising from increasingly 'promising' accounting prescriptions; from increasingly complex information technologies; and from increasingly complicated infra- and extrastructures:

- The complexity of information technology is such that whilst IT in principle can do everything, in practice IT requests choice (Dechow & Mouritsen, 2004). *May it be* that in contrast to the promises of more sophistication it is reasonable only to expect weak management information? (Granlund & Mouritsen, 2003; Willis, 2001).
- If we assume that IT can enhance the production of new knowledge, is it then possible to advance a stable structure in IS? *May it be*, as recent studies (see Dechow & Mouritsen, 2005; Granlund & Mouritsen, 2003; Quattrone & Hopper, 2005) suggest that there is a lot of work already built into the configuration settings?
- If firms need to be able to implement business strategies quickly and flawlessly *may it be* that the design effort in order to accommodate new ambitions and preoccupation should focus on the interaction of infra- and extrastructure? *May it be* too complex?<sup>1</sup>

## 6. Conclusions

Since the advent of information technology, organizations have been able to develop more and more

<sup>1</sup>Leading ERP vendors (and other major players in the software market) have introduced new integration and application platforms (e.g. SAP NetWeaver and Service Oriented Architectures (SOA), in general), which imply the promise of open integration (cf. the general idea of Enterprise Application Integration (EAI) and Middleware; see the Appendix). But when we come down to specific functions, such as accounting, and the functionalities information systems can support within it, the reality may be different. On the other hand, this technology is only very recently introduced, and we do not have much experience of it yet, not to mention research knowledge. The promise of such EAI development is welcomed, of course. The ideal in the IT world would be, from the users' perspective, a situation where you can buy best-of-the-breed solutions for all activities, without having any problems in making them work together seamlessly. Whereas we may be soon approaching such reality, there still remain many practical problems to be solved.

data. The intermingling of accounting and information technology creates a potentially much more complex organization given the power of information technology to develop new accounting representations that can superimpose any 'actual' work with a 'possible' world through some form of simulation or recalculation. The intermingling of information technology and accounting therefore potentially creates a more complex organization and an organization that can be controlled by those who control access to information and calculation. It may even be that firms using highly integrated IS cannot escape their power and can run blind (Ciborra, 2000).

This relation is to be understood as a problem. Often research suggests that information technology and accounting developments are poorly related and the context in which to see their interaction has to be broadened. One can ask, for example, if the disciplines each have difficulty in creating organizational significance, why would two 'weak' parties become a strong one. It may be that the strength from combined efforts arises when they are put into new contexts not initially explicit in the domains of the disciplines—the question is how they can come to stand for important corporate problems

(Dechow & Mouritsen, 2005; Quattrone & Hopper, 2005)?

Management control can easily be seen to be dependent on information technology, but as we have shown information technology cannot present its own case. Accounting is a key metaphor in many applications and distinctions between various kinds of performance relate back to prior discussions in the accounting field. The intermingling of information technology and accounting is therefore important. Nevertheless, the benefits for accounting from information technology materialise only in uncertain ways and typically only after long implementations, after which organizations may even then choose to separate accounting practices from the infra-structure rooted in IT.

There is a relationship but it is one to be untangled rather than to be assumed. The research needed to develop insights into this relationship is therefore significant because it concerns the principles about how firms choose to coordinate their activities—about how firms debate what integration is about. This is a big dish, and it is not clear yet that it can be accommodated within existing frameworks of what IS do and what accountants do in firms.

*Table A1. Technology: definitions and functions.*

Technology	Definition	Example (function)
ASP, Application Service Provider	A form of outsourcing. A company that offers access over the Internet to applications and related services that would otherwise have to be located in personal or enterprise computers.	Instead of purchasing a software license, database license and necessary server and other equipment, a firm can pay a monthly rent for these services. A firm can purchase software e.g. ABC or BSC with this method and gain benefits with regard to e.g. total cost of ownership. Problems may emerge due to information security threats and the fact that only modest customization is possible in this model. The ASP firm basically offers the same basic solution for all its customers.
BoB, Best of the Breed	Best software in certain functional area, like product costing or budgeting.	In BoB software the functionality has been designed explicitly for the particular purpose, so no trade-offs have been made regarding features and quality in the name of integration, for instance.
BI, Business Intelligence	Analytic tools—sometimes designed as web portals—using data mining and other techniques for analysing not only company internal data-sources, but also external ones.	Business Intelligence tools are much applied in customer relationship management (CRM), but they are increasingly applied also in other areas for various analyses from product costing/pricing to financial and nonfinancial competitor analysis.
Data Mining	Sorting through data to identify patterns and establish relationships.	Unlike in OLAP, the user is not specifically defining what she is looking for. Data Mining software searches in large databases for correlations. It is up to the user to evaluate whether these statistically significant relationships are also economically significant and thus valuable regarding decision-making.
DW, Data Warehousing	In this model selected data is copied (and simultaneously extracted and cleaned) from operative and other massive (typically relational) databases (DB) to data warehouses for user-friendly analysis and reporting.	Practically all modern corporate software apply own or shared databases. The amount of data in the many times operative databases is huge and thus difficult and slow to analyse. There are also other motives for applying DW technology, like preventing the emergence of errors in operative DBs during analysis in this environment. Operative DBs are also incapable of storing data from several years, as typically data from DBs are removed to archives once a year.

EAI, Enterprise Application Integration	Plans, methods and tools aimed at modernizing, consolidating and coordinating the computer applications in an enterprise.	Typically, an organization has existing legacy applications and databases, and wants to continue to use them while adding or migrating to a new set of applications that exploit the Internet, e-commerce and other new technologies. Middleware is a commonly applied tool of EAI.
E-invoicing, electronic invoicing	An invoicing process without paper.	In the electronic invoicing process the same electronic document is for one organization a purchase and for another a sales invoice. E-invoices can be easily handled in up-to-date software from special invoicing software to certain ERP products. E-invoices serve as the basis for fully electronic bookkeeping as well. E-invoices are put through the acceptance procedure in e-format via emails, they include suggestions for accounts and periodizing in bookkeeping, and they are ultimately archived in e-format in servers (and copies in CDR-discs).
ERPS, Enterprise Resource Planning system	An integrated information system taking care of all information flows of an organization; operates on a centralized database where data is entered once at the point of transaction.	SAP R/3, ASW, Navision, Oracle, etc. Data is entered in sales, purchases, storehouses, accounting, etc. and is available for all software modules in real time. Lots of automatic transactions: when a storeman enters that ordered goods have arrived, the system simultaneously updates store balances, production planning, sales plans, cash management plans and makes a bookkeeping entry.
Legacy systems	Applications and data inherited from languages, platforms and techniques earlier than current technology.	Most organizations that use computers have legacy applications and databases that serve critical business needs. Typically, the challenge is to keep the legacy application running while converting it to newer, more efficient code that makes use of new technology.
Middleware	General term for any programming that serves to glue together or mediate between two separate and often already existing programs.	Middleware enables different applications to communicate. For instance, it may be designed to integrate a stand-alone ABC software with an ERPS. Middleware can also be used to allow a certain software/program to access other databases than what it was designed to access originally.
OLAP, Online Analytical Processing	User-friendly multidimensional analysis software.	With OLAP a user can easily analyse for example the sales of a certain product during a specific period in a certain geographic region according to salespersons. Visually OLAP is often presented as twiddling an info-cube, but in practice such analysis can drill into dozens of dimensions. A different question is how many dimensions a user is able to reasonably model and use simultaneously.

Table A1. (Continued).

Technology	Definition	Example (function)
SEM, Strategic Enterprise Management CPM, Corporate Performance Management BPM, Business Performance Management	Software families for managerial analysis and reporting (names vary by the vendor but contents are very similar).	Software for balanced scorecard, activity-based costing, strategic planning, advanced financial analysis and planning, etc. These software products are offered by both ERP vendors and other software companies. Typically, these products are used to compensate shortcomings in the analysis and reporting functionalities of ERPS.
SOA, Service Oriented Architecture	A recently introduced platform for application, process management, and integration sectors of the software industry consisting of loosely coupled software parts.	SOA is based on globally standardized modeling and programming tools (Java, XML, etc.) and is therefore intended to be a vendor independent architecture. SOA promises higher flexibility and lower total cost of ownership than client-server solutions (including current ERP solutions).
XBRL, eXtensible Business Reporting Language	XML-based (eXtensible Mark-up Language) language being developed specifically for the automation of business information requirements, such as the preparation, sharing, and analysis of financial reports. AS HTML (Hypertext Markup Language) only defines the appearance of web-pages, XML and XBRL also define their contents.	Financial statements/reports must frequently be duplicated separately (and altered) for different uses, and the extraction of data can be very time-consuming. XBRL will automate these processes. XBRL is intended to provide a standardized framework and integrated methodology for the preparation and publication of electronic reports, as well as a consistent, automated process for the reliable extraction, consolidation and exchange of financial reports in the web and other electronic channels. XBRL applies a tag system, which defines, for example, the content of every line item in the financial statement or in a budget report so that they can be understood as turnover, salaries, etc. and read and analysed accordingly. HTML only defines fonts, colors, etc.

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# A Review of Activity-Based Costing: Technique, Implementation, and Consequences

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**Abstract:** Accounting history has shown that new techniques have periodically been incorporated into the accounting craft. The context of the 1980s and the 1990s has led to the emergence of activity-based costing (ABC). This chapter will include a review of the evolution of ABC from its emergence around 1985 to its most recent development, “time driven ABC.” The academic research on ABC of the last 15 years will be reviewed to identify research opportunities on ABC. The consequences of ABC on the evolution of management accounting and its impact on our comprehension of the accounting process of change will be discussed.

## 1. Introduction

Activity-based costing (ABC) is considered by many academics and practitioners as one of the most important innovation in management accounting of the twentieth century along with variance analysis, return on investment, and the balanced scorecard. The concept of ABC is subject to varying interpretation and its definition has evolved over time. According to Hilton (2005, p. 786), “ABC is a two-stage procedure used to assign overhead costs to products and services produced. In the first stage, significant activities are identified, and overhead costs are assigned to activity cost pools in accordance with the way the resources are consumed by the activities. In the second stage, the overhead costs are allocated from each activity cost pool to each product line in proportion to the amount of the cost driver consumed by the product line.”

ABC emerged at the end of the 1980s in the United States (Jones & Dugdale, 2002). It rapidly spread to Canada and Europe. Early in the 1990s, academics and practitioners who observed or participated in ABC implementations, found that there were other advantages, such as the capability to better manage costs and activities than just an improved calculation of costs. These conclusions not only led to the emergence of activity-based management (ABM) but also conducted academics and managers to examine how ABC could interact with other management innovations and improvement initiatives such as total quality

management (TQM), economic value added (EVA) or the theory of constraints (TOC).

Academics who had already been urged by Hopwood (1983) and Kaplan (1984a, 1984b) to examine how cost management systems and models were designed within real organizations, conducted field studies in different countries in Europe and North America to better understand why and how firms implement ABC. The majority of them, if not all, found that implementing ABC was much more complex than what they expected. They also performed more than 25 surveys in different countries to evaluate the extent to which organizations were implementing ABC. These surveys have shown that the implementation rates for ABC were lower than anticipated. Furthermore, they demonstrated that there was a lot of confusion among the management accounting community on what exactly ABC is.

From 1995, academics started to examine what were the contextual factors that influence the implementation of ABC at various stages (Anderson, 1995; Gosselin, 1997; Krumwiede, 1998), the perceived success of the implementation (Anderson & Young, 1999; Foster & Swenson, 1997; McGowan & Klammer, 1997; Shields, 1995; Swenson, 1995), and the impact of ABC on performance (Cagwin & Bouwman, 2002; Ittner et al., 2002; Kennedy & Affleck-Graves, 2001). These studies were criticised by Kaplan (1998) who considered that the implementation of ABC was a too recent phenomenon to enable researchers to evaluate

if it created values for organizations. Kaplan (1998) suggested that scholars should wait before assessing the effect of ABC. He also claimed that if ABC was not successful in a specific organization, it could be explained by a poor management of the ABC project.

The interest in ABC seems to have weakened at the end of the 1990s because many organizations found that ABC was too complex to implement. Innes et al. (2000) replicated a survey conducted in the United Kingdom in 1994 (Innes & Mitchell, 1995). They found that many organizations that had adopted and implemented ABC abandoned it because of several difficulties. Kaplan & Anderson (2004) also suggested that many large organizations abandoned their ABC project because of rising costs and employee irritation.

ABC has now been incorporated in most management accounting courses offered in Organisation for Economic Co-operation and Development (OECD) country universities, and in management accounting textbooks in the United States, United Kingdom, Canada, and Australia. Accountant institutes are also providing executive training on ABC to their members. There is also an enormous amount of information on ABC on the Internet.<sup>1</sup> Despite favourable context for the adoption and the implementation of ABC and even though ABC exists since almost 20 years, surveys have shown that the diffusion process for ABC has not been as intense as it may have been expected. This is the essence of what has been called the ABC paradox (Gosselin, 1997; Kennedy & Affleck-Graves, 2001). If ABC has demonstrated so much benefits, why not more firms actually employ it? This ABC paradox still remains unexplained. There are several potential explanations for the ABC paradox. Kaplan (1986) suggested four explanations for the management accounting lag: the lack of adequate role models, the prevalence of computer-based accounting systems, the emphasis on financial accounting, and the fact that top management do not emphasize the improvement of the relevance of their management accounting systems. Almost 20 years after the emergence and the publication of this paper, these explanations are still relevant. Kennedy & Affleck-Graves (2001) also identified three potential answers to this paradox:

1. ABC may not be suitable for every firm.
2. ABC may not, *per se*, add value, but may merely be correlated with other variables that are the true value drivers.

3. Little evidence has been presented that documents a direct link between a change to an ABC system and increases in either shareholder value or firm profitability (Kennedy & Affleck-Graves, 2001, pp. 22–23).

The purposes of this chapter of the *Handbook of Management Accounting Research* are first to examine the evolution of ABC from the works of Kaplan (1984a) and Miller & Vollmann (1985) to the recent emergence of “time driven ABC” that provides a link with customer accounting but seems to be a return to standard costing (Kaplan & Anderson, 2004). The second goal is to examine the results of the survey studies that were performed to assess to what extent firms have adopted and implemented ABC and to review the academic research carried out on ABC over the last 15 years. Finally, the chapter will also provide an opportunity to identify research opportunities on ABC and to discuss about the consequences of ABC on the evolution of cost accounting and management accounting.

The chapter is organised as follows. The first section includes a review of the evolution of ABC from the early ABC model to activity-based cost management (ABCM) and comprises a brief examination of the 1,477 papers published on ABC.<sup>2</sup> The second section includes a brief review of the 25 surveys on ABC performed in several countries with a special emphasis on the adoption and implementation rates. The third section focuses on the empirical research on ABC and the fourth section attempts to provide a better understanding of the organisational and social consequences of ABC.

## 2. The Evolution of ABC: From Transaction Costs to Time-Driven ABC

### 2.1. The Early Activity-based Costing (ABC) Model

For the last century, accounting for overhead costs has been a major issue for management accounting researchers and practitioners. Current conventional allocation methods emerged in the beginning of the twentieth century (Chandler, 1977; Kaplan, 1984a). During that period, manufacturing firms were producing a small range of products requiring similar amounts of support services. Overhead costs accounted only for a small portion of total costs. After the Second World War, attempts were made in United Kingdom, France (Bouquin, 1993; Cibert, 1976), Denmark (Israelsen, 1993, 1994), Germany and Holland (Boons et al., 1992), and the United

<sup>1</sup>A search on Google with the words ABC yielded 324,000 results in December 2004.

<sup>2</sup>A review of the ABC literature from 1988 to 2004 is included in Gosselin (2005).

States (Jones & Dugdale, 2002; Staubus, 1971; Vatter, 1945) to improve the conventional allocation method. In the 1960s and 1970s, the emphasis was on cost allocation modelling (Kaplan & Thompson, 1971; Kaplan & Welam, 1974) and the discussion of cost allocation arbitrariness (Eckel, 1976; Thomas, 1969, 1974; Zimmerman, 1979).

Research on cost allocation began to stage a comeback in the mid-1980s. Miller & Vollmann (1985) underlined the changes in the cost structures and environments of manufacturing firms. They showed that output volume did not drive overhead costs in the new manufacturing environment. They also demonstrated that overhead drivers were associated with organizational transactions such as logistics (moving materials), balancing (meeting purchasing, materials planning, and human resource requirements), quality (engineering and quality control), and change (engineering change orders). They referred to these transactions as the “hidden factory” and led to the development of the concept of transaction-based accounting (Shank & Govindarajan, 1988). During the same period, Kaplan (1984b) and Johnson & Kaplan (1987) suggested that traditional costing systems were obsolete and Cooper & Weiss (1985) and March & Kaplan (1987) provided examples of this situation in the Schrader-Bellows and John Deere cases. Cooper (1988a, 1988b, 1989a, 1989b, 1989c), Kaplan (1988) and both authors (Cooper & Kaplan, 1988) introduced ABC in several papers published in the *Harvard Business Review* and a new Journal, the *Journal of Cost Management* that played an important role in the diffusion process for ABC. All these papers examined essentially how traditional cost accounting systems could distort product costs and how ABC could provide a solution to this problem. ABC was launched and became one of the most important innovations in management accounting of the last decade.

ABC is a two-stage cost accounting technique that assigns indirect costs to products, services, or any other cost objects. To complete the first stage, an organization needs to identify significant activities and to assign indirect costs to these activities in accordance with the way resources are consumed by these activities. In the second stage, indirect costs allocated to activities or activity cost pools are assigned to products, services, or any other cost objects in proportion to the amount of the cost driver consumed by each of them. Therefore, costs will be allocated to products, services, or any other cost objects in proportion to their consumption of this activity. For example, a product that requires a large amount of warehousing will be charged warehousing costs in line with this consumption. Conversely, traditional

cost accounting systems tend to allocate costs in accordance with volume drivers such as direct labour hours. The emergence of ABC has led to the development of a specific ABC terminology with new concepts like activities, activity drivers, cost drivers, resource drivers, activity cost pools, and cost objects (Dierks & Cokins, 2000).

Activities represent all the actions performed to convert, and to support the conversion of, materials, labour, technology, and other resources into outputs. Conventional management accounting systems classify cost information by production and service departments, not by activities. This traditional cost classification consists of grouping costs under an account most easily identified with the check disbursed (McGroarty & Horngren, 1993) and the location, in terms of the organizational structure where the costs were incurred. Under ABC, costs are classified into activity cost pools. This classification consists of grouping costs in a pool corresponding to the activity that is performed. Under this approach, the focus is on why the costs were incurred instead of where. Resource drivers are measures of the consumption of resources by activities and activity cost pools. They are used in the first stage of ABC when one needs to assign costs to activities. Activity drivers are measures of the consumption of activities by each product or services. Cost objects are any product, service, customer, project, process for which a separate measurement is desired.

ABC spread rapidly in the United States, Canada, and Europe after the first articles by Cooper & Kaplan. Several other academics and practitioners like Bromwich & Bhimani (1989), Turney (1989), and Banker et al. (1990) had discussed about the same issues at the end of the 1980s. The only authors that questioned this new focus on costing at that time were Nanni et al. (1988) who argued that this emphasis on overhead allocation was not necessarily helping firms achieve their strategic goals and Merchant & Shields (1993) who suggested that in some circumstances, managers could use less accurate cost information. They reminded us that the benefit of a cost management system was derived from having cost data to be approximate but relevant rather than precise but irrelevant. This question raised by these authors was probably a relevant explanation for the lag in the implementation of ABC that was noticed in the early surveys on ABC that will be examined in the second section of this chapter.

## 2.2. The Literature on ABC

In order to better understand, the evolution of ABC over the last 20 years, the articles published on ABC

during the 1988–2004 period were identified, examined, and classified. Abrahamson (1996) has used the number of articles on stock options and quality circles to better understand the diffusion process for management fads and fashions. Jones & Dugdale (2002) performed a similar search for the 1988–1998 period to explain the diffusion process for ABC. The following approach was employed to identify the articles published on ABC since 1988. The word “activity-based costing” was entered in the Proquest ABI/Inform Global database. All the abstracts of the papers identified through this search were examined. Book

Table 1. Number of papers on ABC per year from 1988 to 2004.

Year	Number of articles
1988	3
1989	6
1990	27
1991	62
1992	96
1993	146
1994	149
1995	152
1996	130
1997	146
1998	126
1999	102
2000	71
2001	72
2002	74
2003	62
2004	53
Total	1,477

reviews, editorial and other irrelevant references to “activity-based costing” or “activity-based cost management” were deleted. After this first step in the review process, the final number of papers on ABC was 1,477, published from 1988 to 2004, inclusively. Table 1 shows the number of publications for each year and Fig. 1 depicts the evolution in the number of papers. The number of papers published can be considered as a proxy for the interest of the management accounting community for ABC. Table 1 and Fig. 1 clearly show that the interest for ABC quickly rose at the end of the 1980s. While only a few papers were published in the 1980s, almost 150 papers were published every year in the middle of the 1990s. This analysis will be used throughout the first section of this chapter to better demonstrate the evolution of ABC. Bjornenak & Mitchell (2002) and Lukka & Granlund (2002) have examined the ABC literature. A more in-depth review of the 1,477 papers published on ABC from 1988 to 2004 is included in Gosselin (2005).

### 2.3. ABC in the Early 1990s

In the beginning of the 1990s, the focus was on ABC system implementations and their outcomes (Bhimani & Pigott, 1992; Cooper et al., 1992; Cooper & Kaplan, 1992; Eiler & Campi, 1990; Foster & Gupta, 1990). Most of these studies were conducted by consultants and academicians who had recently been responsible for designing such systems. They consisted essentially of “success stories of ABC installation.” In many cases, researchers seemed to be closely associated with the case study firms, the ABC software, and the ABC implementations (Ferrara, 1993).

At that time, only a few researchers questioned the relevance of ABC (Johnson, 1992a, 1992b, 1994;

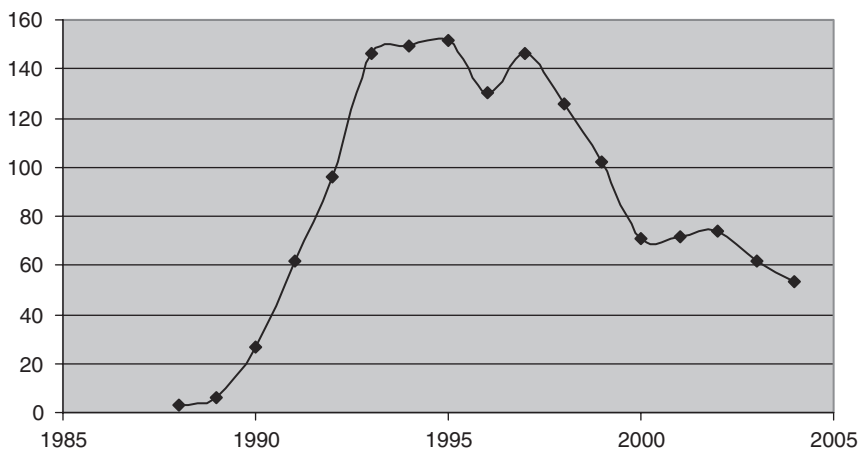


Figure 1. Number of articles on ABC (1988–2004).

Piper & Walley, 1990, 1991). For instance, Johnson (1990) contended that ABC does not show managers how to make their organizations more competitive and profitable. Nanni et al. (1992) also suggested that organizations should stop tinkering with their cost accounting systems. They advocated that firms do not have to install an ABC system to benefit from activity management (AM).

Noreen (1991) launched an interesting discussion on the usefulness of ABC. He identified three conditions under which ABC provides relevant cost information:

- 1) "Total costs can be partitioned into cost pools, each of which depends solely upon one activity";
- 2) "Cost in each cost pool must be strictly proportional to the level of activity in that cost pool";
- 3) "Each activity can be partitioned into elements that depend solely upon each product" (Noreen, 1991, p. 164).

These conditions are important and are not met in many instances. That may explain why managers that developed an ABC model have difficulties employing it for decision making. Bromwich & Hong (1999) extended Noreen (1991) to show that some costs cannot be assigned under ABC and that this situation may lead to cost distortions.

The interest for ABC rose rapidly in the beginning of the 1990s among the management accounting collectivity. Many organizations in the United States, the United Kingdom, and Canada developed seminars, training sessions, and conferences on ABC. One proxy for this growth in interest is the number of articles published on ABC. The number of publications, as shown in Table 1 and Fig. 1, increased quickly from 3 in 1988 (Cooper's articles in the *Journal of Cost Management*) to 152 in 1995, the year during which the largest number of papers on ABC were published. ABC also became a research topic for researchers in management accounting. For example, the European Institute for Advanced Studies in Management (EIASM) launched in 1993 a new Seminar on Manufacturing Accounting Research that was held at that time in Eindhoven, in the Netherlands. The plenary speakers at that conference discussed ABC, the new costing technique.

#### 2.4. Activity-Based Management (ABM)

During its early period of development, ABC was perceived essentially as a new device to determine product and service costs more accurately. A few years after its emergence, both academics and practitioners started to observe that providing financial and non-financial information on activities and cost

drivers could also have important management implications. This evolution conducted to the emergence of adaptations of the early ABC model and more specifically to ABM. Consultants also found in ABM an opportunity to move ABC from a "costing technique" to a "management philosophy" (Jones & Dugdale, 2002). Consequently, the concept of ABM first appeared in 1991. Hilton (2005, p. 786) defines ABM in the following manner: "Using an activity-based costing system to improve the operations of an organization." This step in the development of ABC was critical. After several implementations that had been performed with some success according to the implementers, ABC proponents recognized that the benefits derived from ABC lied in activity analyses and cost driver analyses rather than in the new costing technique *per se*. Thus, ABM evolved out of ABC. What was considered strictly to be a product costing system became much more as Turney (1991) explained in the following quotation: "The real key to success is putting ABC to work to identify appropriate strategies, improve product design, and remove waste from operating activities. Using ABC to improve a business is called activity-based management (ABM). It guides efforts to adapt business strategies to meet competitive pressures as well as to improve business operations."

Another argument in favour of a move to ABM was the degree of emphasis placed on the numbers or cost components under ABC. Johnson (1994) argued that focusing on the accounting numbers traps managers in old-fashioned hierarchical thinking. Managers need to focus on the business processes. These processes form a system of interdependent (co-operative, not competitive) components that have an aim. The general aim of the business, according to Johnson, should be "exceeding customer expectations profitably." For a business to focus only on costs may only result in a better allocation of "bad (excessive) costs."

While ABC emphasizes more accurate product costing, ABM emphasizes activity analysis (AA) that consist in understanding the organization's goals and how the processes within the organization work together to accomplish those goals. The AA within ABM can provide cost, quantity, and time measures suitable for TQM, value engineering, or continuous process improvement. Turney (1992a, 1992b, 1993) and Soloway (1993) suggested that the goal of ABM was to identify and eliminate non-value-added activities and reduce costs. The emergence of ABM drew a lot of attention on ABC outside the management accounting community. For a short period, ABM became one of the leading improvement initiatives.

During the same period, other approaches to improving organizational effectiveness like TQM (Hackman & Wageman, 1995) and re-engineering (Hammer & Champy, 1993) emphasized to need to review processes and activities.

The interest for ABM grew very quickly especially after the publication of Turney's book (1991) entitled "Common cents: The ABC performance breakthrough." An examination of the literature on ABM in the Proquest ABI/Inform Global database confirms the importance of the attention for ABM in the middle of the 1990s. Fig. 2 depicts clearly this evolution. The number of articles on ABM that amounted to 7 in 1992 grew to 25 in 1995. In 1998, 40 articles were published on ABM. After that period, the number of articles declined rapidly to reach five in 2003.

ABM was and still is an interesting way to link a cost accounting device, ABC, to the management of organizations. However, ABM challenges actual processes and activities in organizations and leads to a cross-functional view of the organization (Mevellec & Bertrand, 2005). Ultimately, it could even lead organizations to need to review in depth their organizational structure and power networks (Armstrong, 2002).

The evolution from ABC to ABM had some positive impact on the development of ABC and its use in practice. However, it created some confusion around ABC and the concepts that are relevant to it. The multiplicity of expressions such as activity accounting (Brimson, 1991), ABM (Reeve, 1996; Turney, 1992a), AA (Gosselin, 1997), activity cost analysis (ACA) (Gosselin, 1997), and cost driver analysis (CDA) that emerged in the 1990s is a good

example of the variety of terms used in practice. This inference reflected to some extent the diversity of the ABC models that have been implemented. Gosselin & Mevellec (2003) interviewed managers from 42 firms in Canada and in France and concluded that none of the 42 models implemented were similar.

### 2.5. Deconstructing ABC

Gosselin (1997), and later Baird et al. (2004), examined ABC and ABM from a different perspective. Instead of considering ABC as a single innovation, Gosselin (1997) considered that ABC was part of a much more complex management innovation that he called "activity management". Under this approach, AM was considered as "the effective and consistent organization of the enterprise's activities in order to use its resources in the best possible way to achieve its objectives" (Brimson, 1991). According to Gosselin (1997), AM can be divided into four levels of complexity: AA, ACA, pilot ABC, and full ABC. Fig. 3 depicts these levels. AA is the initial level while full ABC is the final and most complex one. Full ABC subsumes pilot ABC, ACA, and AA. Pilot ABC requires the completion of the ACA and AA levels. AA is a pre-requisite to performing an ACA.

AA consists of reviewing the activities and the procedures carried out to convert material, labour, and other resources into outputs. Activities that do not contribute to the value of those outputs are identified in AA in order that they may be replaced, diminished, or removed. AA is quite similar to process analysis and business process re-engineering (Hammer & Champy, 1993; Harrington, 1991). These two approaches focus on the process itself while AA concentrates on the activities within each process. AA

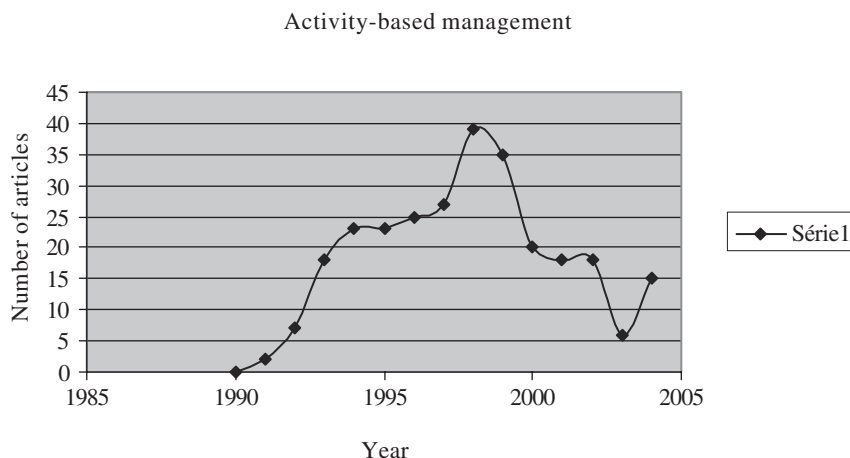


Figure 2. Number of articles on ABM (1991–2004).

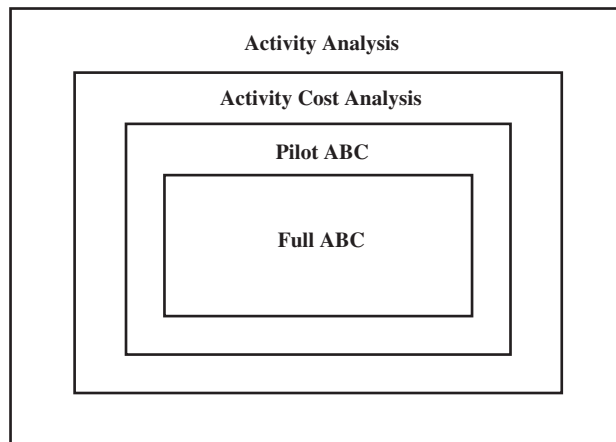


Fig. 3. The four levels of activity management.

does not include financial or accounting analyses. It is aimed at identifying areas of wasted effort, eliminating waste and improving cycle time, product quality, and speed of response to customer demands. However, cost reduction is not necessarily the primary objective of AA. Reduction of cycle time, quality improvement, and zero inventories are also the objectives of such analysis. Just-in-time (JIT) inventory management, cellular manufacturing, continuous flow processing, flexible manufacturing systems implementation, and TQM are all initiatives under which AA may be performed. AA is the simplest version of AM. AA does not require cost analysis and does not necessarily lead to a new overhead allocation method. Most relevant to this approach, AA is also a pre-requisite to all three of the AM approaches examined here.

ACA or CDA is the next level in the AM hierarchy. It consists in analyzing the factors that affect the cost of an activity. ACA and CDA focus on cost minimization by identifying the cost drivers and their associated activities and by tracing the interactions between cost drivers and activities (Aiyathurai et al., 1991). There are two different levels of cost drivers. Porter (1980) uses the concept of cost drivers as a designation for structural variables that explains the cost of an activity. Following Porter, Shank (1989) and Shank & Govindarajan (1989, 1993) classify cost drivers into two categories: structural and executional cost drivers. Structural cost drivers such as scale of investment and product diversity involve strategic choices made by the firm about its economic structure. Executional cost drivers are factors on which an organization depends upon to execute its activities successfully. Cooper (1988a) defines a cost driver as a

measure of the manner in which products consume activities. Setup time, number of setups, material-handling hours, and ordering hours are examples of cost drivers under this definition. The strategic cost management and ABC perspectives on cost driver complement each other in a strategic cost management perspective. The first represents the structural or executional cost determinants while the second is the operationalization of those determinants. For example, product diversity is a structural cost driver (Shank, 1989), the number of setups or setup time represent some ways to measure the impact of product diversity on production costs.

In an AM system, ACA and CDA enable management to identify the costs of each activity and the factors that cause them to vary. Identifying the cost drivers of an activity may enable managers to better understand how they perform a task and may help them find new procedures, activities, and processes to reduce costs. Therefore, ACA focuses on the costs of wasted efforts. It may be accomplished without implementing a product costing system that allocates overhead costs on the basis of these drivers. Nanni et al. (1992) suggested that many firms have not implemented ABC system because most of the benefits are found in the CDA. Organizations would prefer to take actions to reduce the effects of the drivers instead of using them to allocate indirect costs. As an extension beyond simple AA, ACA, and CDA allow firms to prioritize the changes they want to make.

Gosselin (1997) divided the use of ABC into two levels: pilot ABC and full ABC. Pilot ABC is usually the first level in an ABC implementation process but may be an end in itself. It consists of designing and installing an ABC system for only one aspect of an



organization such as a department or a product line. Most of the firms, if not all, that have implemented ABC have limited themselves to this level. The purpose of a pilot ABC system may depend on the organization in which it is implemented. Full ABC is the ultimate level in the implementation of an ABC system. It consists of a cost accounting system in which all products and services are valued on the basis of the output of the ABC system. ABC cost information is used for financial reporting as well as for managerial purposes such as make-or-buy decisions, transfer pricing, performance measurement, and strategic cost management. Full ABC is still at a theoretical level. Most the field studies and surveys, if not all, performed during the 1990s, have shown that this level was never achieved. This state of affairs is even recognized by ABC proponents (Kaplan & Anderson, 2004).

#### 2.6. Activity-Based Costing from 1995 to 2000s

After 1995, the interest in ABC and ABM started to decline. The management accounting collectivity noticed that several organizations that had adopted and implemented ABC were meeting difficulties during the implementation process and that several organizations were abandoning their ABC projects (Gosselin, 1997; Innes et al., 2000; Kaplan & Anderson, 2004). Likewise, the number of articles on ABC listed on the Proquest ABI/Inform Global database declined from 120 to 40, in the period from 1995 to 2000, as shown in Table 1 and Fig. 1. Similarly, the number of papers on ABM also declined from 40 to 20, as shown in Fig. 2. This reduction occurred essentially in professional journals. In academic journals, the number of papers on ABC increased after 1995. Researchers began to report on the contextual factors that influence the adoption and implementation of ABC, the perceived success of the ABC implementations and their impact on decision making and performance.

The discussion on ABC also evolved in the second half of the 1990s while practitioners attempted to design procedures and softwares to facilitate ABC implementations. For instance, consulting firms developed activity dictionaries that list the typical activities of departments and processes of manufacturing and service organizations. These dictionaries would enable consultants to apply a generic ABC model in several organizations. Many consulting firms also developed ABC softwares to facilitate data processing. Surveys have shown that electronic spreadsheets like Excel are more frequently used than these softwares because the costs of customization of

the softwares are too high. Many articles in the professional literature described the difficulties in the ABC implementation process and attempted to provide solutions to them.

The management accounting collectivity also witnessed the emphasis on the application of ABC in specific industries in the professional literature. For example, the professional journal "*Progressive Grocer*" published more than 20 articles such as Garry (1996) on the specific application of ABC to the grocery industry. Table 2 includes a list of article, which reports the implementation of ABC in different contexts. This list is of course incomplete.

Another phenomenon appeared at the end of the 1990s. Some practitioners and academics attempted to link and adapt ABC to other techniques in accounting and management like capital budgeting (Cooks et al., 2000), change process (Brewer et al., 2003), transfer pricing (Kaplan et al., 1997), or to innovations in accounting and management such as balanced scorecard (Maiga & Jacobs, 2003), customer accounting (Foster et al., 1997), target costing (Horvath et al., 1998), TQM (Armitage & Russell, 1993), EVA (Roztocki & Needy, 1999), TOC (Fritsch, 1997; Huang, 1999), total cost of ownership (Ellram, 1995), and life-cycle costing (Emblemsvag, 2001). Similarly, many articles pertained to specific activities such as procurement (Degraeve & Roodhooft, 2000), phase in the life cycle of a project such as product development (Ben-Arieh & Qian, 2003), operation management (Gupta & Galloway, 2003), reverse logistics channel (Goldsby & Closs, 2000), and supply chain management (Lin et al., 2001).

During the last 5 years of the twentieth century, the interest for ABC seemed to decline. Many organizations faced transformations that implied changes that went beyond improvements to their cost management systems. The limitations of ABC

Table 2. List of articles on ABC and specific industries.

Industry	Article
Financial institution	Innes & Mitchell (1997)
Governments, public sector	Brown (1999), Bjornenak (2000)
Grocery	Garry (1996)
Life insurance industry	Adams (1996)
Hospitals	King et al. (1994), Aird (1996)
Postal service	Carter et al. (1998)
Universities	Acton & Cotton (1997)

such as those identified by Noreen (1991) lead several organizations to abandon their ABC projects. This trend was confirmed in Innes et al. (2000).

### 2.7. Activity-Based Costing after the Year 2000

The decline of ABC continued after the year 2000. The number of articles on ABC referenced in the Proquest ABI/Inform Global database diminished from 102 in 1999 to 53 in 2004. Similarly, there were only five articles that referred to ABM in 2003. The concept of ABM was still referred to in academic journals (Armstrong, 2002) but was now rarely used in the professional literature. Because of the overlap and the confusion between ABC and ABM, some authors (Foster & Swenson, 1997) preferred to use the term ABCM. These different labels did not help to reduce the confusion around ABC.

While ABC in the 1990s had focused essentially on allocating actual costs incurred during past period, several organizations claimed that they needed to use ABC for budgeting purposes. Dierks & Cokins (2000) defined activity-based budgeting as “An approach to budgeting where a company uses an understanding of its activities and driver relationships to quantitatively estimate work load and resource requirements as part of an on-going business plan.” ABB is a major change in comparison to ABC because it would enable an organization to plan and prepare a budget based on an ABC model (Blekker, 2001; Hansen & Torok, 2004; Stevens, 2004). There are only 25 articles on ABB referenced in the Proquest ABI/Inform Global database. There has not yet been any academic research on ABB. Only a few case studies were completed (Block & Carr, 1999; Borjesson, 1997; Liu et al., 2003; Mason, 1996).

Other new costing techniques or adaptations of ABC came out in the beginning of the 2000s. These new costing approaches were aimed at solving the fundamental problems that are inherent to ABC and its implementation: full costing and idle capacity. Attribute-based costing is a method derived from ABC, and provides detailed cost–benefit analysis of customer needs (Walker, 1998). It breaks customer needs into the specific product attributes and focuses on planning rather than analyzing past costs. Resource consumption accounting, which claims to leverage the best of the last several decades of developments in cost accounting in Europe and the US was developed and explained in several articles (Benjamin & Simon, 2003; Clinton & Webber, 2004; Keys & Van der Merwe, 2001; Van der Merwe & Keys, 2002a, 2002b). But the most recent development in ABC is the emergence of “time-driven ABC”

(Kaplan & Anderson, 2004). Kaplan (1998) had claimed that if ABC was not successful in an organization, it could simply be explained by poor management of the ABC project. In their more recent article, Kaplan & Anderson (2004) suggested that many organizations were abandoning their ABC model because the costs were too high and employees were irritated. Kaplan also recognized that ABC was very difficult to implement. Kaplan & Anderson (2004) proposed a new approach that they essentially describe as a change from a “rate based ABC” to a “time-driven ABC.” The conventional ABC approach is considered rate based. Cost driver rates are determined to assign activity costs to cost objects. Under “time-driven ABC,” rates are established on a time basis. Kaplan & Anderson (2004) explain their new concept with a customer department. This supposedly new approach does not solve the conceptual problems inherent to ABC such as: fixed costs considered variable, idle capacity costs, and the design and maintenance of the ABC model. It enables an organization to determine periodically unit cost based on the time-driven rates but it does not provide the benefits that may be earned from AM. Cleland (2004) outlines some of the limitations of time-driven ABC when compared to another approach labelled “contribution-based approach CBA.” The innovation process for cost accounting continues.

In 2005, the ABC paradox remains unexplained. ABC has several interesting features from a conceptual point of view. It is very attractive for managers since it can provide relevant information for decision making. ABC has been included in most, if not all, management accounting textbooks. It is also part of the curriculum of most business schools and professional accounting associations. The ABC paradox remains because, even though, ABC seems to be well-known and accepted in the management accounting collectivity, it has not been considered by the majority of organizations and it has been abandoned by many organizations that had sometime in the 1990s decided to adopt and implement it.

### 3. Research on the Diffusion of ABC

Since the beginning of the 1990s, researchers have attempted to evaluate the degree to which organizations have adopted and implemented ABC in several countries and to identify the factors that influence the decision to adopt and implement ABC. In this section, these studies will be reviewed to better understand the diffusion process for ABC and to provide some explanations for the ABC paradox (Gosselin, 1997; Kennedy & Affleck-Graves, 2001).

### 3.1. Descriptive Research on ABC<sup>3</sup>

A large number of survey studies on ABC have been conducted in different countries over the last 15 years especially during the 1990s to determine to what extent organizations have adopted and implemented ABC. Some researchers also attempted simultaneously to associate some contextual factors with the adoption and the implementation of ABC. The results of these studies showed that despite the fact that academics and management accountants have demonstrated a great deal of interest for ABC, the diffusion process for ABC has not been as intense as one may have expected. The results of all these surveys have to be considered cautiously since there is no single definition of ABC. Gosselin (1997) showed that there may be some confusion among the survey respondents about what exactly ABC is. Baird et al. (2004) confirmed these findings. Furthermore, respondents that are working in organizations that have not implemented ABC may not be inclined to respond to ABC surveys. In other words, it is possible that most ABC surveys overestimate the ABC implementation rates.

In the following pages, we shall briefly examine most of these surveys to better understand to what extent ABC has become part of the management accounting tools that are used by organizations. The description of the surveys is divided into three periods.

#### 3.1.1. Surveys Published from 1990 to 1994

The Cost Management Group of the Institute of Management Accountants, formerly the National Association of Accountants (IMA, 1993; National Association of accountants, 1991) conducted a large survey of controllers of 2,500 American firms in 1991 and 1,500 in 1993. The response rates were 23% in 1991 and 27% in 1993. The results of these two surveys are shown in Table 3. According to these surveys, there was an increase in the percentage of firms that implemented ABC in the United States between 1991 and 1993 and a similar reduction in the percentage of organizations that had not considered ABC, diminishing from 70% to 50%. These results were interesting at the time because they suggested that there was a discernible upward trend in the proportion of firms that were implementing ABC. Other surveys will show that this trend was more the result of the different potential biases inherent to the surveys like the confusion about what exactly ABC is and non-response biases.

Innes & Mitchell (1991) conducted a survey of the use of ABC by members of the Chartered Institute of Management Accounting (CIMA) in the United Kingdom. They surveyed 720 firms in the manufacturing and financial services sectors. The overall response rate was 26%. This survey revealed an implementation rate of only 6% among the respondents but 33% of them indicated that they were currently assessing ABC. There were also 9% of the respondents who indicated that they rejected ABC. The majority of respondents mentioned that they had not considered ABC. Again, the results of this survey suggested that there was a potential for growth in the proportion of firms that would implement ABC. Innes & Mitchell (1995) and Innes et al. (2000) replicated this survey to verify this hypothesis. These results will be examined further in this chapter.

Cobb et al. (1992) also conducted a follow-up study of the respondents to their Innes & Mitchell (1991) survey. They selected 30 of the 62 respondents that had previously mentioned that they were still considering ABC. These respondents were chosen because they had indicated that they had identified potential problems in installing ABC. The purpose of this study was an attempt to explain why so few firms implement ABC. The first stage of the study consisted of telephone interviews while the second involved company visits and personal interviews. The most important finding of this study was that two-thirds of the 30 respondents who had considered ABC a year ago were still considering it a year later without having reached a decision. The amount of work involved and the existence of other priorities were the most often-mentioned reasons for not having decided to install an ABC system.

Another study was done by Nicholls (1992) in the United Kingdom among a group of participants at an ABC seminar that was held in May 1990. About 10% of the respondents mentioned that they had adopted ABC, 18% were experimenting the ABC technique while 62% were considering the adoption of ABC. These results are, of course, biased because of the nature of the sample and cannot be generalized to the population of United Kingdom firms. Nicholls (1992) investigated the factors that would motivate firms to adopt ABC. The respondents indicated the need for more accurate cost information (65%), the dissatisfaction with the actual costing system (65%), the need to reduce costs (45%), and the growing proportion of overhead costs (32%). Respondents that adopted ABC were asked to identify the difficulties that they have encountered during the ABC implementation. They mentioned that the availability of data, the shortage of resources, the resistance to

<sup>3</sup>This section includes descriptive parts of exploratory and explanatory studies on ABC.

Table 3. Surveys on the diffusion of ABC (1990–1994).

	Country	Population	Response rate	Period	Implementation rate
NAA (1991)	United States	CMAs of 2,500 firms	23%	Spring, 1991	11% had implemented ABC
Innes & Mitchell (1991)	United Kingdom	1990 survey of manufacturing and financial service firms	26%	September, 1990	6% began to implement ABC, 33% were considering, 52% had not considered ABC, 9% had rejected ABC
Ask & Ax (1992)	Sweden	Engineering industry	67.3%	January–April, 1991	2% are applying ABC, 23% are considering
Bright et al. (1992)	United Kingdom	Manufacturers	12%	Latter half of 1990	32% are re-applying ABC <sup>a</sup>
Nicholls (1992)	United Kingdom	179 companies that attended an ABC seminar in May 1990	34.6%	January, 1991	10% had implemented ABC, 18% were piloting ABC techniques
IMA (1993)	United States	CMAs of 1,500 firms	27%	Spring, 1993	36% had implemented ABC
Armitage & Nicholson (1993)	Canada	Financial Post list of 700 largest companies in Canada	50%	Summer, 1992	14% are applying ABC, 15% are considering
Drury & Tayles (1994)	United Kingdom	Sample of 866 business units drawn from a population of 3,290 manufacturing firms	35%	1991	ABC has been introduced in 4% of the firms, 9% are planning the introduction, 37% are considering ABC, 44% had not considered, 5% rejected ABC

<sup>a</sup>The authors of this study have shown some scepticism about the validity of the disclosed usage of ABC in their survey.

change, and the lack of training were the most important problems they had faced.

Armitage & Nicholson (1993) also used a questionnaire to capture information about Canadian firms' attitudes towards ABC. Their survey was sent to 702 large Canadian firms. The response rate was as high as 50%. The results, shown in Table 3, demonstrated that 14% of the respondents had implemented ABC. They also indicated that most of the firms that implemented ABC were not planning to replace their conventional cost accounting systems with ABC and that larger organizations were more likely to consider ABC. Like Innes & Mitchell (1991), the majority of the respondents (67%) mentioned that they had not considered ABC. At that time, many considered such a result as an indication of the potential for ABC, the results of the surveys conducted subsequently refuted this proposition. Organizations that had not considered ABC, did not adopt ABC subsequently.

In fact, organizations that were not planning to adopt ABC or that had rejected ABC (Armitage &

Nicholson, 1993; Cobb et al., 1992) provided the following explanations for their decisions:

- Organizations' products or services were not the types that would benefit from ABC
- Information technology inadequacy
- Lack of senior management commitment
- AA is already performed to determine value-added and non-value-added activities
- Difficulties in linking cost drivers to individual products
- Amount of work involved in comparison to the benefits resulting from ABC
- Difficulty of collecting quantitative information on cost drivers

During the same period, Ask & Ax (1992), Bright et al., 2002, and Drury & Tayles (1994) conducted survey studies on product costing systems in Swedish and British firms. Ask & Ax (1992, 1997) showed that 7.2% of Swedish engineering firms were involved in pilot ABC projects. The vast majority of the

respondents (80%) mentioned that they wanted to improve their costing systems. Bright et al. (1992) consisted of a large study on product costing techniques in the United Kingdom firms. The results of the part of their study on the adoption and implementation were astonishing. They indicated that 32% of the respondents were using ABC and that 60% of the remaining group was planning to use ABC within the next 3 years. Even the authors of this study showed some scepticism about these results. There are potential explanations for these results. The response rate was low, 12% and the authors have not performed any test for non-response bias. Drury & Tayles (1994) also conducted a large study on product costing practice in the United Kingdom. Their instrument included a series of statements relating to the actual and planned use of ABC. There were 4% of the firms that introduced ABC while 9% intended to introduce ABC.

Surveys on ABC that have been conducted between 1990 and 1995 demonstrated clearly that there was at the time a strong interest for ABC but that the majority of firm managers in industrialized countries had not yet considered implementing an ABC system. Walley et al. (1994) contended that questionnaire surveys were overstating the level of adoption and implementation of ABC and that there was a gap between the leading edge practices described in the management accounting literature and current practices within firms. Bright et al. (1992) who reported that 32% of the organizations they surveyed were currently using ABC and that 60% of their respondents, expected to be using ABC within the next 3 years, have also suggested this potential overstatement.

### 3.1.2. Surveys Published from 1995 to 2000

Several survey studies were completed in the second half of the 1990s. Their results are summarized in Table 4. Innes & Mitchell (1995) replicated their 1991 survey. The population surveyed comprised the 1,000 largest firms in the United Kingdom. The results showed that 20% of the respondents had adopted ABC. In 1991, that rate was 6%. They also demonstrated that even though ABC had been developed since 7 years at that time, the proportion of firms that had not considered implementing ABC was still very high (40%). Furthermore, 13% of the firms had rejected ABC (9% in 1991). The adoption rate was almost similar in both manufacturing and service organizations (19.8% in comparison to 18.9%). This result is interesting since at first ABC was intended for firms from the manufacturing industry. Again,

respondents mentioned that the objectives of their ABC system were: cost reduction, pricing, profitability analysis, performance improvement, and cost management.

Shields (1995) did a survey in 1994 to identify the factors that influence the success of ABC implementation. This was one of the first academic paper on ABC and the first survey study that tried to identify the factors that influence the perceived success of ABC implementations instead of attempting to determine to what extent firms have adopted ABC. The population was made up of 143 firms that were known to be ABC implementers. Therefore, there was no implementation rate. The model used by Shields was based on Shields & Young (1989). The results are further explained in the next section.

The study of Lukka & Granlund (1996) was aimed at providing a better understanding of the cost accounting practices of Finnish firms. The population surveyed consisted of 309 Finnish manufacturing firms. They found that that 30% of the respondents had implemented or were in the process of implementing ABC. Like in several studies that had been completed at that time (Armitage & Nicholson, 1993; Ask & Ax, 1992; Gosselin, 1997; Innes & Mitchell, 1995; Nicholls, 1992), size was associated with the adoption of ABC. The other factors that significantly influenced the adoption of ABC were the number of products and the complexity of the manufacturing process.

In 1994, Bjornenak (1997) did a survey in Norway to develop a conceptual framework to explain the diffusion process for ABC and to identify the factors that influence managers' decision to adopt ABC. Among the 75 respondents, 53 had some knowledge of ABC. Within this group, 30 had adopted ABC, 12 had not considered its implementation, and 11 had rejected it. The results of this study were mixed. Consistent with the literature, firms with high level of overhead costs tended to adopt ABC more frequently but, on the other hand, firms that manufactured customized products and that face a high level of competition did not adopt ABC. The percentage of exports and the number of competitors were the proxies used to measure competition. In Finland, Malmi (1997) conducted a survey to understand the diffusion process for ABC. The study enabled Malmi to conclude that capital-intensive firms, firms with a wide range of products, larger firms, and firms that export a more important proportion of their products tended to adopt ABC.

A second survey on ABC was conducted by Gosselin (1997) in Canada after Armitage & Nicholson (1993). Among the 161 respondents, 77 indicated

Table 4. Surveys on the diffusion of ABC (1995–2000).

	Country	Population	Response rate	Period	Adoption rate
Innes & Mitchell (1995)	United Kingdom	Firms listed in TIME 1000	33.2%	Early 1994	21% currently use ABC, 29.6% are considering, 13.3% have assessed and rejected, and 36.1% have not considered
Lukka & Granlund (1996)	Finland	Manufacturing firms	43.7%	November 1992 to January 1993	25% were considering, 5% were implementing
Bjornenak (1997)	Norway	Manufacturing organizations	57%	1994	40% wanted to implement, were currently implementing, or had already implemented ABC
Gosselin (1997)	Canada	Manufacturing strategic business units	39.5%	October, 1994 to January, 1995	30.4% are implementing ABC
Groot (1999)	Netherlands and USA	Food industry	24% and 17%	1994–1995	17% (USA) and 24% (Netherlands) are implementing ABC
Clarke et al. (1999)	Ireland	Manufacturing firms in the Business & Finance listing of Ireland	41%	Not mentioned	11.8% currently use ABC, 20.6% are considering, 12.7% have assessed and rejected, and 54.9% have not considered
Innes et al. (2000)	United Kingdom	Firms listed in TIME 1000	22.8%	1999	17.5% currently use ABC, 20.3% are considering, 15.3% have assessed and rejected, and 46.9% have not considered

that they had adopted ABC but only 49 finally implemented it. Thus, the implementation rate was high at a level of 30.4%. The population in this survey was limited to manufacturing organizations. Most surveys have clearly demonstrated that the ABC implementation rates are higher in manufacturing firms. Gosselin (1997) conducted the first survey study that examined the differences between the innovation that the organization adopted and finally implemented. The results of this survey showed that many respondents were confused about what ABC really was. This study will be reviewed in depth in the next section.

Chenhall & Langfield-Smith (1998) did a survey on the adoption of management accounting practices in Australia. They report that the adoption of ABC is relatively low. ABC was ranked 24 out of 27 in their study. Clark (1999) performed the first survey on ABC in Ireland. A total of 204 firms responded to the survey. Approximately, 12.5% of the firms mentioned that they use ABC, 20% were currently assessing ABC, and 13% said they assessed ABC but

decided not to use it. The largest group, 55%, again, like in previous surveys, comprises firms that had not considered ABC. This study also demonstrated that subsidiaries of multinational firms and larger firms tend to adopt and implement more ABC. Groot (1999) performed a survey in Dutch and US firms from the food industry and found that the implementation rates in the two countries were quite similar.

Innes et al. (2000) replicated their 1994 survey (Innes & Mitchell, 1995) in the United Kingdom's largest companies and compared the results. They showed that the ABC adoption rate had not increased during the 1994–1999 period. It had actually dropped from 21% of the respondents to 17.5%. On the other hand, the rejection rate had grown. Larger companies were still more likely to adopt ABC than the smaller ones. The use of ABC was important in firms in the financial service industry. Although small changes were apparent in the popularity ranking of ABC application, cost reduction, pricing, performance

measurement/improvement, and cost modelling remain the most common applications, with over 60% use by the adopters. The overall success of ABC was rated 3.9 on an average (on a five-point scale) by the 1999 respondents (3.8 in 1994) and 25 of them (of the 28 who answered the question) considered that the investment made in ABC had been financially beneficial to their organizations. The results of both the 1994 and 1999 survey like Shields (1995) showed that top management support had a strong impact on the success rating of ABC. Finally, on the question of whether ABC represented a fad, this survey evidence is inconclusive.

The survey studies that have been done over the 1995–2000 period have shown that despite the large number of articles published on ABC during that period, the inclusion of ABC in most management

accounting textbooks, the presence of several consulting firms and the development of ABC softwares, and the ABC adoption rate have not increased as much as the management accounting community would have expected. These results support the proposition of the existence of an ABC paradox.

### 3.1.3. Surveys Published from 2001 to 2005

After the year 2000, the number of surveys decreased significantly. Table 5 includes a summary of the findings of these surveys. Bescos et al. (2002) compared the implementation rates for ABC in France and in Canada. This was the first ABC survey in France. Lebas (1994) had pointed out that the French cost accounting method called “*méthode des sections homogènes*” was different from the British and

Table 5. Surveys on the diffusion of ABC (2001–2005).

	Country	Population	Response rate	Period	Adoption rate
Bescos et al. (2002)	Canada and France	Financial Post 500 in Canada and members of the Association of Financial Directors and Management Accountants	21.2% in Canada and 4.7% in France	Spring and summer of 1999	23.1% of firms had adopted ABC in Canada and 23% in France. 9.3% were examining the possibility of adopting ABC in Canada and 22.9% in France
Cotton et al. (2003)	New Zealand	Corporate sector members of the Institute of Chartered Accountants of New Zealand (organizations with more than 100 employees)		September, 2001	20.3% currently use ABC, 11.1% are considering, 10.8 have assessed and rejected, and 57.8% have not considered
Kianni & Sangeladji (2003)	USA	500 Fortune largest industrial corporations	21.6%	Fall, 1999	40% recently started implementing, 11.8% are having ABC well established
Pierce (2004) and Pierce & Brown (2004)	Ireland	Top 500 companies and top 50 financial services companies from the 2001 Business and finance listings of top Irish firms	23.2%	June, 2002	27.9% currently use ABC
Cohen et al. (2005)	Greece	Leading Greek companies in the manufacturing, retail, and service sectors	31.1%	March to May 2003	40.9% of adopters, 31.9% of ABC deniers, 13.6% of supporters, and 13.6% of ABC unawares

American costing methods. However, unlike ABC, this approach is based on functional areas not on activities (Lebas, 1999). Some French academics and practitioners have claimed that French firms were already using a system similar to ABC. It was therefore useful to examine the extent to which French firms apply ABC. The results of this survey show that the implementation rates were similar in Canada and in France. However, the use of mail questionnaire is not part of the French research tradition. The response rate in France was very low (4%). This rate did not enable the researchers to draw satisfactory conclusion.

Cotton et al. (2003) replicated the Innes et al. (2000) survey in New Zealand in 2001. The response rate was high at 40%. Their results are quite similar to Innes et al. (2000). The adoption rate was slightly higher (20.3% vs. 17.5%) but fewer firms were considering ABC (11.1% vs. 20.3%). The authors suggest that these variances could be explained by the difference in size of the firms in the two samples. It is not clear that the fact that New Zealand firms are smaller is the right explanation for the differences in the results of these two surveys. Both surveys also explored the factors that influence the success of the ABC implementations. Overall, the perception of the success of ABC implementations by New Zealand respondents was high like those of UK respondents (Innes et al., 2000). In Australia, Baines & Langfield-Smith (2003) examined the antecedents and found that a change towards a differentiation strategy would result in an increased use of advanced management practices such as ABC. This result was consistent with Gosselin (1997).

The most recent survey done in the United States was by Kiani & Sangeladji (2003). The questionnaire was sent to 500 presidents, controllers, and managers of the Fortune 500 largest industrial corporation in the United States. The number of responses amounted to 85. Among the respondents, 44 firms had used ABC at various levels. The adoption rate was high but again like in many surveys the questionnaire did not enable the researchers to assess what was the nature of the ABC model implemented.

Pierce (2004) and Pierce & Brown (2004) also conducted a survey in Ireland with a questionnaire similar to that used by Innes et al. (2000) and found results that they consider to be quite similar to those of Cotton et al. (2003). Even though they report an adoption rate of 27.9%, they indicate that the proportion of Irish firms that have not considered ABC is still high at just over 50%. The adoption rate of this survey is much higher than the one reported by Clark et al., 1999. The responding companies included 51.6% of manufacturing firms. Subsidiaries of

multinational companies accounted for 49.2% of the respondents. This is probably one explanation for the adoption rate of 27.9%, which is larger than the one disclosed in Innes et al. (2000). Regarding the use and the perceived success of ABC for a series of specific applications, the results of this Irish survey are, in general, quite similar to those obtained in Innes et al. (2000). Cohen et al. (2005) surveyed Greek firms and found that a large number of firms had adopted ABC but also that many firms had decided not to adopt ABC. Lastly, Bhimani et al. (2005) conducted a survey study in seven countries (Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States). In this investigation, the response rates in Canada and Italy were the lowest at a rate of 7% and highest in Japan with 19%. United Kingdom, Germany, United States, and France produced response rates of 17%, 15%, 11%, and 8%, respectively. The results of the study suggested the prevalence of outcome-based rather than process-based dependencies between ABC and strategy orientation across the organizations investigated. They also indicated that the strategy and perception of ABC implementation success are associated. On the other hand, strategy orientation was neither found to affect the decision to implement ABC, nor the speed or stage of ABCM. The investigation was also indicative of the stability of ABC and corporate strategy relationships across different country contexts.

#### 3.1.4. Survey Findings

Despite the fact that ABC has been incorporated to the syllabus of most accounting training programs and is the topic of at least one chapter in most popular accounting textbooks in the United States (Atkinson et al., 2004; Hilton, 2005), in the United Kingdom (Horngren et al., 2002), surveys show that the adoption rates for ABC have been and remain low.

Many have argued that the use of the survey method in management accounting does not enable to gather valid data from which general responses would be found to questions like: Why firms implement ABC, how they implement it, or which decisions are based on ABC information. It is even difficult to evaluate to what extent ABC is really used within organizations. There are some factors that may lead us to the conclusion that implementation rates of ABC are overestimated. First, in most survey studies on ABC, respondents were working in the management accounting area, their responses may not necessarily reflect the perception of other managers. Second, the concept of ABC is not clearly



defined in most surveys. Thus, there may be some confusion about what ABC really is. Gosselin & Mevellec (2004) have interviewed managers in 42 organizations to find out that there was no single ABC and that all the models developed and implemented were to some extent different. This conclusion led them to design a cladogram (a classification device) to categorize the different types of ABC and cost management systems.

### 3.2. Exploratory and Explanatory Research on the Diffusion of ABC

The empirical studies on ABC can be organised into three different groups. The first group of research studies is aimed at identifying the factors that influence the decision to adopt and implement ABC. The second group is made up of studies that have attempted to go beyond the first level of analysis and examine what are the factors that influence the success of ABC implementations. The third group includes research projects that seek to evaluate the impact of ABC on performance and stock prices. This last category will be reviewed in the section on the organizational and social consequences of ABC while the first two will be examined in the following pages.

#### 3.2.1. Contextual and Organizational Factors Influencing the Adoption and the Implementation of ABC

From the mid-1990s, researchers have started to examine what were the contextual factors that influence the adoption and implementation of ABC in studies that were not aimed primarily at evaluating the extent to which organizations had adopted and implemented ABC like in the previous section. Table 6 comprises a list of the factors that affect the adoption and the implementation and the studies that have examined these factors.

Anderson (1995), Bjornenak (1997), Innes & Mitchell (1995), and Krumwiede (1998) noted that organizations that face more competition tended to adopt ABC. Anderson (1995), Innes & Mitchell (1995), Gosselin (1997), Malmi (1997), and Chenhall & Langfield-Smith (1998) found an association between environmental uncertainty and the adoption of ABC. Gosselin (1997) reported that centralization was associated with the implementation of ABC among firms that had adopted an AM approach. Bjornenak (1997), Krumwiede (1998), and Malmi (1999) demonstrated that firms with more product diversity adopted ABC while Krumwiede (1998) and Ittner et al. (2002) associated the complexity of the production process with ABC adoption and implementation. Many field

Table 6. Contextual factors that affect the adoption of ABC.

Contextual factors	Articles
Competition	Anderson (1995), Innes & Mitchell (1995), Bjornenak (1997), Krumwiede (1998), Malmi (1999)
Environmental uncertainty	Anderson (1995), Innes & Mitchell (1995), Gosselin (1997), Malmi (1997), Chenhall & Langfield-Smith (1998)
Organizational structure	Gosselin (1997)
Product diversity	Bjornenak (1997), Krumwiede (1998), Malmi (1999)
Production process	Krumwiede (1998), Ittner et al. (2002)
Size	Armitage & Nicholson (1993), Innes & Mitchell (1995), Bjornenak (1997), Gosselin (1997), Krumwiede (1998), Innes et al. (2000), Pierce & Brown (2004)
Strategy	Gosselin (1997), Baines & Langfield-Smith (2003), Bhimani et al. (2005)
Subsidiary of multinational firms	Clark et al. (1999)

studies and surveys have demonstrated that the adoption of ABC tends to be more frequent within large organizations (Armitage & Nicholson, 1993; Bjornenak, 1997; Gosselin, 1997; Innes et al., 2000; Innes & Mitchell, 1995; Krumwiede, 1998; Pierce & Brown, 2004). Gunasekaran et al. (1999), Gunasekaran & Singh (1999), and LaScola et al. (2003) examined how small and medium enterprises implement ABC and what are the specific difficulties that are met within this context. Strategy was also another determinant of the adoption of ABC that was considered in Gosselin (1997), Baines & Langfield-Smith (2003), and Bhimani et al. (2005). Finally, Clark et al. (1999) have shown that subsidiaries of multinational firms tend to adopt more ABC.

Some researchers suggested that the influence of contextual and organizational factors would depend on the stage in the innovation process. Anderson (1995) and Krumwiede (1998) used the six stages proposed by Kwon & Zmud (1987) and Cooper & Zmud (1990) in the management information system literature while Gosselin (1997) referred to the

four stages used in the innovation literature (Hage, 1980).

Anderson (1995) examined the contextual factors that influenced the adoption and implementation of ABC at a large US automobile manufacturing industry and developed a model to explain the implementation process within a large firm. The study was based on more than 40 hr of interviews with managers from different hierarchical levels of a firm in the automobile industry during the 1986–1993 period. The model developed based on Kwon & Zmud (1987) and Cooper & Zmud (1990) had six stages:

1. Initiation
2. Adoption
3. Adaptation
4. Acceptation
5. Routinization
6. Integration

The observations and interviews enabled Anderson to identify 19 factors that influence positively or negatively the implementation of ABC at four stages of the Cooper & Zmud (1990) model. The four stages were initiation, adoption, adaptation, and acceptance. These factors are presented in Table 7. Some of

the factors have an influence only at one specific stage. The impact of contextual factors such as competition, relevance to managers' decisions, and compatibility and organizational factors such as top management support, training, and satisfaction with the existing system vary according to the stage studied. Therefore, this model can only be useful and reliable if the stage of the implementation can be identified properly.

Anderson (1995), as shown in Table 7, suggested that at the initiation stage, factors such as competition, heterogeneity of demands, environmental uncertainty, disposition toward change, functional specialization, training, complexity for users, compatibility with existing systems, relative improvements over existing system, and worker responsibility have a positive influence at the initiation stage of ABC. Centralization and worker responsibility would have a negative influence.

At the adoption stage, environmental uncertainty, disposition toward change, process knowledge, role involvement, training, complexity for users, relative improvements over existing system, relevance to managers' decisions, and compatibility with firm strategy have a positive influence on adoption. Three variables have a negative influence: internal communications,

Table 7. Factors that influence the attainment of stage (Anderson, 1995).

Categories	Factors	Positive influence	Negative influence
External environment	Heterogeneity of demands, competition, environmental uncertainty	Initiation; initiation, adaptation; initiation, adoption	
Individual characteristics	Disposition toward change, process knowledge, role involvement	Initiation, adoption, adaptation; adoption; initiation, adoption	Adaptation
Organizational factors	Centralization, functional specialization, internal communications, training	Adaptation; initiation; adaptation, acceptance; initiation, adoption, adaptation, acceptance	Initiation, adaptation, adoption
Technological factors	Complexity for users, compatibility with existing systems, relative improvements over existing system, relevance to managers' decisions and compatibility with firm strategy	Initiation, adoption; initiation, adaptation; initiation, adoption; adoption, adaptation	
Task characteristics	Uncertainty and lack of goal clarity, variety, worker autonomy, worker responsibility	Initiation; acceptance; initiation, adaptation	Initiation and adoption, adoption, initiation

uncertainty, and lack of goal clarity and worker autonomy. The number of variables that have some influence at more advanced stages of the implementation process is much lower. The third stage, the adaptation, is influenced positively by competition, disposition toward change, centralization, internal communications, training, and compatibility with existing systems. Only internal communications, training, and variety would have an influence at the acceptance stage.

This article provided a theory of implementation of change in management accounting that will be referred to in many subsequent studies in management accounting. Table 7 clearly shows that the number of factors that influence negatively the implementation of ABC at one of the four stages of Anderson model is limited. This situation is probably explained by the fact that the organization in which Anderson performed the study did not complete all the stages and has not made the decision to abandon ABC. Future research could attempt to use the Anderson's model in the context of an organization that abandoned ABC after having completed three or four stages of the Cooper & Zmud (1990) model.

Krumwiede (1998) empirically tested the model developed by Anderson (1995). He examined how some contextual factors influence the initiation and adoption stages of ABC and how various contextual and organizational factors affect the implementation stages. In this study, the data were collected through a survey instrument mailed to members of the Institute of management accountants in the United States. The dependent variable was the stage of ABC implementation. The results show that, as suggested by Anderson (1995), the influence of the factors varies according to the implementation stage of the innovation, in this case ABC. Table 8 outlines the

stages and the factors that have some significant influence.

### 3.2.2. Diffusion of Innovations

Gosselin (1997) examined the effect of strategy and organizational structure on the adoption and implementation of AM approaches such as ABC. This study was based on the literature on the diffusion of innovations. An innovation is defined as the adoption of an idea or a behaviour that is new to the organization adopting it (Bolton, 1993; Zaltman et al., 1973). Innovations are typically classified into two categories: administrative innovations and technical innovations. Administrative innovations are those that affect organizational structures and administrative processes. This type of innovation is concerned with changes in goals, strategies, and control systems. Accounting innovations such as ABC are considered as administrative innovations (Clark et al., 1999; Dunk, 1989; Hopwood, 1974; Merchant, 1981). Technical innovations are ideas for new products, processes, and services (Daft, 1978). They pertain to changes in products or services and to the way products are produced and services are rendered. Evan (1966) argued that administrative innovations tend to lag behind technical innovations because they are perceived by management as being less closely associated with the profit objectives of manufacturing organizations. On the other hand, Damanpour & Evan (1984) suggest that administrative innovations may lead technical innovations. Gosselin (1997) suggested that AM levels have characteristics of both technical and administrative innovations. AA and ACA or CDA are technical innovations because they mainly have an impact on how products are manufactured and services are rendered. AA and ACA are generally conducted at the operational level. They

Table 8. Variables that influence the attainment of stage (Krumwiede, 1998).

Stages of ABC implementation	Positive influence	Negative influence
Initiation		
Adoption	Perceived degree of potential cost distortions, size	Job shop
Analysis	Perceived degree of potential cost distortions, top management support, degree of decision usefulness	
Acceptation	Degree of decision usefulness, information technology, number of years since ABC was adopted	
Routinization	Perceived degree of potential cost distortions, top management support, number of years since ABC was adopted, number of purposes identified for ABC	
Integration	Degree of decision usefulness, information technology, training, level of non-accounting ownership	

usually involve more commitment from plant managers, engineers, and other operation management people than from management accountants. Some organizations may decide to go beyond the AA and ACA levels and implement ABC. In such a case, the innovation becomes more administrative than technical. ABC, like other management accounting innovations, is classified as an administrative innovation because it leads to new administrative procedures, policies, and organizational structures (Clark et al., 1999; Dunk, 1989). Since the implementation of ABC affects the management accounting system and the organizational structure, the involvement from management accountants becomes more essential at that level.

Several theories of organizational innovation have emerged during the last 20 years. Poole & Van de Ven (1989) insisted that no single theory encompasses the complexity and diversity of innovation processes. Downs & Mohr (1976) and Damanpour (1987, 1991) emphasized that no reliable theory of organizational innovation had yet been developed because of the instability in research findings.

Three models have been developed to better understand the diffusion process for an innovation in an organization:

- 1) The mechanistic and organic organizations model
- 2) The dual-core model
- 3) The ambidextrous model

These models rely mainly on distinctions between mechanistic and organic organizations, administrative and technical innovations, and initiation and implementation stages of innovations. Damanpour (1991) found strong support for the mechanistic and organic model and the dual-core model but little support for the ambidextrous model.

### 3.2.3. Mechanistic and Organic Organizations

Organizations can be classified into two groups according to the way they adapt to technological and commercial change: mechanistic and organic organizations. This model suggests that the adoption of innovations is easier in organic organizations while it is more difficult in mechanistic organizations (Burns & Stalker, 1961). Organic organizations have higher levels of specialization, horizontal differentiation, professionalism, internal and external communication, and lower levels of formalization, centralization, and vertical differentiation in comparison to mechanistic organizations. Table 9 summarizes the characteristics of these organizations. Specialization represents the presence of different

Table 9. Mechanistic and organic organizations.

	Mechanistic	Organic
Specialization	Lower	Higher
Horizontal differentiation	Lower	Higher
Professionalism	Lower	Higher
Communication	Lower	Higher
Formalization	Higher	Lower
Centralization	Higher	Lower
Vertical differentiation	Higher	Lower

specialties in an organization; horizontal differentiation, the extent to which the organization is divided into different units and professionalism, the level of education and experience of organizational members. Formalization reflects the extent to which following rules and procedures are important in the organization while centralization represents the extent to which the decision process pertaining to the management of divisions or subsidiaries is centralized. Vertical differentiation is the number of levels in an organization's hierarchy.

The mechanistic and organic model suggests that the adoption and implementation of innovation are facilitated in organizations that have organic rather than mechanistic characteristics. Damanpour (1991) gathered data from several organizational innovation studies and compared the attributes of organic organizations with organizational characteristics that favour innovation. The results of this analysis were consistent with the mechanistic and organic model except for vertical differentiation. However, results for vertical differentiation were consistent with the model for manufacturing organizations.

### 3.2.4. The Dual-Core Model

The dual-core model rests on the distinction between administrative and technical innovations (Daft, 1978; Daft & Becker, 1978; Evan, 1966). In this model, mechanistic characteristics facilitate the implementation of administrative innovations. Technical innovations are easier to implement in organic organizations. Daft (1978), Daft & Becker (1978), Kimberly & Evanisko (1981), and Damanpour (1991) found results that are consistent with this model's propositions. Table 10 summarizes the features of the dual-core model. MacDonald & Richardson (2005) have extended this model and applied it to management accounting innovations.

ABC has characteristics of both technical and administrative innovations. Gosselin (1997) suggests that AA and ACA are technical innovations because they

Table 10. The dual-core model.

	Mechanistic	Organic
Administrative	Easier	More difficult
Technical	More difficult	Easier

mainly have an impact on how products are manufactured and services are rendered. ABC, like other management accounting innovations, is classified as an administrative innovation because it leads to new administrative procedures, policies, and organizational structures (Dunk, 1989). Gosselin (1997) hypothesized that organizations with organic characteristics would more easily adopt AA and ACA while mechanistic organizations would prefer ABC. The results of his study are consistent with the dual-core model.

### 3.2.5. The Ambidextrous Model

The ambidextrous model is based on the distinctions between mechanistic and organic organizations and the initiation and implementation stages of innovations (Duncan, 1976). The initiation stage consists of all the actions leading to the decision to adopt the innovation such as problem perception, information gathering, attitude formation and evaluation and resource attainment (Damanpour, 1991). The implementation stage comprises all activities between the adoption and the routinization of the innovation (Rogers, 2003). Table 11 outlines the features of this model. According to this theory, the initiation of innovations is easier in organic organizations while implementation is facilitated in mechanistic organizations.

Damanpour (1991) showed that the research in this area has not produced findings in the direction of the theory's propositions except for professionalism. In the diffusion process for an innovation like ABC, Gosselin (1997) suggested that AA and ACA may be considered as being two steps in the initiation stage. AA and ACA are essential to implement ABC because they supply key information for the implementation. ABC may be included in the implementation stage. Some organizations that adopted ABC may be tempted to stop the implementation process at one of those two levels. Organic organizations may find AA and ACA to be better suited to their needs. Mechanistic organizations may prefer, once they have adopted ABC, to pursue the implementation of ABC all the way. Consistent with the ambidextrous model, Gosselin (1997) proposed that organic organizations that adopted ABC may limit the innovation process to the AA or ACA level while mechanistic organizations would pursue ABC. The results of his study were partly consistent with the ambidextrous model.

Table 11. The ambidextrous model.

	Mechanistic	Organic
Adoption	More difficult	Easier
Preparation, implementation, routinization	Easier	More difficult

In Gosselin (1997), the innovation process for ABC was divided into four distinctive stages (Gerwin, 1988; Hage, 1980):

- 1) Adoption
- 2) Preparation
- 3) Implementation
- 4) Routinization

Adoption is the first level in the innovation process. During this stage, the need for change is recognized and the organization makes the decision to adopt or reject the innovation. This stage is characterized by a high level of uncertainty about the innovation's returns. Several contextual factors may affect the organization's decision to adopt an innovation. Institutional and competitive pressures (Abrahamson & Rosenkopf, 1993) may also influence managers in their decision process. Once the decision to adopt the innovation has been made, the organization has to develop the infrastructure needed to support the innovation. This represents the preparation level. If the organization has adopted ABC, several key actions will have to be completed. First, managers and accountants will be trained, a consulting firm, if necessary, will be selected and computer software will be purchased or developed in-house. Second, accountants and managers will have to identify the activities and actions to be carried out to convert and support the conversion of materials, labour, and overhead into outputs, determine the activity cost pools in which activity costs will have to be collected and select the cost drivers that will be used to allocate activity costs to specific cost objects. Gosselin (1997) suggests that the preparation phase of ABC comprises AA and ACA, which he considered the first two levels of AM. During the preparation process, the organization has the opportunity to re-examine the decision made during the adoption stage (Leonard-Barton, 1988). Rogers (2003) mentioned that innovations are not necessarily invariant and that they can be adapted during the innovation process. This concept of re-invention is defined as follows in (Rogers, 2003, p. 16): "The degree to which an innovation is changed or modified by a user in the process of its adoption and implementation."

Re-invention may occur during the preparation stage as well as during the implementation. This phenomenon has been observed throughout the last 15 years with ABC (Cobb et al., 1992; Gosselin, 1997; Horngren, 1990; Innes et al., 2000; Madison & Power, 1993; Malmi, 1999; Nanni et al., 1992). From the innovation perspective, these organizations may have decided to re-invent ABC and limit themselves to the AA, AM, ABM, or CDA that are previous stages in the implementation of ABC. This situation may be explained by the complexity of ABC implementation or by cost-benefit analysis of implementing ABC (Kaplan & Anderson, 2004). The implementation process consists of introducing the innovation and evaluating its impact. This stage also includes the management of longer-term organizational changes in terms of organizational structure, inter-functional relationships, and job design and communication patterns (Robey, 1987). The impact of the new system on these key organizational variables should be anticipated and managed as part of the implementation process. During the last stage, routinization, the innovation becomes a part of daily practices.

Gosselin (1997), as noted in the first section, distinguishes three levels of AM (AA, cost driver analysis, and ABC (pilot and full)). Gosselin (1997) examined the influence of several factors at these three stages of the implementation process of ABC. He found a significant association between competitive strategy and the adoption of an AM approach. Prospectors are more likely to adopt one of the three AM approaches, followed by analyzers and defenders. Among firms that adopted an AM approach, Gosselin found a significant positive association between vertical differentiation and the adoption of ABC. Among firms that adopted ABC, a significant positive association was found between formalization and centralization and the implementation of ABC. Thus, organizations that adopt ABC tend more to implement ABC when they are centralized. Decentralized organizations have the opportunity to adapt the innovation and stop the intra-organizational diffusion process. Ultimately, the results of the study showed that organizations that adopt and finally implement ABC are bureaucracies. Baird et al. (2004) also found evidence that support the results of Gosselin (1997). They demonstrated that there was an association between the stages of AM and size, decision usefulness of cost information, and culture dimensions of innovation.

The few studies on innovations that have been completed in management accounting have shown that the theories and frameworks developed in the

innovation literature may apply to management accounting. These theories need to be adapted (McDonald & Richardson, 2005) and also have to be tested in the context of innovations that have not only been implemented but also adopted and abandoned.

The research on contextual and organizational factors and the adoption and implementation of ABC has shown that some factors influence the diffusion process for ABC. The studies of Anderson (1995), Gosselin (1997), Krumwiede (1998), and Baird et al. (2004) have demonstrated that researchers need to distinguish between the stages in the implementation process and the nature of the ABC approach that is being adopted and implemented.

### 3.3. Determinants of the Success of ABC Implementation

Shields's (1995) was the first study that aimed at identifying the factors that can be associated with the success of ABC implementation. This survey study was completed with 143 firms that were known to have adopted ABC. The factors considered in the study were those identified in Shields & Young (1989). The results showed that top management support, link to performance evaluation and compensation, training, accounting ownership, and adequacy of resources are associated with the perceived success of implementation. The measurement of the success of the implementation was based on the scores from 1 (extremely unsuccessful) to 7 (extremely successful) from the following two statements related to the success of the implementation. There were two major weaknesses in this study. First, the stage of implementation was not considered. Therefore, projects at the initiation stage were compared with more advanced projects. Second, the measurement of the perceived success of the implementation was primitive. Swenson (1995) examined the level of financial and operating managers' satisfaction with ABC in 25 organizations identified as ABC users in professional journals. The results of this study showed that the satisfaction was higher with ABC in comparison to prior cost system. Since the respondents were managers in charge with the ABC projects, these results are not necessarily reliable.

The measurement of the success of ABC implementation was refined by Foster & Swenson (1997). They grouped into four categories the measures of success:

1. Use of ABC information in decision making
2. Decisions and actions taken with ABC information
3. Perceived financial improvements from ABC implementation
4. Management evaluations of overall ABC success

Foster & Swenson (1997) conducted their investigation in 166 ABC implementation sites among 132 different companies. Their results varied depending on the measure of success that was used. The use of ABC information was the measure of success that yielded the highest  $r^2$  in a regression with the five factors that Shields (1995) had identified as determinants of ABC implementation: top management support, training, link to performance evaluation, link to quality, and resource adequacy. None of these factors were significant in the four models and in a fifth one that included as independent variables the four measures of success combined. The refinement of the measure of success of ABC implementation and the results were not conclusive.

Another study by McGowan & Klammer (1997) attempted to examine the association between employee satisfaction and contextual and organisational factors of ABC implementation. They found that employee satisfaction with ABC was associated with most of the factors identified in Shield & Young (1989) and Shields (1995): top management support, involvement, link to performance evaluation and training. The major limitation of this research was the measurement of success that was limited to one dimension: the perceived degree of satisfaction with the implementation of ABC. This concept was measured on a five-point scale from strongly unfavourable to strongly favourable. There were no distinctions in this study on the type of ABC project and its stage of implementation.

Finally, Anderson & Young (1999) attempted to evaluate the impact of contextual and process factors on the success of ABC implementations in two manufacturing firms. The objective was to link empirical studies of correlates of ABC implementation with process theories of ABC implementation and provide model stability across number of dimensions. The overall evaluation of ABC is influenced by the reward environment and the quality of the existing information system. The accuracy of the ABC information is related

to adequacy of resources devoted to the ABC project and if the respondent felt need for change. The use of ABC data is related to top management and local union support, adequacy of resources devoted to the project, respondent commitment to organization, if the respondent felt the need for change, likelihood of employee layoffs and rewards environment. The model was stable across firms and respondents, but was sensitive to the maturity of the ABC system, again confirming the need to distinguish between the stages in the implementation process.

The studies on the impact of contextual factors on the success of ABC have provided empirical evidence that some factors are helping to improve the success of the ABC implementation process. Even though, the measurement of ABC implementation success is not trouble free. These studies have essentially relied on managers' perception. In general, managers were asked to evaluate several items on a scale from 1 (strongly disagree) to 5 (strongly agree). As a result, the measures bear some biases that are difficult to evaluate. In general, the perceived benefits of ABC are always very high. Table 12 shows the different measures used to evaluate the success of ABC. Anderson et al. (2002) completed a study on the performance of ABC implementation teams.

Measuring the success of ABC implementation is not a simple task. The quality of the measurement of success improved rapidly from Shields (1995) to Anderson & Young (1999). However, the results of the studies on the success of ABC implementations have not been persuasive. This outcome may explain why researchers have stopped attempting to find answers to research questions on the success of ABC implementations.

#### 4. Organizational and Social Consequences of ABC

Almost 20 years after the emergence of ABC, many wonder if this important innovation was just a fad or

Table 12. Measurement of success of ABC implementation.

	Measurement of success
Shields (1995)	Success of the ABC initiative and financial benefits from ABC (two items)
Swenson (1995)	Satisfaction with methodology for calculating product costs before ABC and after ABC (two items)
McGowan & Klammer (1997)	Degree of satisfaction with the implementation of ABC (one item)
Foster & Swenson (1997)	Use of ABC information in decision-making; decisions and actions taken with ABC information; perceived financial improvements from ABC implementation; management evaluations of overall ABC success
Anderson & Young (1999)	Perceived overall value of ABC (five items); perceived accuracy of ABC data (three items); perceived use of ABC data (four items)

if it is still relevant today. Whatever is the answer to this question, ABC has had a strong influence on cost accounting and management accounting. This section includes a discussion on the consequences of the emergence of ABC on organizational performance, management accounting, and management accountants.

#### 4.1. Impact of ABC on Organizational Performance

Many practitioners and academics have suggested that the implementation of ABC has a favourable influence on the financial performance of organizations. However, the amount of empirical evidence that confirms this proposition is very limited. Kennedy & Affleck-Graves (2001) attempted to explain the “ABC paradox” and to show that the choice of a management accounting system, such as ABC, may have a significant impact on firm value. Specifically, for a sample of UK firms, they showed that firms adopting ABC outperformed matched non-ABC firms by approximately 27% over the 3 years beginning on January 1 of the year in which the ABC techniques was first implemented. They considered their results robust for different matching criteria and for both accounting and market-based measures of performance. Further analysis suggests that ABC adds to firm value through better cost controls and asset utilization, coupled with greater use of financial leverage. Superior subsequent performance suggests that the adopting firms made a rational value-enhancing choice when adopting ABC. Consequently, their results provide support for Malmi’s (1999) evidence in favour of the efficient choice hypothesis. Kennedy & Affleck-Graves (2001) claimed that their results do not clarify Gosselin’s (1997) ABC paradox, but rather accentuate it: If ABC-adopting firms have better stock performance in addition to the other benefits cited in the literature, then why have more firms not implemented the approach?

Another way to attempt to evaluate the impact of ABC on performance is to examine the stock market effect of the announcement of the adoption of an ABC system. This is the task that completed Gordon & Sylvester (1999). Their investigation showed that the announcement of ABC adoption had no effect, positive or negative, on stock price of the adopting firms. Cagwin & Bouwmann et al. (2002) investigated the improvement in financial performance that is associated with the use of ABC and the conditions under which such improvement is achieved. They found that firms have a net improvement in financial performance when ABC is used concurrently with strategic business initiatives such as JIT or TQM, which is greater than that obtained from the use of those

without ABC. There is a positive association between ABC and improvement in ROI when implemented in complex and diverse firms, in environments where costs are relatively important, and when there are limited numbers of intra-company transactions to constrain benefits. There is an indication that other enabling conditions (information technology sophistication, absence of excess capacity, and competitive environment) affect the efficacy of ABC. Cagwin et al. (2002) also show that previously used measures of success, satisfaction with ABC, and financial benefit obtained from ABC (Krumwiede, 1998; Shields, 1995; Swenson, 1995) are predictors of improvement in financial performance.

Ittner et al. (2002) have attempted to evaluate the association between the extensive use of ABC and plant-level operational and financial performance using a large sample of manufacturing firms that responded to a survey in 1997. They indicated that they have found a positive, but “modest,” association between the extensive use of ABC and manufacturing performance. Three variables were used to measure manufacturing performance: return on net plant assets, improvements in cycle time, and quality and cost reductions associated with these improvements. Ittner et al. have not been able to evaluate if these results are the consequences of the AA or CDA or are the outcome of decisions based on ABC. They did not find a significant association between ABC and return on investment, a measure of financial performance.

After almost 20 yr of presence of ABC, there is still not much empirical evidence that the adoption and implementation of ABC has an impact on performance. There is a need to better examine the relationships between contextual and organizational factors, success of ABC implementation and performance.

#### 4.2. ABC and Fads and Fashions in Management Accounting

Theories of bandwagons suggest that organizations adopt or reject an innovation because of bandwagon pressures by organizations that have already adopted or rejected this innovation (Abrahamson & Rosenkopf, 1993). The level of bandwagon pressures is influenced by the level of ambiguity surrounding the organizations’ assessments of the innovations’ efficiency and returns and also by institutional and competitive pressures (Abrahamson & Rosenkopf, 1993). Thus, bandwagon cycles may cause organizations to adopt inefficient innovations but may also lead organizations to reject profitable innovations because of bandwagon pressures of rejection (counter-bandwagon). Abrahamson (1991) described two sets of



theories to explain the bandwagon process: rational efficiency theories and fad theories.

Rational efficiency theories are based on the assessment made by managers about the efficiency of an innovation. Some rational-efficiency theorists assume that non-adopters are informed instantaneously about innovation's technical efficiency and returns. Others consider that as the number of adopters increase, more information about the innovation's technical efficiency and returns are made available to non-adopters. This access to this information would cause the innovation costs to decrease and returns to increase. This would lead to a bandwagon cycle that would increase the diffusion rate of the innovation. [Abrahamson & Rosenkopf \(1993\)](#) suggested that rational-efficiency theories have two major limitations. First, in many groups of competitors, information about innovation's technical efficiency and returns may not affect potential adopters' decisions. [Abrahamson & Rosenkopf \(1993\)](#) argued that this influence will occur only if

1. information about the technical efficiency and the returns of an innovation is readily available to potential adopters;
2. channels through which this information may flow exist;
3. early adopters agree to diffuse the information to potential adopters; and
4. the information may influence potential adopters' decisions to adopt the innovation.

Thus, the bandwagon cycles would only take place if all of these four conditions are met. This might not be the case in many circumstances. Second, rational-efficiency theories sustain a pro-innovation bias. They cannot be used to explain the rejection of efficient innovations and the adoption of inefficient innovations. Therefore, in this chapter, the focus is on the next set of bandwagon theories, fad theories.

Fad theories suggest that organizations adopt innovations because other organizations have adopted it rather than on the basis of an evaluation of the innovation's efficiency and returns. Institutional bandwagon pressures and competitive bandwagon pressures may cause this behaviour. Institutional bandwagon pressures may occur when non-adopters fear that they will appear abnormal and then lose legitimacy with their stakeholders. This threat would lead them to adopt an innovation even though they have not assessed its efficiency and returns. Competitive bandwagon pressures arise from the menace of lost competitive advantage. Risk adverse managers would prefer to adopt an innovation, even though it

was not well appraised, to avoid potential losses of competitive advantage. The threat of a lost competitive advantage would outweigh the benefits of an equally competitive advantage in managers' utility schema. Adopting an innovation similar to the competitors' would prevent managers from being perceived as incompetent. If the returns were high, they would look as if they were good managers. If the returns were low, they would look no worse than other managers in the industry.

Bandwagon pressures may affect the diffusion process for ABC in two distinct manner. On one hand, institutional pressures such as those created by consultants and professional accounting associations may force managers to adopt and implement ABC. Furthermore, because of the high level of ambiguity surrounding the technical efficiency and returns of ABC, firms and strategic business units within an industry in which a large number of firms adopted ABC, may feel more pressures from competitors to adopt and implement ABC. On the other hand, these competitive pressures may cause counter-bandwagon effects, since managers within an industry may not feel pressures to adopt ABC if competitors tend to reject ABC. [Bain & Company \(2005\)](#) recently showed that US managers consider ABM as one of the management tool with a satisfaction level below the over-all mean. Consequently, since managers have evaluated that ABC yielded low returns, bandwagon pressures to reject ABC could be high and pressures to adopt it would be low.

[Gosselin \(1999\)](#) examined the diffusion of ABC from a bandwagon perspective. The results of this study showed that pressures from competitors, suppliers, and customers affect the decision to adopt or reject ABC. [Malmi \(1999\)](#) also examined the diffusion process for ABC in Finland. The purpose of his research was to explain what drives innovation diffusion of ABC in Finland during its various phases. Malmi performed four surveys, interviewed consultants, academics, and software company employees. He concluded that efficient choice may explain the earliest adoptions, whereas fashion-setting organizations exert considerable influence in the take-off stage. Later on, the influence of fashion-setting organizations diminishes. Further diffusion is explained by mimetic behaviour and efficient choice. The results in the initial phase indicate that both a high proportion of exports and perceived change in competition are correlated with ABC adoption. Also, high product diversity was found to be positively correlated with ABC adoption. Early adopters appear to have been smaller in size. The largest firms and units have not been the first to adopt ABC in Finland.

There has not yet been enough empirical research on fads and fashions in management accounting that would allow to better understand the diffusion process of management accounting innovations from a fads and fashions perspective.

*4.3. Relevance Recovery of Management Accounting*  
ABC emerged in the 1980s just after Hopwood (1983) and Kaplan (1984a, 1984b) had urged researchers to examine how management accounting systems were designed and used within real organizations and Johnson & Kaplan (1987) had documented the lost relevance of management accounting techniques. ABC was a response to this questioning. It became one of the leading topics along with other new techniques such as target costing or life-cycle costing that called for the renewal of management accounting (Bromwich & Bhimani, 1989, 1994). This is probably the most important consequence of ABC. Therefore, ABC has played a key role in the relevance recovery of management accounting.

#### *4.4. From Manufacturing Cost Accounting to Cost Management*

Even though, all the surveys examined earlier in this chapter showed that the implementation rates for ABC have been limited, ABC imposed a new cost accounting logic that is, in many respects, responsible for the emergence of other techniques such as customer accounting and customer profit analysis. Before the emergence of ABC in the 1980s, the main objective of cost accounting techniques was essentially to determine product costs in a manufacturing environment for inventory valuation in accordance with generally accepted accounting principles (GAAP). After the development of ABC, the use of cost accounting techniques was extended to service, not-for-profit, and public sector organizations and also to different cost objects like customers, projects, activities, and internal services. ABC and other costing techniques like target costing and their applications to non-manufacturing settings provided a context that led to a shift from cost accounting to cost management.

#### *4.5. New Cost Accounting (Management) Logic*

The concepts inherent to ABC like cost objects, activities and cost drivers allowed the emergence of a new cost accounting logic that bears several features. First, the concept of cost objects has enabled management accountants to broaden the scope of cost accounting to new cost objects such as services, customers, customized services, product lines, internal services, and projects. This change may have occurred despite the emergence of ABC but the interest

for ABC accelerated this phenomenon. Second, while traditional accounting systems emphasized the classification of costs by categories of expenses, ABC requires this classification to be activity oriented. Thus, accounting system should enable managers to know why costs were incurred. This need may be one of the reasons why ABC is difficult to implement. Most accounting systems do not allow classifying expenses on an activity basis. Third, management accountants concluded after having experimented ABC for a few years that cost drivers and cost driver rates were key information for cost management. Volume driver rates used traditionally do not provide as much relevant information as cost driver rates do for cost management purposes. The identification of appropriate cost drivers requires managers and accountants to review processes and activities. This is essentially the ABM or AM piece of ABC. Fourth, the Cooper & Kaplan (1988) cost hierarchy provided a simple but efficient tool to explain to managers and students the influence of cost behaviour. However, despite the fact that ABC requires a paradigm shift in terms of cost classification, cost behaviour, activity definition, and cost driver management, ABC remains an extension of the traditional full costing rationale.

#### *4.6. ABC and the Role of Management Accountants*

The perception of management accountants by other managers has been influenced by the emergence of ABC. Friedman & Lyne (1997) suggested that ABC has improved the image of accountants. While traditionally management accountants were perceived to be focusing only on accounting procedures and techniques, the ABC literature and ABC projects have shown that management accountants need also to be concerned by processes, activities, and cost drivers to complete the implementation of ABC. The success of ABC implementations requires the creation of multifunctional teams in which accountants have to work with operation and marketing people. The fact that accountants need to work with other managers to complete ABC implementations provides a setting for a change in the perception of accountants by other managers.

#### *4.7. Consulting Activities and ABC*

Another important consequence of the emergence of ABC and ABM in the 1990s is the development of an important industry devoted to helping organizations to implement and use information generated by ABC models. This industry has had a strong influence on the diffusion process for ABC. The presence of consultants usually accelerates the diffusion of an innovation but can also lead, after this initial period, to

the re-invention of the innovation (Gosselin, 1997; Rogers, 2003) or to the dissatisfaction of organizations and the rejection of the innovation like ABC (Innes et al., 2000).

#### 4.8. Organizational Learning and ABC

One key feature of ABC is that it not only requires accountants and managers to learn about cost accounting techniques like ABC but also have more knowledge about what is going on in their organizations (Argyris & Kaplan, 1994). This dimension has not been considered in many ABC implementation projects. Top management expected that managers would be able to develop an ABC model and install it within a very short period of time. Almost 20 years after the inception of ABC, it is clear that accountants, managers, and organizations need to have enough time to implement new knowledge. This may be one explanation for the large number of ABC projects that have been abandoned. Researchers could investigate the influence of organizational learning on the diffusion process for innovations in management accounting.

### 5. Conclusion

ABC is considered one of the most important innovation in management accounting of the twentieth century. Although ABC is very attractive from a conceptual point of view and it has been included in all management accounting textbooks and most business school curriculum, surveys have shown that it has not been considered by the majority of organizations and that it has been abandoned by many organizations that had sometimes in the 1990s decided to adopt and implement it. Survey studies have also demonstrated that there is, in practice, some confusion about what exactly ABC is and that it is very difficult to investigate on the implementation of ABC without, at first, clarifying the definition of ABC with managers. This confusion is probably, with other methodological difficulties, the explanation for the decrease in the number of surveys on ABC since 2000.

Several factors influence the adoption and the implementation of ABC. A number of studies have shown that factors such as size, strategy, environmental uncertainty, and product diversity affect the decision to implement ABC. More refined investigations, based on the innovation literature, have demonstrated that the impact of these factors is different according to the stages of the implementation. Therefore, the need to understand at what stage an ABC project becomes essential to study the factors that influence the implementation of ABC and its success.

Research on the impact of ABC on performance has also shown that the implementation of ABC does not clearly improve performance and firm value. Despite all these mixed results, most academics and practitioners will agree that ABC, since its emergence, had an important influence on the development and the renewal of management accounting and on the role of management accountants.

After all, the ABC paradox remains (Gosselin, 1997): Regardless of the inclusion of ABC in most management accounting textbooks, the large number of ABC seminars, the consulting activities, the ABC softwares, and the large number of articles published on ABC, why firms are not implementing ABC and furthermore why some that have adopted ABC, have decided to abandon it.

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# An Economic Perspective on Transfer Pricing

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**Abstract:** This chapter reviews the recent economic literature on transfer pricing. As a starting point, we take Hirshleifer's transfer pricing model and discuss the basic structure of the most widely used model extensions. We review transfer pricing models with asymmetric information, transfer pricing models in incomplete contracting settings, strategic transfer pricing models, and international transfer pricing models with firms operating in different tax jurisdictions. The results offer a rich set of different explanations for the wide variety of transfer pricing methods in practice but they also show that it is impossible to give a general recommendation about "the" best transfer pricing method. By contrast, only limited progress has been made in arriving at a sufficient theory of decentralization. The models are either silent about organizational issues, or the advantages of decentralization are based on more or less restrictive informational assumptions. We conclude that the economic transfer pricing research has certainly improved the understanding of the relative usefulness of alternative transfer pricing methods for a carefully selected set of assumptions. Further theoretical and empirical research seems necessary for a better understanding of the economic reasons for decentralization and for explaining some unresolved empirical puzzles.

## 1. Introduction

In this chapter we provide a review of some of the recent economic contributions to the transfer pricing literature. Most of the survey considers transfer prices as a device for coordinating the plans and actions of individual decisions makers in decentralized organizations.<sup>1</sup> The overall objective is an efficient allocation of resources within the organization and transfer prices are one instrument for achieving it.<sup>2</sup>

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<sup>1</sup>We do not discuss behavioral research and mathematical programming models. See Grabski (1985) and Abdel-khalik & Lusk (1974) for earlier surveys covering these lines of research. We also restrict this survey to contributions in English. See Ewert & Wagenhofer (2006) for a survey of the transfer pricing literature in German-speaking countries.

<sup>2</sup>Of course, transfer prices also serve other purposes. They determine divisional profits, they may help to calculate product prices, and they are sometimes used by financial accountants to value inventories. In practice there arise tensions between these different roles. In Section 6 of this survey we discuss the tension between tax and managerial motives in transfer pricing.

The research perspective of the economic transfer pricing literature under review is largely normative. Most of the selected models attempt to identify the optimal transfer pricing method for given set of assumptions about the organization, the preferences of the individuals involved in the decision processes, and other factors affecting the resource allocation process. Other models do not explicitly aim for identifying the optimal solution of the transfer pricing problem but for analyzing the relative usefulness of alternative transfer pricing methods for a varying set of model assumptions. Nevertheless, the theoretical insights of economic transfer pricing models can also prove to be useful from a positive research perspective because they help to explain and understand the broad variety of existing transfer pricing practices and organizational settings.

Economic transfer pricing research is typically based on microeconomic models, particularly from agency theory and game theory. We provide a systematic review of the most widely used model classes. We explain their basic structure and their main

insights but do not attempt to provide a detailed and comprehensive review of all individual model versions within these classes.

The starting point of our analysis (and of almost all transfer pricing models) is the standard transfer pricing model, as proposed by Hirshleifer (1956). We introduce this model in Section 2 and discuss its limitations. In the standard model, the resource allocation problem is solved by setting the “right” transfer price. However, the firm’s headquarters (HQ) must solve the optimization problem for finding the “right” price in the first place. Thus, the model leaves open why the firm does not simply instruct the divisions to implement the optimal production policy instead of coordinating their activities by a transfer pricing mechanism. In other words, the model does not provide a sufficient theoretical explanation for a decentralized organization. Without this explanation the theory of transfer pricing remains incomplete.

A number of model extensions have been proposed to overcome the conceptual deficiencies of the standard model. We group them into four classes and discuss them in separate sections.

In Section 3 we discuss transfer pricing under asymmetric information. The models of this class are referred to as adverse selection problems. They assume that the divisional managers have superior abilities and/or information regarding their area of responsibility. This informational advantage of the local management makes the coordination problem more difficult for HQ. After introducing a prototype model we ask whether asymmetric information establishes a strict preference for a decentralized organization. The general answer is “no” unless the set of feasible contracts is restricted by assumption. A strict preference for transfer pricing can only arise if the communication between HQ and the divisions is limited or prohibitively costly. We conclude Section 3 by introducing several papers that follow this route.

In Section 4 we turn to incomplete contracting models. These models assume that the divisions can make upfront specific investments that enhance the value of internal trade but have little or no value for the divisions’ business with outside partners. Since the investments are typically made under uncertainty, the beneficiary of the investment may renegotiate the initial terms of trade once the investor has incurred the investment expenses. A rational investor will anticipate this threat and choose an inefficiently low investment level in the first place. This problem is known as the “hold-up” problem.

The recent transfer pricing literature has discussed various approaches for mitigating this problem. As a benchmark case, we first discuss the model of Edlin &

Reichelstein (1995) and their solution for the hold-up problem. Subsequently, we discuss a related branch of research that uses the same generic model setup but restricts the available mechanisms for solving the hold-up problem to simple transfer pricing methods that have counterparts in firms’ daily transfer pricing practice. In these models the transfer price is not only designated for stipulating an efficient level of trade but also for providing appropriate investment incentives. Usually, there is a tension between these two roles of transfer pricing because transfer prices that provide efficient investment incentives do not necessarily provide incentives for efficient trade.

Providing a better understanding of the important trade-off between the right incentives for specific investments and intrafirm trade and the role of various transfer pricing methods in balancing it is certainly the main contribution of the incomplete contracting literature. On the other hand, the theory is silent about the benefits of decentralization as such because most incomplete contracting models can easily be reinterpreted as analyzing contractual relationships between independent parties.

Section 5 reviews the interaction between transfer pricing and product market competition. The literature typically assumes that firms compete in prices in the final product market. With this assumption, transfer pricing serves as a commitment device vis-à-vis the competitor. It reduces the intensity of competition in the final product market and yields profits that would not be attainable by a centralized firm. In other words, this model class offers an economic rationale for a decentralized organization. However, strategic transfer pricing requires that the rival firm observes the transfer pricing method of its competitor before making its pricing decision. We extensively discuss the informational requirements that are necessary to support the strategic use of transfer pricing.

International transfer pricing models are reviewed in Section 6. They assume that the firm’s divisions are located in different tax jurisdictions and analyze how the transfer pricing policy affects after tax profits. First, we illustrate the basic tax shifting incentives, and second, we discuss the tension between managerial and tax objectives in transfer pricing, and how an existing goal conflict can be solved.

In Section 7 we conclude this paper with a discussion of the achievements of this strand of literature and some suggestions for further research.

## 2. The Standard Transfer Pricing Model

### 2.1. Model Setup and Optimal Transfer Prices

The standard transfer pricing model is the smallest common denominator of almost all economic studies

Table 1. Results of the neoclassical transfer pricing model.

Scenario	Unit	Division $s$ (seller)	Division $b$ (buyer)	Integrated firm
No market	Profit	$tq_b - C(q_s)$	$R(q_b) - tq_b$	$R(q) - C(q)$
	First-order conditions	$t = C'(q_s)$	$R'(q_b) = t$	$R'(q) = C'(q)$
Competitive market (price $p_e$ )	Profit	$p_e(q_s - q_b) + tq_b - C(q_s)$	$R(q_b) - tq_b$	$p_e(q_s - q_b) + R(q_b) - C(q_s)$
	First order conditions	$p_e = C'(q_s)$	$R'(q_b) = t$	1) $p_e = C'(q_s)$ 2) $R'(q_b) = p_e$

Note:  $C(q_s)$ ,  $C'(q_s)$ : cost, marginal cost of seller,  $q_s$ : production quantity of seller  $R(q_b)$ ,  $R'(q_b)$ : revenue, marginal revenue of buyer,  $q_b$ : sales quantity of buyer  $t$ : transfer price,  $p_e$ : market price

of transfer pricing. Its simplest version assumes a decentralized firm consisting of HQ and two divisions ( $j = s, b$ ). Division  $s$  (the “seller” or the “upstream” division) produces an intermediate product and supplies it to division  $b$  (the “buyer” or the “downstream” division). The buyer processes the intermediate product and sells it in the final product market. Both divisions are organized as profit centers and evaluated on the basis of their divisional profit. As a consequence, rational managers are supposed to maximize their divisional profit ignoring the potentially negative consequences of their decisions for other divisions and the firm as a whole.

The problem of HQ consists of finding a transfer price that coordinates the decisions of the two independent divisions so that the aggregate firm profit is maximized. The efficient level of internal trade can be implemented by setting the transfer price equal to the opportunity cost of the intermediate product. If there is a competitive market for the intermediate product, the opportunity cost of the intermediate product is equal to the market price. If no market exists, the optimal transfer price equals the marginal cost of the intermediate product.<sup>3</sup>

Table 1 illustrates the main results of the neoclassical transfer pricing model with and without the existence of a competitive market for the intermediate product. In the example, the seller’s cost equals  $C(q_s)$  and the buyer’s revenue is  $R(q_b)$ . Each final product unit requires one unit of the intermediate good, and  $q_j$  denotes the quantity produced and sold by division  $j$ . The transfer price is set by HQ and equals  $t$  per unit

of the intermediate product. The market price is denoted with  $p_e$ : internal trade at the transfer price  $t$  is mandatory for the two divisions. Table 1 reports the profit functions and the first-order conditions for profit maximization for the two separate divisions and for an integrated firm with the same cost and revenue structure.<sup>4</sup>

The profit of the integrated firm serves as a benchmark for the profit that can be attained in the decentralized firm by correctly setting the transfer price. When there is no market for the intermediate product, the aggregate profit is maximized by producing and selling the quantity that equates marginal revenue with marginal cost. For coordinating the decisions at the divisional level, HQ evaluates the marginal cost of the selling division for the optimal quantity  $q^*$  and sets a constant transfer price of  $t = C'(q^*)$ . Faced with this transfer price, each division  $j$  determines its internal demand, denoted by  $q_j$ . The first-order profit maximization condition for division  $b$  becomes  $R'(q_b) = C'(q^*)$ , as for the integrated firm. Solving this equation for  $q_b$  yields an optimal sales quantity of  $q_b^* = q^*$ . Similarly, the first-order condition of division  $s$  becomes  $C'(q_s) = C'(q^*)$ . Solving this equation for  $q_s$  yields  $q_s^* = q^*$  because HQ sets the transfer price such that  $C'(q^*) = R'(q^*)$ .

With a perfectly competitive market for the intermediate product, the production quantity of the intermediate product is generally not identical with the sales quantity of the final product. An integrated firm finds the optimal quantities  $q_s^*$  and  $q_b^*$  by equating

<sup>3</sup>The classical reference for this result in the Anglo literature is Hirshleifer (1956). In the German literature it dates back to Schmalenbach (1908/1909). An instructive textbook version can be found in Milgrom & Roberts (1992).

<sup>4</sup>For all  $q$  we assume that  $R''(q) \leq 0$  and  $C''(q) \geq 0$  (with strict inequality for either  $R''$  or  $C''$ ) to assure that the profit maximization problems at all organizational levels have a unique interior solution that can be represented by the first-order condition for profit maximization.

marginal cost (marginal revenue) with the external market price  $p_e$ . If  $q_s^* > q_b^*$ , the firm sells the excess production at the market price and receives an additional revenue of  $p_e(q_s^* - q_b^*)$ , if  $q_s^* < q_b^*$ , the firm procures the required quantity of the intermediate product at the market price and incurs an additional cost of  $p_e(q_b^* - q_s^*)$ . In a decentralized firm with mandated internal trade, the seller produces the same quantity as the integrated firm and the buyer sells the optimal quantity of the final product if HQ sets the transfer price equal to the market price, that is,  $t = p_e$ .

## 2.2. The Limits of Market-Based Transfer Pricing

The principle that transfer prices should equal market prices or at least be derived from market prices if they exist is one of the most fundamental rules for transfer pricing. It is not only the theoretical basis of the arm's-length principle constituted in the OECD's "Transfer Pricing Guidelines for Multinational Enterprises and Tax Administration" (OECD, 2001) but is also strongly recommended as the best practice in all major managerial accounting textbooks. A good example is the following statement of Anthony & Govindarajan (1995, p. 182):

"The fundamental principle is that the transfer price should be similar to the price that would be charged if the product were sold to outside customers or purchased from outside vendors."

Taken literally, however, the principle may be misleading. Rather, it is restricted to settings where the market for the intermediate product is perfectly competitive and transaction costs do not exist. Hirshleifer (1956) graphically analyzes a setting in which the buying division is a monopolist in the final product market and the selling division has monopoly power in the intermediate market. With this assumption total firm profit becomes

$$\Pi = R(q_e) + R(q_b) - C(q_b + q_e) \quad (1)$$

where  $q_e$  and  $R(q_e)$  denote the demand quantity and the revenue in the external market for the intermediate product, respectively. For a centralized firm, the profit maximizing sales quantities in both markets  $q_e^*$  and  $q_b^*$  are found by equating marginal revenues with marginal cost and the optimal production quantity equals total sales in both markets (i.e.,  $q_s^* = q_e^* + q_b^*$ ). In a decentralized firm, the profit of the seller and the buyer are

$$\begin{aligned} \Pi_s &= R(q_e) + t \cdot q_b - C(q_b + q_e) \quad \text{and} \\ \Pi_b &= R(q_b) - t \cdot q_b \end{aligned} \quad (2)$$

where the profit of the buyer is equivalent to the expression in Table 1. Hence, the first-order conditions

for decentralized profit maximization are not affected by the introduction of the external market and equivalent to those for the no market scenario in Table 1. We conclude that the optimal transfer price equals marginal cost and not the market price of the intermediate product. However, unless the cost function is linear, determining the optimal transfer price becomes more difficult with an imperfect intermediate market because the marginal cost of the intermediate product generally depends on both, the internal and the external demand quantity.

Inspired by empirical evidence on the widespread use of market-based transfer pricing Baldenius & Reichelstein (2006) revisit the problem by assuming that the transfer price is derived from the external market price  $p_e$ . Baldenius and Reichelstein look for conditions under which "intracompany discounts" are favorable. To this end, they restrict the transfer price to take the following form:

$$t(p_e, \delta) = (1 - \delta) \cdot p_e \quad (3)$$

Here  $\delta \in [0, 1]$  denotes an intracompany discount favoring the buying division over external customers. With a linear cost function and a downward sloping demand function  $q_e(p_e)$ , total firm profit takes the following form:

$$\Pi = p_e \cdot q_e(p_e) + R(q_b) - c \cdot (q_b + q_e) \quad (4)$$

Evidently, eq. (4) has the same structure as eq. (1) and is maximized by equating marginal revenues in both markets with constant marginal cost. In a decentralized firm, the problem could easily be solved by setting  $t^* = c$  but with the market-based transfer price in eq. (3) an efficient level of internal and external trade is generally difficult to achieve. To demonstrate the difficulties, we account for the fact that profit maximizing quantity of division  $b$  depends on the transfer price and write the internal demand of the buying division as a function of the transfer price  $t$ , namely  $q_b(t)$ . Substituting the internal demand and the transfer price function from eq. (3) into the profit function of the seller yields the expression

$$\Pi_s = (p_e - c) \cdot q_e(p_e) + [(1 - \delta) \cdot (p_e - c)] \cdot q_b(t(p_e, \delta)) \quad (5)$$

From the perspective of the downstream division's management, the divisional profit function in eq. (5) shows that the transfer price and the demand of the buying division are both functions of the external market price. A rational management realizes that the external market price allows for extracting additional rents from the internal customer. It hence behaves in the manner of a multimarket monopolist.

The profit maximizing pricing decision of the upstream division satisfies the following first-order condition:

$$\frac{\partial \Pi_s}{\partial p_e} = \frac{\partial \Pi}{\partial p_e} + (1 - \delta) \cdot \left[ q_b(t(p_e, \delta)) + (t(p_e, \delta) - c) \frac{\partial q_b(t(p_e, \delta))}{\partial t} \right] = 0 \quad (6)$$

We can see from the expression in eq. (6) that the optimal price of the upstream division  $p_e^{*s}$ , generally differs from the optimal price of the centralized firm  $p_e^*$ . The direction of the deviation from the optimal price depends on the sign of the expression in squared brackets (note that for  $p_e = p_e^*$  the first term in eq. (6) equals zero). Only for  $\delta = 1$  both prices coincide but this solution would imply a transfer price of zero and thereby provide the downstream division with incentives to sell an inefficiently high quantity in the final product market. For any positive discount, however, the pricing distortion prevails. Moreover, Baldenius & Reichelstein (2006) find that with unlimited capacity it is even not clear if the firm benefits at all from using intracompany discounts. The point is that without the capacity constraint the optimal internal price  $t^*$  may well exceed the external market price  $p_e^*$ . A discount will then move  $p_e^{*s}$  away from  $p_e^*$  and thereby reduce profits. However, an unambiguous result can be derived if the firm's production capacity is constrained. Then, a positive discount is always better than no discount. Unlike the unconstrained case, the efficient solution can even be restored under certain restrictive assumptions about the demand function.

We conclude that a naive application of market-based transfer pricing can significantly distort the allocation of resources and reduce the overall firm profit if the intermediate market is not perfectly competitive. It remains an open question, why firms actually use market-based transfer prices with intracompany discounts in the first place although cost-based transfer prices would obviously outperform them.<sup>5</sup>

### 2.3. Limitations of the Standard Model

At first glance, the economics of the standard transfer pricing model seems fascinating. A firm is organized into separate responsibility centers and subsequently the potential deficiencies of this organizational form

are corrected by aligning the divisional activities via a simple market mechanism. At closer inspection, however, the model has its limitations.

From a normative research perspective, the model is certainly useful for answering the question of how transfer prices should be set in a given organizational environment. From a positive research perspective, however, the model is largely meaningless because it cannot explain why divisionalized firms should rely on transfer pricing for coordinating divisional activities. In particular, without a market for the intermediate product, HQ must know  $q^*$  for setting the optimal transfer price. In the multimarket model, it must even know  $q_e^*$  and  $q_b^*$  for implementing the efficient level of trade. The model leaves open, why the firm does not directly instruct the divisions to exchange the efficient quantities instead of achieving the same goal by means of transfer pricing. With a perfectly competitive input market, HQ does not even need to regulate production quantities; it just has to grant free market access to both divisions for implementing the efficient level of internal trade.

Moreover, even if we take the coordination device as given, the standard model is not very helpful in explaining the large variety of existing transfer pricing methods. For example, it is a well-documented empirical fact that firms frequently use full-cost-based transfer prices or negotiated transfer pricing.<sup>6</sup> The use of both methods cannot be explained by the standard model. Full-cost-based pricing would clearly distort efficiency and negotiated transfer pricing is excluded by assumption.

Finally, and more fundamentally, the standard transfer pricing model does not provide an economic rationale for the assumed organizational structure. A divisionalized firm can at best replicate the profit of the integrated firm but decentralization offers no clear advantage. With a perfectly competitive input market, there is even no incentive for integrating both divisions into a single firm. The two divisions could act as independent firms and make the same profit as if they were part of an integrated business.

### 3. Transfer Pricing under Asymmetric Information

One of the fundamental shortcomings of the standard transfer pricing model is the assumption that the local profit functions are common knowledge. Kaplan & Atkinson (1998, p. 291) argue that information specialization is one of the major reasons for decentralization. At the same time information specialization

<sup>5</sup>Baldenius & Reichelstein (2006) assume that HQ cannot observe marginal cost, but if imperfect cost information would be the sole reason for using the transfer-pricing scheme in eq. (3), it would be worthwhile to verify if the firm could increase its profits by basing its transfer prices on expected marginal cost.

<sup>6</sup>See Vancil (1978) for a well-known early survey, and Horngren et al. (2005) for a summary of several survey results.

causes information asymmetries because it is practically impossible or at least too costly for the decentralized management of large multidivisional firms to share all local information with the central management of the firm. However, if the local management is better informed about the cost (and revenue) functions of their divisions, the simple solution of the standard transfer pricing model is no longer feasible because setting the optimal transfer price generally requires the knowledge of the cost function.

A number of papers have addressed the problem of transfer pricing under asymmetric information using a mechanism design approach.<sup>7</sup> To illustrate the basic idea and the limitations of this model class, we subsequently present a simplified version of the model in Vaysman (1996) who considers the following situation. The revenue of the downstream division equals  $R(e_b, q)$  and the cost of the upstream division is given by  $C(e_s, q)$ . The variables  $e_b$  and  $e_s$  denote the division managers' efforts for enhancing the revenue of division  $b$  and for reducing the cost of division  $s$ , respectively.  $R(\cdot)$  is increasing and strictly concave in  $e_b$ ,  $C(\cdot)$  is decreasing and strictly convex in  $e_s$ , and the total profit  $R(\cdot) - C(\cdot)$  is strictly concave in  $q$  so that a profit-maximizing production quantity exists for all effort levels. The firm's accounting system records the realizations of  $R(e_b, q)$  and  $C(e_s, q)$  and thereby makes the information about the manager's efforts publicly available.

Effort is personally costly for the divisional managers. The disutility of manager  $j$ 's effort,  $j \in \{s, b\}$ , is captured by his personal cost function  $V_j(\theta_j, e_j) = \theta_j \cdot v(e_j)$ , where  $v(e_j)$  is increasing and convex in  $e_j$ . The parameter  $\theta_j$  captures the manager's personal characteristics, or his "type", where  $\theta_j \in \Theta_j = [\underline{\theta}_j, \bar{\theta}_j]$ . The type  $\theta_j$  is private information of manager  $j$ , that is, HQ lacks precise information about the managers' cost of effort. In particular, from the perspective of HQ, the managers' types are independent random variables with distribution functions  $F_j(\theta_j)$  and positive densities  $f_j(\theta_j)$  over  $\Theta_j$ , so that the terms  $F_j(\theta_j)/f_j(\theta_j)$  are increasing in  $\theta_j$ .

The benchmark approach for solving the intrafirm resource allocation problem uses a direct revelation mechanism. With a direct revelation mechanism, the firm's HQ designs individual compensation contracts for each manager and decides centrally on the resource allocation. The resource allocation and the compensation payments are based on the managers' reports about their types. Call those messages  $m_j$ .

Before managers send the messages, HQ announces which quantities  $q(m_b, m_s)$  and target efforts  $e_j(m_j, m_k)$  will be assigned to each possible pair of reports. Each manager subsequently must fulfill those requirements, otherwise there will be a prohibitive punishment.<sup>8</sup> If  $q(m_b, m_s)$  and the  $e_j(m_j, m_k)$  are realized, HQ pays out wages  $w_j(m_j, m_k)$  to the managers. Anticipating HQ's policy, the managers optimize over their reports by selecting between different assignments  $(q(m_b, m_s), e_j(m_j, m_k), w_j(m_j, m_k))$ .

The optimal direct revelation contract must be accepted by both managers and give them incentives to report their true type. Formally spoken, for all messages and true types  $(m_j, \theta_j) \in \Theta_j^2$  each manager's expected equilibrium utility

$$E_{\Theta_k}[u_j((m_j, m_k), \theta_j)] \equiv E_{\Theta_k}[w_j(m_j, m_k) - \theta_j \cdot v(e_j(m_j, m_k))]$$

must satisfy the following two conditions:

$$E_{\Theta_k}[u_j((\theta_j, \theta_k), \theta_j)] \geq E_{\Theta_k}[u_j((m_j, \theta_k), \theta_j)], \quad (7)$$

$$E_{\Theta_k}[u_j((\theta_j, \theta_k), \theta_j)] \geq 0 \quad (8)$$

The first set of constraints is usually referred to as the (Bayesian) incentive compatibility (or truth-telling) constraints and the second as the participation constraints. The conditions assure that manager  $j$  participates and reports his true type, given that manager  $k$  reports his true type as well. This simplifying approach can be chosen with reference to the revelation principle (Myerson, 1979). It states that without loss of generality any contract can be replaced by a direct revelation mechanism in which the agents truthfully report their type. Accordingly, the problem of HQ can be stated as of maximizing the expected net firm profit

$$E_{\Theta}[(R(e_b(\theta), q(\theta)) - C(e_s(\theta), q(\theta)) - w_s(\theta) - w_b(\theta))]$$

subject to the constraints (7) and (8), where  $\Theta = \Theta_s \times \Theta_b$ , and  $\theta = (\theta_s, \theta_b)$ . Under some regularity conditions, the solution of the problem is found by maximizing the following expression for all  $\theta$  with respect to  $q$ ,  $e_s$ , and  $e_b$ :

$$SP = R(e_b, q) - C(e_s, q) - H_s(e_s, \theta_s) - H_b(e_b, \theta_b) \quad (9)$$

<sup>7</sup>Well-known examples are Ronen & Balachandran (1988), Amershi & Cheng (1990), Banker & Datar (1992), and Vaysman (1996).

<sup>8</sup>More realistically, effort will be unobservable. The reader might think of an assignment of some target cost and revenue level  $\tilde{C}(m_b, m_s)$ ,  $\tilde{R}(m_b, m_s)$  instead. By enforcing these target levels, HQ enforces the required efforts. See Ewert & Ernst (1999) for deeper work on the relation between target costs and target efforts.

where

$$H_j(e_j, \theta_j) = v(e_j) \cdot \left[ \theta_j + \frac{F_j(\theta_j)}{f_j(\theta_j)} \right] \quad (10)$$

The term  $H_j(e_j, \theta_j)$  is usually referred to as the virtual cost of agent  $j$ . It consists of two terms. The first term  $v(e_j) \cdot \theta_j$  is the reimbursement for the agent's actual cost of effort. The second term  $v(e_j) \cdot F_j(\theta_j)/f_j(\theta_j)$  captures the expected information rent from the perspective of the principal, where the information rent of agent  $j$  equals  $\int_{\theta_j}^{\theta_j^*} v(e_j^*(t_j)) \cdot dt_j$ . The rent reimburses the agent for the potential gains that he could attain from pretending to be a less productive type. The information rent is increasing in the agent's productivity so that the most productive type  $\theta_j$  receives the highest rent and the least productive type  $\bar{\theta}_j$  receives no rent. In other words, the participation constraint in eq. (8) binds only for  $\bar{\theta}_j$ . Maximizing eq. (9) with respect to  $e_b$  and  $e_s$  yields the following first-order conditions:

$$\begin{aligned} R'(e_b, q) &= v'(e_b) \cdot \left[ \theta_b + \frac{F_b(\theta_b)}{f_b(\theta_b)} \right] \quad \text{and} \\ C'(e_s, q) &= v'(e_s) \cdot \left[ \theta_s + \frac{F_s(\theta_s)}{f_s(\theta_s)} \right] \end{aligned} \quad (11)$$

From eq. (11) we can see that only the most productive manager type  $\theta_j$  provides the efficient effort level because  $F_b(\bar{\theta}_j) = 0$ . For all other types of managers, the effort level under asymmetric information is less than the first best effort level that could be implemented if the principal would know the agent's type. More generally spoken, the principal trades off the agents' information rents against their productive efficiency. The lower the agents's productivity, the lower the requested effort level and the agents' information rent. This trade-off and the properties of the above solution are standard results for continuous-type adverse selection models.<sup>9</sup>

According to Vaysman (1996), the optimal solution attained by the direct revelation mechanism can be replicated by an indirect mechanism under which the managers send messages  $m_j$  about their types to HQ but then decide decentrally on their effort levels and the trade quantity.<sup>10</sup> The managerial reward system

consists of a transfer payment  $T(q, m_s)$  that uses only the sellers report on his type, and linear bonus schemes

$$w_j(m_j) = \alpha_j(m_j) \cdot \Pi_j + \beta_j(m_j) \quad (12)$$

based on the managers' reports and their divisional profits  $\Pi_j$ , where  $\alpha_j(m_j)$  is the variable rate of pay and  $\beta_j(m_j)$  is a constant base salary assuring that the participation constraint is met. The profits of the selling and the buying divisions are given by the following expressions:

$$\begin{aligned} \Pi_s &= T(q, m_s) - C(e_s, q) \quad \text{and} \\ \Pi_b &= R(e_b, q) - T(q, m_s) \end{aligned}$$

Vaysman shows that for replicating the allocation implemented by the direct revelation mechanism, it suffices to set the variable rate of pay equal to

$$\alpha_j(m_j) = \frac{V_j(m_j, e_j)}{H_j(e_j, m_j)} = \frac{\theta_j}{\theta_j + F_j(\theta_j)/f_j(\theta_j)} < 1$$

and to specify a transfer payment of

$$T(q, m_s) = C(e_s^*(q, m_s), q) + H_s(e_s^*(q, m_s), m_s) \quad (13)$$

where  $e_s^*$  minimizes the sum of the production cost and the seller's virtual cost  $C(e_s, q) + H_s(e_s, m_s)$ .<sup>11</sup> The transfer payment in eq. (13) is an example of standard-cost-based transfer pricing. It comprises of a reimbursement for the seller's cost of production and his personal cost of effort plus a term capturing the agent's expected information rent. In addition, the transfer payment is an example of standard-cost-based transfer pricing because the payment is not based on the actual effort level but on the target effort level  $e_s^*$ .

However, as in the basic transfer pricing model of Section 2, the decentralized mechanism offers no obvious advantages over a centralized solution. Rather, the transfer pricing procedure seems somewhat more complicated than just asking the managers for their type and then deciding centrally on the optimal allocation. More generally, this result follows directly from the revelation principle. If unlimited communication is possible, the presence of asymmetric information cannot be taken as an economic rationale for coordinating the managers's actions by means of transfer pricing. The limitations of Hirshleifer's (1956) approach thus directly generalize to settings where the revelation principle holds.

<sup>9</sup>See Fudenberg & Tirole (1991), Chapter 7 for more examples.

<sup>10</sup>Vaysman's results are based on earlier insights provided by Amershi & Cheng (1990) and Banker & Datar (1992). Like Vaysman (1996), these papers solve adverse selection problems with transfer-pricing mechanisms. Banker & Datar (1992) observe that the even the first best solution can be attained with post-contract information asymmetry.

<sup>11</sup>See Vaysman (1996) for a formal proof. The "trick" is that the proposed incentive scheme converts the managers' objective functions into linear transformations of HQ's objective function in eq. (9).



Vaysman (1996) addresses this dilemma by introducing limited communication into the model. Based on an approach that has been originally developed by Melumad et al. (1992), he assumes that the managers cannot communicate their actual type  $\theta_j$  but a certain range of types to which their type belongs. Formally, the type space  $\Theta_j$  is partitioned into a finite number of intervals, and agent  $j$  can report the interval of his type. Vaysman shows that in this setting, decentralization strictly dominates centralization. The reason is that the decentralized structure uses the information better. If the divisions communicate with each other, they can base their decisions on the messages received by the other division and on their own actual type. By contract, HQ can base its decisions only on the coarser messages of the managers.

A related approach to overcome the conceptual deficiencies of the standard transfer pricing model has been developed by Christensen & Demski (1998). As in Vaysman's model, the revelation principle is suspended by assumption. In the model two independent divisions have the opportunity to jointly pursue a project that is "small" relative to the other business. Hence, a formal communication flow is not established. In this setting, the authors focus on moral hazard concerns at the division level. The model formalizes the intuitive idea that profit allocation is skewed toward the division with the relatively smaller control problem.

Another route to model situations where decentralized mechanisms can be meaningfully compared are exogenous restrictions of the contract space. That is, for some reasons, the optimal mechanism is assumed to be unfeasible. The research agenda then consists of considering several alternative second best mechanisms and comparing their economic consequences. We will show in more detail in Section 4 that the introduction of these restrictions may prove useful for the understanding and comparison of transfer pricing mechanisms. From a purist's perspective, this approach may be critical because it leaves open why the firm voluntarily foregoes profits. From a practical point of view, the proposed constraints are meaningful as long as they depict existing institutional facts, and thereby underpin theoretical research with sufficient empirical relevance.

In this vein, Wagenhofer (1994) compares several transfer pricing mechanisms in the context of a binary adverse selection model. More precisely, he compares cost-based, negotiated, dual-rate, and market-based transfer pricing. He finds that institutional design becomes important if the intermediate product market is not perfect, because then other transfer pricing methods than market-based transfer prices may

become preferable. For example, if communication is costless, cost-based transfer pricing (weakly) dominates negotiated transfer pricing. However, more generally he identifies conditions under which each of the transfer pricing methods under consideration may become the preferable method. Wagenhofer's results clearly underline the critical role of different model assumptions for understanding the incentive properties of transfer pricing methods.

Another example of this model class is Schiller (1999). He compares a traditional transfer pricing scheme depending on the volume of internal trade with an alternative incentive scheme that utilizes information on the buyer's revenue. If the performance-measurement scheme is based on revenue, the incentive system can be interpreted as being based on a cost-allocation method, where the amount of allocated cost is increasing in the buyer's ability to bear the cost. Schiller shows that the cost-allocation method outperforms the traditional transfer pricing method if either revenue uncertainty is high or if controlling the manager's revenue-enhancing effort is important for the firm.

#### 4. Transfer Pricing and Divisional Investment Incentives

##### 4.1. Transfer Pricing and the Hold-Up Problem

A new dimension of the transfer pricing problem arises when divisions can make upfront-specific investments that enhance the value of internal trade but have little or no value for the divisions' business with outside partners. Finding the right transfer price under these conditions is more difficult as in the standard model of Section 2 because the transfer price is not only designated for stipulating an efficient level of trade but also for providing incentives for divisional investments. Usually, there is a tension between these two roles of transfer pricing. To illustrate the problem, consider a selling division that faces the opportunity to invest in new equipment for reducing the variable cost of production. If the transfer price equals marginal cost, the division has no incentives to invest in cost reductions because it is effectively punished by the transfer pricing policy in place. If the transfer price is based on full cost instead, the division is rewarded for its investment but internal trade is distorted.

One possible solution for the example would be a two-part tariff with a marginal cost-based transfer price and an additional fixed fee for recovering the investment cost. However, the fundamental problem with specific investments is that they do not only have limited outside value, but are typically made under uncertainty and cannot be reversed. This offers the

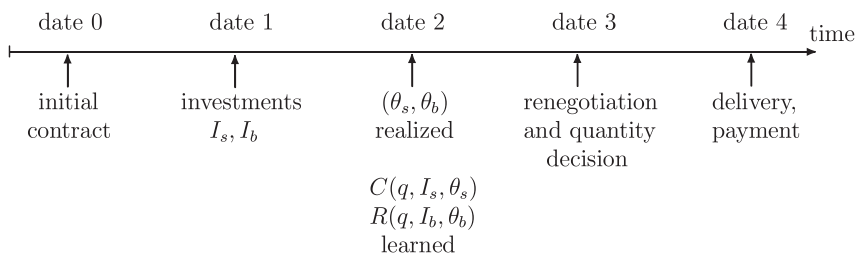


Figure 1. Time line of events.

beneficiary of the investment to renegotiate the initial terms of trade once the investor has incurred the investment expenses. The buyer could, for instance, attempt to renegotiate the fixed fee because of unexpected quality problems or an unanticipated decline in demand. This problem is known as the “hold-up” problem.<sup>12</sup> In principle, the problem could be avoided by signing a complete contract that provides specific clauses for all future events that affect the relationship between the beneficiaries of the investor. In practice, however, it is either impossible or too costly to anticipate all contingencies and to specify appropriate contract clauses for them, so that real world contracts necessarily remain incomplete.

Since contractual solutions to the hold-up problem are generally excluded, the economics literature has concentrated on solving hold-up problems between unrelated parties by the design of properties rights, or, more generally, by institutional design (Hart, 1995). In a similar vein, the transfer pricing literature has analyzed the incentives provided by alternative transfer pricing mechanism for undertaking specific divisional investment within firms.<sup>13</sup>

#### 4.2. The Edlin–Reichelstein Model

In what follows, we present a slightly modified version of the model in Edlin & Reichelstein (1995). It can be taken as the starting point for analyzing the role of transfer pricing in mitigating hold-up problems in divisionalized firms. The model extends the standard model in Section 2 by assuming that both divisions simultaneously make specific investments before internal trade takes place. More precisely, the

seller invests an amount  $I_b$  into the reduction of his production cost and the buyer invests an amount  $I_s$  in additional marketing activities for enhancing the revenue in the final product market. Thus, we consider “selfish” investments. One could also think of “cross” investments, for example, when the seller invests into product quality and thereby allows the buyers to charge higher prices in the final product market. We discuss cross investments at a later stage.

The firm’s cash flow from operations for a given vector of investments,  $I \equiv (I_b, I_s)$ , is given by the following expression:

$$M(\theta, I, q) = R(\theta_b, I_b, q) - C(\theta_s, I_s, q) \quad (14)$$

where  $\theta_b$  and  $\theta_s$  are realizations of two random variables, and  $\theta = (\theta_b, \theta_s)$  denotes the vector of the joint realizations of two random variables. The realizations of  $\theta_b$  and  $\theta_s$  are observed by both managers after investments have been made but before production takes place.<sup>14</sup> The buyer’s investment increases marginal revenue, the seller’s investment lowers marginal cost, and the objective function in eq. (14) is strictly concave in  $q$ .<sup>15</sup> The sequence of events is depicted in Fig. 1.

At date 0, the initial contract and the transfer pricing mechanism are specified. Edlin and Reichelstein propose a “fixed price–fixed quantity” contract  $(\bar{q}, \bar{T})$ , consisting of a prespecified trade quantity  $\bar{q}$  and a lump sum monetary transfer  $\bar{T}$ . At date 1, the division managers simultaneously undertake their specific investments. At date 2, the realizations of the random variables  $\theta_b$ ,  $\theta_s$ , and the chosen investment levels are observed by both managers. At date 3, the

<sup>12</sup>In economics literature the problem is discussed by Williamson (1979, 1985). In business literature it has already been discussed by Schmalenbach (1908/1909).

<sup>13</sup>Usually, the transfer pricing models within this line of research assume that the organizational structure of the firm is exogenously given. An exception is Holmström & Tirole’s (1991) study. They analyze the relation between divisional investment incentives and the organizational form.

<sup>14</sup>This is a typical assumption in this particular branch of literature. If each manager would only observe his own state variable  $\theta_j$ , HQ would face the same problem as in Section 3. See Baldenius (2000) for the analysis of a hold-up problem with asymmetric information. See Tirole (1986) and Rogerson (1992) for a closer look at hold-up problems with asymmetric information.

<sup>15</sup>Formally spoken, we assume that  $(\partial^2/\partial q \partial I_b)R(\theta_b, I_b, q) > 0$  and  $(\partial^2/\partial q \partial I_s)C(\theta_s, I_s, q) < 0$  for all  $q$ ,  $\theta_b$ ,  $\theta_s$ ,  $I_b$ , and  $I_s$ .

initial contractual arrangement is renegotiated, and the parties agree on an actual trade quantity  $\hat{q}$  and a monetary transfer  $\hat{T}$ . The ratio  $\hat{T}/\hat{q}$  can be interpreted as a negotiated transfer price.

It is assumed that HQ cannot observe  $\theta$  and  $I$ . As a consequence, HQ cannot observe the actual revenue and cost.<sup>16</sup> Moreover, it is assumed that communication about  $\theta$  and  $I$  (as considered in Section 3) is impossible because such reports cannot be verified by third parties, notably by HQ or by a court. Thus, state contingent centralized contracts infeasible. It follows that the divisions do not enter into such attempts to contractually solve the hold-up problem because the respective contracts cannot be enforced. On the other hand, it is assumed that both division managers have symmetric information about their investment levels and the state realizations before the production takes place. This assumption greatly facilitates the analysis but it is not essential for analyzing the economics of the hold-up problem.

Working backwards, the analysis of the model starts at date 3. After observing  $\theta$ , the managers renegotiate the original contract and specify the trade quantity  $\hat{q}$  and the monetary transfer  $\hat{T}$ . The managers agree to maximize the cash-flow function  $M(\theta, I, q)$  and subsequently share the joint surplus, so that the seller receives a fraction  $\gamma$  and the buyer a fraction  $(1-\gamma)$  of it.<sup>17</sup> Following standard results of more elaborated bargaining models, Edlin & Reichelstein (1995) assume that the two parties agree on the efficient quantity  $q^*(\theta, I)$ .<sup>18</sup> With  $\hat{q} = q^*(\theta, I)$ , the renegotiation surplus equals the difference between the maximum cash flow and the cash flow attainable under the initial contract:

$$RSP = M(\theta, I, q^*(\theta, I)) - M(\theta, I, \bar{q})$$

where  $q^*(\theta, I)$  denotes the efficient level of internal trade. For the transfer payment defined in the initial contract  $\hat{T}$ , the divisions realize the following cash flows at date 3:

$$M_s = \hat{T} - C(\theta_s, I_s, \bar{q}) + \gamma \cdot RSP$$

$$M_b = R(\theta_b, I_b, \bar{q}) - \hat{T} + (1 - \gamma) \cdot RSP$$

<sup>16</sup>Edlin & Reichelstein (1995) justify this assumption by the existence of “account fungibility”. Account fungibility typically arises if the divisions are also engaged in other transactions, which makes it impossible for HQ to separate the revenues and cost arising from the internal transactions.

<sup>17</sup>For  $\gamma = 1/2$  the bargaining outcome corresponds to the Nash bargaining solution.

<sup>18</sup>Although a standard result in game theoretic research this assumption is under pressure from contradictory experimental evidence. See Chalos & Haka (1990).

The new transfer payment  $\hat{T}$  is implicitly determined as the outcome of the bargaining process at date 3. At date 1, the divisions anticipate the outcome of the bargaining stage and maximize the difference between the expected cash flow at stage 3 and their investment costs,  $\Pi_j = E_\theta[M_j] - I_j$ . For simplicity, we first analyze the case where the initial trade quantity  $\bar{q}$  equals zero, which is equivalent to assuming that both divisions can refuse internal trade at date 3. With this simplification, the renegotiated surplus equals  $M(\theta, I, q^*(\theta, I))$ , and the first-order conditions for maximizing the divisional profits  $\Pi_j$  with respect to  $I_j$  are

$$\frac{\partial \Pi_s}{\partial I_s} = \gamma \cdot \frac{\partial}{\partial I_s} E_\theta[M(\theta, I, q^*(\theta, I))] - 1 = 0 \quad (15)$$

$$\frac{\partial \Pi_b}{\partial I_b} = (1 - \gamma) \cdot \frac{\partial}{\partial I_b} E_\theta[M(\theta, I, q^*(\theta, I))] - 1 = 0 \quad (16)$$

By contrast, the first best investment levels would satisfy the condition

$$\frac{\partial}{\partial I_j} E_\theta[M(\theta, I, q^*(\theta, I))] = 1 \quad (17)$$

We can therefore conclude that both parties under-invest. The buyer would only choose the efficient investment level if he would receive the full surplus ( $\gamma = 0$ ), and the seller would choose the efficient investment level if he would receive the full surplus ( $\gamma = 1$ ). For any  $\gamma \in (0, 1)$ , both investment levels are necessarily below the first best investment level.

The reason for the under-investment problem is not the renegotiation procedure *per se*. Rather, the problem arises from the fact that both parties invest and the investment return must be split between the parties via the transfer pricing system, whereas the investment costs are exclusively born by the investors. If only one division has the opportunity to invest, the hold-up problem can be easily avoided by letting the investor be the residual claimant.

### 4.3. Solutions for the Hold-Up Problem

We have seen that inefficient investments can hardly be avoided in situations where both parties have the opportunity to make specific investments. The fundamental reason for this problem is a lack of a binding *ex ante* agreement that could help the parties to overcome the hold-up problem. More generally, the provision of incentives for undertaking specific investments critically depends on the feasibility of a binding commitment to a governance structure that provides the investor with a sufficient return on his investment. In practice, firms can use internal transfer pricing guidelines for providing an institutional

environment that stipulates efficient investment and trade decisions.

However, a closer look at a problem shows that the typical transfer pricing mechanisms found in practice are generally not very helpful.<sup>19</sup> Suppose that HQ sets a transfer pricing schedule of the form  $\bar{T}(q) = \bar{t} \cdot q + \bar{\beta}$  before the investment stage, where  $\bar{t}$  is the transfer price and  $\bar{\beta}$  is a lump sum payment. Notice that  $\bar{T}(q)$  can neither depend on  $\theta$  nor on  $I$  since these variables are not contractible. After uncertainty has resolved, both parties face incentives to adjust  $T(q)$ , given their knowledge of  $\theta$  and  $I$ . They do so because the initial transfer price  $\bar{t}$  triggers inefficient trade for almost every state of nature. Therefore, both parties will likely engage in renegotiating the original transfer pricing agreement in order to realize efficiency gains.

The outcome of any renegotiation procedure critically depends on the default point, that is, the allocation that is implemented if the negotiations break down. In the context of our model, the default point is determined by the quantity that must be traded under the conditions of the original contract. Assume that HQ enforces a trade quantity of zero if renegotiation fails. We have seen in the last subsection that a trade quantity of  $\bar{q} = 0$  causes bilateral under-investment. This setting is similar to a market trading mechanism. Internal trade will only take place if the buyer and the seller reach an agreement. With  $\bar{q} = 0$  the initial transfer pricing schedule becomes meaningless because no trade will take place under the pre-specified terms. As a consequence, the seller invests efficiently only if  $\gamma = 1$  and the buyer invests efficiently only if  $\gamma = 0$ . For any other distribution of the bargaining power, both parties will under-invest.

The situation changes if HQ enforces a strictly positive default quantity  $\bar{q}$ . In particular, if  $\bar{q}$  is chosen “very large”, say  $\bar{q} \geq \sup(q^*(\theta, I))$ , both divisions have an incentive to over-invest.<sup>20</sup> At the renegotiation stage, both parties have an incentive to agree on a reduction of the initial quantity for realizing a higher surplus. If the associated gain is shared among the parties, the achieved individual incremental surplus from reducing  $q$  can be enhanced by raising the investment level. Given this threat, both divisions invest too much.

This observation breaks the path towards the solution proposed by Edlin & Reichelstein (1995). The fact that both parties under-invest for  $\bar{q} = 0$  and over-invest if  $\bar{q}$  is very large suggests that there exist

default quantities  $\bar{q}_s$  and  $\bar{q}_b$  such that the buyer and the seller invest efficiently. In general,  $\bar{q}_s$  and  $\bar{q}_b$  need not coincide, but Edlin and Reichelstein show that if the cost and the revenue function satisfy a separability condition, a unique default quantity of  $\bar{q}_s = \bar{q}_b = E(q^*(\theta, I))$  stipulates efficient investment. The Edlin–Reichelstein transfer pricing mechanism seems robust in the sense that for any distribution of the bargaining powers there exists a solution to the problem.

Not surprisingly, the study has motivated a number of model extensions. Che & Hausch (1999) generalize the Edlin–Reichelstein setting by allowing for cross investments. Assume that the revenue and the cost function are of the form  $R(\theta_b, I_s, q)$  and  $C(\theta_s, I_b, q)$ . That is, each party’s investment affects the outcome function of the other party. Suppose that an initial contract  $[\bar{q}, \bar{T}]$  is in place. Again,  $\bar{q}$  will be replaced by the efficient quantity  $q^*(\theta, I)$  at the renegotiation stage. Under the sharing rule proposed by Edlin and Reichelstein, the seller’s and the buyer’s investment decisions maximize the following objective functions:

$$\begin{aligned} \Pi_s &= \bar{T} - E_{\theta_s}[C(\theta_s, I_b, \bar{q})] \\ &\quad + \gamma \cdot E_{\theta}[M(\theta, I, q^*(\theta, I)) - M(\theta, I, \bar{q})] - I_s \end{aligned}$$

$$\begin{aligned} \Pi_b &= E_{\theta_b}[R(\theta_b, I_s, \bar{q})] - \bar{T} \\ &\quad + (1 - \gamma) \cdot E_{\theta}[M(\theta, I, q^*(\theta, I)) - M(\theta, I, \bar{q})] - I_b \end{aligned}$$

The first derivative of the seller’s objective function now reads

$$\begin{aligned} \frac{\partial \Pi_s}{\partial I_s} &= \gamma \cdot E_{\theta} \left[ \frac{\partial}{\partial I_s} R(\theta, I, q^*(\theta, I)) - \frac{\partial}{\partial I_s} R(\theta, I, \bar{q}) \right] \\ &\quad - 1 = 0 \end{aligned} \tag{18}$$

which shows that the *ex ante* contract is of no value. The same argument can be made for the seller. Che and Hausch generalize their result by invoking the revelation principle. Suppose that the seller and the buyer must make reports  $(m_s, m_b)$  about  $(\theta, I)$  before the quantity is selected. The initial quantity and the initial transfer payment are allowed to be functions of the reports. A contract is renegotiated if  $q^*(\theta, I) \neq q(m_s, m_b)$ . Che and Hausch show that there is no contract that induces the first best unless investments are sufficiently selfish.

Wielenberg (2000) assumes that the firm must install capacity along with specific investment. For understanding the intuition of Wielenberg’s model, suppose that only the seller invests. That is, the seller chooses an investment level  $I_s$  plus a capacity  $K$ . The optimal initial contract specifies a minimum quantity  $\underline{q}$  and a transfer price  $\underline{t}$ . The *minimum quantity contract* gives the buyer the obligation to buy at least a

<sup>19</sup>The following discussion is based on Hart & Moore (1988) and Rogerson (1984).

<sup>20</sup>This result goes back to Rogerson (1984).

quantity  $q$  at the prespecified transfer payment  $\bar{T}(q) = \underline{t}q + \underline{\beta}$ . In addition, the buyer may exercise an option to buy any quantity exceeding  $q$ . Taking the modified default point as a starting point, both parties renegotiate after uncertainty has resolved. For the single-sided investment scenario, there exists an initial contract  $[q, t]$  so that the seller has incentives to choose the first best investment level. The first best remains unattainable, however, if there is bilateral investment and contracts are of a similarly simple form.

These two extensions of the Edlin–Reichelstein model show that their mechanism has its limitations. In addition, one may ask why the hold-up problem is not avoided in the first place by rewarding both divisional managers on the basis of the firm-wide profit. Anttil & Dutta (1999) provide an answer for this question. In their model each divisional manager must spend additional effort to enhance profits from stand-alone operations. These activities add additional risk to the problem. If performance is evaluated on a firm-wide basis rather than on the basis of divisional profits, the additional risk of manager  $j$  is also imposed on manager  $k$  ( $j, k \in \{s, b\}$ ). Anttil and Dutta assume uncorrelated risks and risk-averse agents. Therefore, firm-wide performance evaluation may well solve the under-investment problem but only at the cost of imposing extra risk on the risk-averse managers. Anttil and Dutta conclude that the optimal compensation scheme should be based on both divisional *and* firm-wide performance measures.

Another immediate question is why Edlin and Reichelstein's model should be interpreted as one that addresses transfer pricing within a firm rather than contracting between firms. In fact, one could imagine the same contract between independent firms that are members of a supply chain. Böckem & Schiller (2004, 2005) shed light on the interpretational problem of transfer pricing versus supply chain contracting by extending the setting to three parties. Division  $s_1$  sells to a division  $s_2$  that finally sells to division  $b$ . The problem gets “bite” if the renegotiation rounds between divisions  $s_1, s_2$  and  $s_2, b$  are sequential. The additional problem then is that an agreement between  $s_1$  and  $s_2$  shifts the default point for the renegotiation procedure between  $s_2$  and  $b$ . Böckem & Schiller (2004) find that this externality tends to destroy efficiency if the Edlin–Reichelstein mechanism is used. The first best remains attainable, however, if HQ commits to a “forced compliance” regime that reinstalls the original default allocation if only one of the two renegotiation rounds has failed.

On the other hand, Böckem & Schiller (2005) show that no such crude intervention is necessary if the three parties use an “option contract”. Like the

Edlin–Reichelstein mechanism, option contracts solve the hold-up problem if there are only two parties that must incur selfish investments (see Aghion et al., 1994; Chung, 1991; Nöldeke & Schmidt, 1995). The idea is to use “renegotiation design” in order to overcome the hold-up problem. Option contracts ensure that one party has full bargaining power at the renegotiation stage but the other has the option to determine the quantity. Böckem & Schiller (2005) show that this mechanism also works in the three-party setting provided that the parties credibly stick to a specific renegotiation sequence.

The second mechanism is more complicated than the first. Returning to the initial question, evidence suggests that supply chain contracts between independent firms have much richer clauses than those within firms.<sup>21</sup> On the other hand, there is little evidence that transfer pricing codes shift the bargaining power to one of the parties. In the light of the two solutions to the three-party setting, supply chain contracts need to be more complicated between firms rather than within firms because the externalities that some chain members exert on others cannot be undone by “selective intervention” (Williamson, 1985) like the reinstallation of the default point in the setting of Böckem & Schiller (2004).

Finally, Pfeiffer (2004) considers the effect of pre-investment information in an investment-hold-up setting. He assumes that prior to the investment stage each manager receives a signal  $\eta$  that helps revising beliefs about the realization of  $\theta$ . Accordingly, the expectations about cost and revenue are contingent on  $\eta$ . Contrary to the seemingly evident intuition that a finer information system cannot be harmful, Pfeiffer shows that the information has an ambiguous effect. On the one hand it helps the decision makers to find the individually efficient investment levels, but on the other hand it fosters the hold-up problem. We conclude that the provision of preinvestment information is a subtle issue in the context of bilateral hold-up problems. Hinss et al. (2005) show that the same problem also arises with cost-based transfer pricing.

#### 4.4. The Incentive Properties of Second Best Mechanisms

The focus of the Edlin–Reichelstein model is the provision of first best solutions for the hold-up problem. A related research approach assumes the same generic model setup but restricts the available

<sup>21</sup>See Cachon (2003). Böckem & Schiller (2005) present a case where an option-contract-like mechanism is used in a supply chain.

mechanisms for solving the hold-up problem to simple transfer pricing methods that have counterparts in firms' daily transfer pricing practice. As noted above, this approach seems meaningful because it provides a better understanding of the incentive properties of existing transfer pricing methods. Subsequently, we will give some examples for this approach.<sup>22</sup>

#### 4.4.1. Transfer Pricing Based on Actual Cost

Many firms take the actual cost of production as a benchmark for determining their transfer prices. Frequently, the unit cost measures do not only contain the variable cost of production but also a markup for covering a part of the fixed overhead cost. The incentive properties of transfer prices based on the actual cost of production are considered in Sahay (2003), and in Lengsfeld, Pfeiffer & Schiller (2006). Sahay considers a one-sided hold-up problem where the seller can invest in cost reductions. From the preceding analysis it should be clear that first best investments could be achieved if the seller would become the firm owner but in practice the firm may be restricted to provide the right investment incentives by means of the transfer pricing system in place.

If the transfer price equals marginal cost, the buyer orders the efficient quantity but the seller makes no investment. This result is not surprising because with transfers at marginal cost the buyer receives all benefits and the seller gets no reimbursement for his investment cost. For triggering the seller's investment, the transfer price must exceed marginal cost.

Sahay examines various types of full-cost markups and finds that additive markups generally provide superior investment incentives to multiplicative markups. However, the downside of any markup policy is the fact that it impedes efficient trade. Thus, the firm faces a trade-off between providing the right incentives for specific investments and intrafirm trade, and the optimal markup balances the cost of inefficient trade against the cost of under-investment. Understanding this trade-off may prove to be helpful for solving real world transfer pricing problems because recommendations based on the standard model in Section 2 would solely focus on efficient trade but ignore the investment incentives of the transfer pricing method in place.

#### 4.4.2. Transfer Pricing Based on Standard Cost

In practice, transfer prices are often based on standard cost instead of actual cost. The transfer pricing literature has discussed two methods for setting cost standards, the bottom-up and the top-down approach. With a top-down standard, HQ effectively commits to a transfer price  $t_{TD}$ . If the transfer pricing method is determined before investment takes place, it stipulates efficient investment. To see the intuition of this result, consider a slightly modified version of the Edlin–Reichelstein model. With a standard-cost-based transfer price fixed at date 0, and a given transfer quantity  $q(t_{TD}, I)$ , the seller's divisional profit for a given transfer quantity  $q(\theta, I)$  at date 1 equals

$$\Pi_s = t_{TD} \cdot q - E_\theta[C(\theta_s, I_s, q(t_{TD}, I))] - I_s$$

Maximizing  $\Pi_s$  with respect to  $I_s$  yields

$$-\frac{\partial}{\partial I_s} E_\theta[C(\theta_s, I_s, q(t_{TD}, I))] = 1$$

This expression is equivalent to the first best solution in eq. (17) if the expected production quantity equals  $q(t_{TD}, I) = E_\theta[q^*(\theta, I)]$ . For implementing this quantity, it suffices to set the transfer price equal to the expected marginal cost.<sup>23</sup> However, as for actual-cost-based transfer pricing, this method is coupled with distorted trade incentives. The reason is that  $q(t_{TD}, I)$  is fixed before the managers observe the state variables  $\theta_s$  and  $\theta_b$ . Accordingly, the trade quantity cannot be adjusted to the actual production and demand conditions and will therefore necessarily be inefficient (Lengsfeld, Pfeiffer & Schiller, 2006).

With a bottom-up standard, the seller sets the cost standard. In particular, Baldenius et al. (1999) assume that the seller quotes a unit cost  $t_{BU}$ , and the buyer decides on the quantity  $q(t_{BU})$  to be traded at the price quoted by the seller. Effectively, this method puts the seller into the position of a monopolist if the cost report is not verifiable. As for the top-down standard and for actual costing, the firm faces a trade-off between distorted trade and inefficient investments. The higher the monopoly markup, the stronger the seller's investment, and the weaker the buyer's trade incentives. The major difference between the bottom-up standard and actual costing is the way in which the markup is determined. In the decentralized setting information about the realization of the state variables enters the markup whereas

<sup>22</sup>The examples have in common that they investigate several alternative ways to find a transfer price. Of course, transfer pricing could also be compared against other methods of surplus sharing. For example, Chwolka & Simons (2003) compare profit sharing, revenue sharing, and transfer pricing in a setting with cross investments.

<sup>23</sup>Essentially, the cost-based transfer pricing mechanism acts like a fixed price–fixed quantity contract as in Edlin & Reichelstein (1995). In their paper cost-based transfer pricing is excluded because HQ cannot observe the divisions' cost and revenue functions.

under actual costing the markup is determined *ex ante* by HQ.

#### 4.4.3. Comparative Analysis of Different Transfer Pricing Methods

The natural continuation of the research approach discussed above is a comparison of the incentive properties of several transfer pricing mechanisms for a given institutional setting. In this vein Baldenius et al. (1999) compare decentralized standard-cost-based transfer pricing with negotiated transfer pricing. They find that negotiated transfer pricing frequently performs better than standard-cost-based transfer pricing. The result holds for two-sided investment problems with equally distributed bargaining power as well as for one-sided investments of the buyer.

For example, in settings where only the seller invests, decentralized standard-cost-based transfer pricing avoids the hold-up problem but suffers from inefficient trade incentives because the seller acts like a monopolist when setting the transfer price. Baldenius, Reichelstein, and Sahay find that the cost of the trade distortion is often higher than the benefits from the sellers' investment incentives.

Lengsfeld, Pfeiffer & Schiller (2006) compare three cost-based transfer pricing methods, namely, actual-cost-based transfer pricing and the two standard-cost-based mechanisms discussed above. They consider a scenario with two-sided investments where the buyer's revenue function is common knowledge but the seller's cost function subject to random shocks. If the transfer pricing system can be changed at no cost, the bottom-up version of standard-cost-based transfer pricing is always dominated by the actual-cost-based method. Moreover, transfer prices based on actual costs are also superior to those determined by the top-down standard if the cost uncertainty is substantial. The reason is that transfer prices based on actual costs take cost shocks into account whereas the top-down standard does not respond to random events. As argued above, efficient trade can generally only be stipulated in the first but not in the latter case. Finally, the preferability of the transfer pricing methods also depends on the cost of the costing system in place. Even the bottom-up method of standard costing may be preferable if the costing system that is needed for firm-wide actual costing is much more expensive.

## 5. Strategic Transfer Pricing

### 5.1. Observable Transfer Prices as a Commitment Device

In the basic model of Section 2, transfer pricing serves primarily as an internal coordination device for the

profit center organization. However, if the manager of the buying division is responsible for product pricing, the transfer price also affects the product price in the downstream market because it determines the marginal cost of the buyer. Unless the firm is a price taker, the product price usually increases with the transfer price.

The interrelation between transfer prices and product prices becomes particularly important in downstream markets with a small number of competitors who react on each other's price changes. Alles & Datar (1998) and Göx (2000) consider extensions of the standard model where the downstream market is served by a symmetric duopoly with price competition. They find that both firms can increase their profits by strategically setting the transfer prices above the marginal cost of the intermediate product.<sup>24</sup> Faced with the increased transfer price, the managers of the downstream divisions charge higher prices in the final product market as compared to a centralized firm that sets prices on the basis of marginal cost. In Alles & Datar (1998) and Göx (2000), strategic transfer pricing effectively serves as a commitment device vis-à-vis the competitor. It reduces the intensity of competition in the final product market and yields profits that would otherwise only be attainable if the firms would collude.

To illustrate the idea of strategic transfer pricing, we assume the same model setup as in Section 2 except for the fact that there are two divisionalized firms competing in prices in the downstream market. The firms sell differentiated products, that is, the products are substitutes but not identical. The demand for the final product of firm  $i$ ,  $i = 1, 2$ , is given by the demand function  $q_i(p_i, p_j)$ , where  $p_i$  and  $p_j$  are the prices of firms  $i$  and  $j$ .<sup>25</sup>

As a benchmark case, we first consider the simultaneous pricing game between two centralized firms. Both firms maximize their aggregate firm profit  $\Pi_i(p_i, p_j) = R(q_i(p_i, p_j)) - C(q_i(p_i, p_j))$  with respect to  $p_i$ , and the equilibrium prices in the final product market are determined by solving the following pair of first-order conditions with respect to  $p_1$  and  $p_2$ :

$$\frac{\partial \Pi_i(p_i, p_j)}{\partial p_i} = \left( \frac{\partial R_i}{\partial q_i} - \frac{\partial C_i}{\partial q_i} \right) \cdot \frac{\partial q_i}{\partial p_i} = 0 \quad i, j \in \{1, 2\}, i \neq j \quad (19)$$

<sup>24</sup>Quantity competition generally provides incentives for setting transfer prices below marginal cost. See Göx (1999) for a general analysis of strategic transfer pricing with quantity and price competition.

<sup>25</sup>The fact that products are weak substitutes implies that  $\partial q_i / \partial p_i < 0$  and  $\partial q_i / \partial p_j > 0$ .

We have seen in Section 2 that the same solution would be obtained in a decentralized firm if both firms set their transfer prices equal to the marginal cost of the intermediate product.

However, strategic transfer pricing works differently. Assume that both firms can commit to a certain transfer pricing policy before the managers of the downstream divisions select their pricing strategies for the final product. With this assumption, the firms' profit maximization problems become a two-stage game with perfect information. On the first stage of the game both firms' HQ simultaneously set the transfer prices  $t_i$  and  $t_j$ . Both managers observe the outcome of the first-stage game and simultaneously determine their pricing strategies on stage two.

The solution of the two-stage game is obtained by backward induction starting with the managers' pricing decisions on stage two. The manager of division  $b_i$  (i.e., division  $b$  in firm  $i$ ) maximizes his divisional profit function  $\Pi_i^b(p_i, p_j) = R(q_i(p_i, p_j)) - t_i \cdot q_i(p_i, p_j)$  with respect to his own price  $p_i$  for a given price  $p_j$ . The resulting pair of first-order conditions

$$\frac{\partial \Pi_i^b(p_i, p_j)}{\partial p_i} = \left( \frac{\partial R_i}{\partial q_i} - t_i \right) \cdot \frac{\partial q_i}{\partial p_i} = 0, \quad i, j \in \{1, 2\}, i \neq j \quad (20)$$

implicitly defines the Nash equilibrium,  $(p_1^*, p_2^*)$ , of the second stage game. Because the optimal price of firm  $i$  depends on the transfer price  $t_i$  and transfer prices are observable, the equilibrium prices of the second-stage game can be expressed as functions of both firms' transfer prices, that is, the equilibrium price of firm  $i$  can be written as  $p_i^*(t_i, t_j)$ . Thus, the transfer price  $t_i$  affects the product price  $p_j$  although the profit of division  $b_j$  does not directly depend on  $t_i$ . To see this, consider a small increase of  $t_i$ . The manager of division  $b_i$  raises the product price  $p_i$  because his marginal cost curve is shifting upwards. The manager of division  $b_j$  does not directly respond to the change of  $t_i$  but reacts on the price change of his competitor and raises  $p_j$  as well. In particular, it can be shown that  $p_i^*$  is generally increasing in  $t_i$  and  $t_j$ .<sup>26</sup>

On stage one, both HQ anticipate that the equilibrium strategies of the second-stage game are increasing functions of the transfer prices. They maximize the aggregate firm profit  $\Pi_i^*(t_i, t_j) = \Pi_i(p_i^*(t_i, t_j), p_j^*(t_i, t_j))$  with respect to their own transfer price  $t_i$ . The notation  $\Pi_i^*(t_i, t_j)$  for the equilibrium profit of firm  $i$  emphasizes that not only the equilibrium prices but also the

equilibrium profits of both firms are functions of the transfer prices  $t_i$  and  $t_j$  from the perspective of the firms' HQs. Differentiating the total profit  $\Pi_i^*$  with respect to the transfer price  $t_i$  yields the necessary conditions for a Nash equilibrium of the first-stage game:

$$\frac{\partial \Pi_i^*(t_i, t_j)}{\partial t_i} = \frac{\partial \Pi_i^*}{\partial p_i} \frac{\partial p_i^*}{\partial t_i} + \frac{\partial \Pi_i^*}{\partial p_j} \frac{\partial p_j^*}{\partial t_i} = 0, \quad i, j \in \{1, 2\}, i \neq j \quad (21)$$

To determine the equilibrium transfer price, we first evaluate the sign of  $\partial \Pi_i^*(t_i, t_j) / \partial t_i$  for a transfer price equal to the marginal cost of the intermediate product. From eq. (19) the first term in eq. (21) equals zero for  $t_i = C'_i$ . The second term in eq. (21) represents the strategic effect of transfer pricing. It is positive because products are substitutes and  $p_j^*$  is increasing in  $t_i$ . We conclude that the optimal transfer prices exceed the marginal cost of the intermediate products. Accordingly, the equilibrium prices and profits in a duopoly with two decentralized firms are higher than with two centralized firms. A graphical analysis of the strategic transfer pricing equilibrium for the case of a linear demand system is depicted in Fig. 2.

The analysis starts at point  $N$ , the Nash equilibrium under centralized decision-making. It is determined by the intersection of the reaction functions  $p^*(p_2, C')$  and  $p_2^*(p_1, C')$ . These reaction functions would coincide with those of the division managers' when the intermediate product would be transferred at marginal cost. The corresponding equilibrium profits are given by the isoprofit curves  $\pi_1^N$  and  $\pi_2^N$ , respectively. When both HQs set their transfer pricing strategically, the managers' reaction functions are shifted away from the origin to the new equilibrium point  $D$ . The new equilibrium is determined by the intersection of the reaction functions  $p_1^*(p_2, t_1^*)$  and  $p_2^*(p_1, t_2^*)$  with both firms charging higher prices than in the original equilibrium, and attaining higher profits which are depicted by the isoprofit curves  $\pi_1^D$  and  $\pi_2^D$ .

### 5.2. Unobservable Transfer Prices and Alternative Commitment Devices

The preceding analysis rests on the assumption that the managers observe their competitor's transfer price before deciding on their pricing strategies for the final product. If this condition is not met, transfer pricing has no strategic effect because the division managers cannot react to something that they do not observe. Formally spoken, if the manager of division  $b_j$  does not know  $t_i$ , the term  $\partial p_j^* / \partial t_i$  in eq. (21) equals zero so that the strategic effect vanishes. Without the strategic effect, however, the equilibrium condition of

<sup>26</sup>See Göx (2000) for a formal proof. In general, this property stems from the fact that prices are strategic complements (see Bulow et al., 1985).



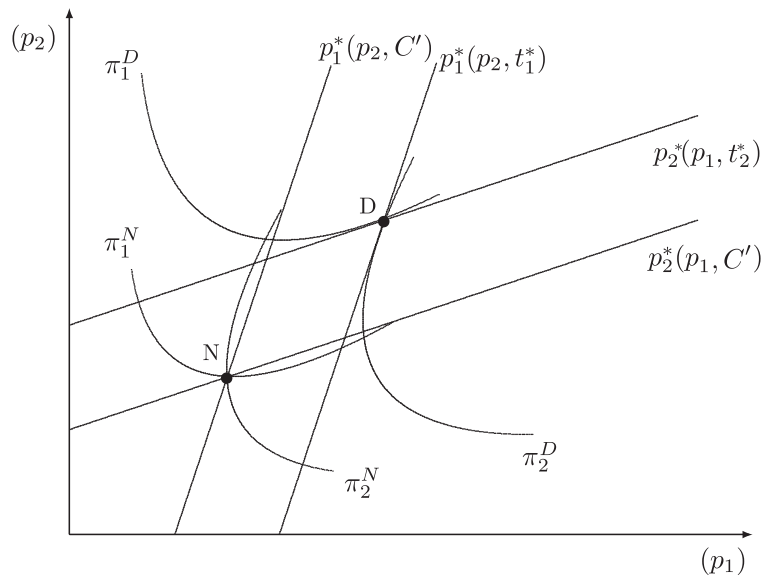


Figure 2. Strategic transfer pricing equilibrium.

the two-stage game in eq. (21) is identical to the equilibrium condition of the simultaneous game in eq. (19) and the optimal transfer price equals the marginal cost of the intermediate product.

This conceptual problem applies to all types of strategic delegation games.<sup>27</sup> Well-known examples are the models of Spencer & Brander (1982), Vickers (1985), Fershtman & Judd (1987), and Sklivas (1987), who analyze the role of incentive contracts as credible precommitments, or the papers of Gal-Or (1993), and Hughes & Kao (1997), who analyze the strategic role of cost allocations. According to Katz (1991) unobservable contracts can only serve as credible precommitments if they are employed for other than strategic reasons. Bagwell (1995) shows that Katz's result even extends to situations where both firms observe noisy signals about the other firm's incentive contract, no matter how small uncertainty becomes. The reason for Bagwell's result is that the signal plays no strategic role. As a straightforward extension of work by Maggi (1999), the strategic effect is reinstated if there is asymmetric information about the firms' production cost. In such circumstances, the signal about the transfer price is also a signal about rival's cost. Then, distorting the signal by biasing the transfer price has strategic value.

Narayanan & Smith (2000) use Maggi's insight and analyze the transfer pricing policy in a duopoly that operates in different tax jurisdictions. They find that international tax rate differentials are sufficient for signalling transfer prices deviating from marginal cost. Moreover, Göx & Schöndube (2004) analyze strategic transfer pricing with risk- and effort-averse managers and find that the existence of an agency problem is sufficient to signal the competitor the use of transfer prices above marginal cost.

The general point behind these extensions is that the causes for deviating from a transfer price equal to marginal cost must be common knowledge. From a managerial perspective an important example for credibly signalling a certain transfer pricing policy is the commitment to a particular cost accounting system. Choosing an accounting system is typically a long-term commitment because its introduction requires substantial investments in software, consulting services, and employee training. Once the system is installed, it is costly to change and it is very likely that the type of costing system in place becomes common knowledge among the firms working in the same industry.

The following modification of the strategic transfer pricing model illustrates the argument. Suppose that the two competitors must commit to an accounting system before they determine their product prices. There are two alternative cost systems: full costing and variable costing. With variable costing, all products and services are valued at marginal cost. With full costing, all manufacturing costs, including direct

<sup>27</sup>The idea that delegation can serve as a commitment device actually goes back to the recent Nobel laureate Thomas Schelling (1960).

firm 1/firm 2	variable costing	full costing
variable costing	$\Pi_1(p_1^v, p_2^v)$ $\Pi_2(p_1^v, p_2^v)$	$\Pi_1(p_1^v, p_2^f)$ $\Pi_2(p_1^v, p_2^f)$
full costing	$\Pi_1(p_1^f, p_2^v)$ $\Pi_2(p_1^f, p_2^v)$	$\Pi_1(p_1^f, p_2^f)$ $\Pi_2(p_1^f, p_2^f)$

Figure 3. Costing system choice game.

materials, direct labor, and the total amount of (fixed and variable) manufacturing overhead cost are allocated to the firm's products and services.

The transfer prices are determined by the costing system in place, that is, the firms do not set their transfer prices strategically but they compute them mechanically according to the allocation rules defined by the costing system. Accordingly, the transfer prices under full costing are higher than under variable costing. Because the transfer prices are determined by the costing system, the managers of the downstream divisions are able to anticipate the price policy of their competitor even if they cannot directly observe the transfer price. It suffices to know the costing system in place for anticipating that the price with full costing is higher than with variable costing. Figure 3 depicts the costing system choice game between the two firms.

For a given costing system  $cs \in \{v, f\}$ , the expected profits of firm  $i$  depend on its own price  $p_i^{cs}$ , and the anticipated price of firm  $j$ ,  $p_j^{cs}$ . The superscripts denote the costing system in place:  $v$  for variable costing, and  $f$  for full costing. The game in Figure 3 can have various equilibria, depending on the magnitude of the transfer prices under full costing and the resulting product prices. In particular, it can be shown that symmetric full costing is a dominant strategy equilibrium if the full-cost-based transfer prices are located in a certain range around the optimal strategic transfer prices defined in eq. (21). If the markups on transfer prices under full costing become very large, however, both firms strictly prefer marginal costing.<sup>28</sup>

The example shows that the use of full-cost-based transfer prices can be a rational decision, and thereby provides one possible theoretical explanation for empirical observable transfer pricing practices that

cannot be explained by the standard model.<sup>29</sup> There is a qualitative difference between this result and the insight derived from the adverse selection model in Section 3. In Vaysman's model, the cost plus transfer price is just another way for implementing the second best solution that could also be achieved by a direct revelation mechanism (as long as communication is not limited). In the strategic delegation game the firms have a strict preference for full-cost-based transfer pricing because the outcome of the strategic delegation game cannot be replicated by a centralized allocation mechanism. Therefore, the strategic transfer pricing literature provides an economic rationale for the profit center organization.<sup>30</sup> The literature also shows that transfer pricing has strategic implications even if the strategic rationale is not the principal reason for establishing a profit center organization. These effects should carefully be considered when a firm decides on its internal transfer pricing guidelines and on alternative transfer pricing methods.

## 6. International Transfer Pricing

So far, this survey has concentrated on the managerial aspects of transfer pricing. In practice, however, a major determinant for the choice of transfer pricing methods is taxes. According to a recent survey conducted by Ernst & Young (2005a) more than 90% of the surveyed multinational companies find transfer pricing important, and the corporate tax directors of the companies named transfer pricing as the most important item on their agendas. The reason is that international tax authorities have become

<sup>28</sup>See Göx (2000) for further details and a formal proof. A numerical example with linear demand functions can be found in Göx & Wagenhofer (forthcoming).

<sup>29</sup>Another explanation for full-cost-based transfer pricing may be derived from the literature on capacity planning and pricing under uncertainty. See Banker & Hughes (1994), Balakrishnan & Sivaramakrishnan (2002), Budde & Göx (1999), and Göx (2001, 2002).

<sup>30</sup>See Göx & Schöndube (2004) for a detailed analysis of this argument.

increasingly aware of the possible use of transfer prices as a device for shifting profits into low tax jurisdictions. In recent years, a large number of countries have therefore released special legislation and documentation rules for international transfer prices.<sup>31</sup>

To illustrate the tax incentives in transfer pricing, suppose that the selling division is situated in country *S* and the buying division in country *B*. The two countries have different tax rates, denoted by  $\tau_S \in [0, 1)$  and  $\tau_B \in [0, 1)$ , respectively. If country *B* is a tax heaven and *S* a tax hell ( $\tau_B < \tau_S$ ), the firm has an incentive to shift profits from country *S* to country *B* by choosing a low transfer price so that the largest possible fraction of the firm's global profit is taxed in the low tax jurisdiction. If  $\tau_B > \tau_S$ , the tax incentives are reversed and the firm chooses the highest possible transfer price for shifting global profits to country *S*.

To discourage tax shifting activities by multinational firms, most countries have agreed on following the OECD taxation agreements that are based on the OECD "Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations". The fundamental principle in the OECD guidelines is the arm's length principle. It is stated in Article 9 of the OECD Model Tax Convention and reads as follows:

[When] conditions are made or imposed between ... two [associated] enterprises in their commercial or financial relations which differ from those which would be made between independent enterprises, then any profits which would, but for those conditions, have accrued to one of the enterprises, but, by reason of those conditions, have not so accrued, may be included in the profits of that enterprise and taxed accordingly (OECD, 2001).

Put differently, transfer prices should equal the prices that would have been agreed upon between two independent firms for comparable transactions in comparable circumstances. These qualifications make clear that firms have substantial leeway in determining their prices because in most cases comparable transactions are not easily identified except for perfectly competitive commodity markets. Here, the recommendation of the arm's length principle coincides perfectly with the Hirshleifer model. Setting the transfer price equal to the market price meets the arm's length condition and leads to an efficient allocation of resources.

However, as we have demonstrated in Section 2, Hirshleifer's efficiency result is limited to the perfect

intermediate market assumption. If this condition is not met, transfers should take place at marginal cost. Thus, applying the arm's length principle with imperfect market conditions may significantly distort the resource allocation if the firm uses the same transfer price for tax and managerial purposes.<sup>32</sup> In principle, this problem can be solved if the firm uses "two sets of books". That is, the firm uses different transfer prices for managerial purposes from those reported for tax purposes. This method allows the firm to solve the resource allocation problem independent of the profit allocation problem. By contrast, with "one set of books" there will usually be a tension between managerial and tax motives of transfer pricing.<sup>33</sup>

We first consider the case where the firm uses one set of books, and adopt the assumptions of the standard model without an intermediate market. For simplicity, we assume a linear cost function and introduce the parameter  $\Delta_\tau = \tau_B - \tau_S$  for the tax difference between the two countries. If  $\Delta_\tau > 0$  ( $\Delta_\tau < 0$ ), the tax rate in country *B* is higher (lower) than in country *S*. With this assumptions the divisional after tax profits are

$$\begin{aligned}\Pi_s &= (1 - \tau_S) \cdot (t - c) \cdot q, \quad \text{and} \\ \Pi_b &= (1 - \tau_s - \Delta_\tau) \cdot (R_b(q) - t \cdot q)\end{aligned}$$

and the global profit after taxes equals

$$\Pi = (1 - \tau_S - \Delta_\tau) \cdot [R(q) - c \cdot q] + \Delta_\tau \cdot (t - c) \cdot q \quad (22)$$

Following Samuelson (1982), we assume that the firm aims to maximize global after-tax profits subject to an arm's length constraint restricting the firm to choose its transfer price from the interval  $c \leq t \leq \bar{p}$ , where *c* is marginal cost and  $\bar{p}$  is some exogenously given price limit, possibly derived from the firm's price in the final product market. Intuitively, the constraint limits the firm to rational transactions. No firm would sell its products below marginal cost and  $\bar{p}$  must be lower than the market price of the final product because it would also be deemed as unreasonable if outside customers would pay less than insiders.

In what follows, we first analyze the optimal policy of a centralized firm. Maximizing the profit function

<sup>32</sup>Other complications arise if the firm faces price regulations in its intermediate and/or final product markets. See Wündisch (2003) for details.

<sup>33</sup>Related evidence conducted by Borkowski (1990), Harris (1993), and Jacob (1996) suggests that there is also a tension between international transfer pricing and the firm's incentive system.

<sup>31</sup>See Ernst & Young (2005a, b) for details.

in eq. (22) with respect to  $t$  shows that the profit maximizing transfer price is determined by the sign of tax difference. In particular, because  $\partial\Pi/\partial t = \Delta_\tau \cdot q$ , the optimal transfer price equals

$$t^* = \begin{cases} c & \text{if } \Delta_\tau = \tau_B - \tau_S < 0 \\ \bar{p} & \text{if } \Delta_\tau = \tau_B - \tau_S > 0 \end{cases} \quad (23)$$

for any quantity  $q$ . The solution in eq. (23) suggests that the transfer price is solely determined by tax considerations. If  $\tau_B < \tau_S$ , the optimal transfer price equals marginal cost, so that the largest possible profit share is left in country  $B$ . If  $\tau_B > \tau_S$ , the optimal transfer price equals  $\bar{p}$ , so that the major part of the firm profit is shifted to country  $S$ . From HQ's perspective, the profit maximizing quantity is determined by the following first-order condition:

$$\frac{\partial\Pi}{\partial q} = (1 - \tau_S - \Delta_\tau) \left( \frac{\partial R(q)}{\partial q} - c \right) + \Delta_\tau \cdot (t - c) = 0 \quad (24)$$

We consider two cases. If  $t^* = c$ , the quantity decision is not affected by the tax difference. The last term in eq. (24) drops out, and the optimal quantity is found by equating marginal revenue with marginal cost. If  $t^* = \bar{p}$ , the last term in eq. (24) is positive, so that the optimal quantity is biased upwards because every unit that is transferred from country  $B$  to country  $S$  increases the firm's marginal revenue after taxes by the factor  $\Delta_\tau \cdot (t - c)$ .

To illustrate the tension between managerial and tax incentives, we contrast the optimal quantity decision of HQ with the profit maximizing quantity of division  $b$ . Differentiating  $\Pi_b$  with respect to  $q$  yields

$$\frac{\partial\Pi_b}{\partial q} = (1 - \tau_S - \Delta_\tau) \cdot \left( \frac{\partial R(q)}{\partial q} - t \right) \quad (25)$$

Comparing the conditions in eqs. (24) and (25) shows that for  $\tau_B < \tau_S$ , or equivalently for  $t^* = c$ , there is generally no conflict between the managerial and the tax objectives of transfer pricing. Transferring the intermediate product at marginal cost provides incentives for goal-congruent decentralized decision-making, and at the same time minimizes the firm's tax burden. If  $\tau_B > \tau_S$ , a conflict between the two objectives of transfer pricing arises. Minimizing the global tax bill calls for setting  $t^* = \bar{p}$ , but for the tax minimizing transfer price the manager of division  $b$  sells an inefficiently low quantity.<sup>34</sup>

<sup>34</sup>Formally, this can be seen by evaluating HQ's first-order condition in eq. (24) for  $q(\bar{p})$ . The derivative yields  $(1 - \tau_S)(\bar{p} - c) > 0$ .

As long as unlimited communication between HQ and the divisions is possible, the conflicting role of the transfer price is not a serious concern for the firm. It suffices to set the transfer price as to minimize the tax bill and to instruct the divisions to implement the profit maximizing production and sales policy. In other words, the transfer price is reduced to its tax shifting function and plays no role in coordinating the intrafirm resource allocation.

In principle, the managerial function of transfer pricing can be restored if the firm uses two sets of books as in Baldenius et al. (2004). In particular, if the firm uses the internal transfer price  $t_m$  for managerial purposes, and the external transfer price  $t_e$  for tax purposes, the divisional contributions to global after tax profits become

$$\Pi_s = (t_m - c) \cdot q - \tau_S \cdot (t_e - c) \cdot q$$

and

$$\Pi_b = (R(q) - t_m \cdot q) - (\tau_S + \Delta_\tau) \cdot (R(q) - t_e \cdot q)$$

Both profit functions consist of two terms. The first term is the profit before taxes and the second term is the division's tax burden. The profit before taxes is determined by the managerial transfer price  $t_m$ , and the tax bill is determined by the external transfer price  $t_e$ . Adding both terms yields the total firm profit after taxes

$$\Pi = (1 - \tau_S - \Delta_\tau) \cdot [R(q) - c \cdot q] + \Delta_\tau \cdot (t_e - c) \cdot q$$

Comparing this expression with the profit function in eq. (22) shows that the overall firm profit is not affected by the introduction of a second transfer price for managerial purposes. Accordingly, the optimal transfer price for tax purposes  $t_e^*$  is given by eq. (23), and the optimal quantity is determined by eq. (24). By contrast, the buying division's first-order condition for profit maximization becomes

$$\frac{\partial\Pi_b}{\partial q} = (1 - \tau_S - \Delta_\tau) \cdot \frac{\partial R(q)}{\partial q} - t_m + (\tau_S + \Delta_\tau) \cdot t_e = 0 \quad (26)$$

The expression differs from eq. (25) because the external transfer price forces that manager to internalize the tax effect of his quantity choice. Straightforward algebra shows that it suffices to set the managerial transfer price equal to

$$t_m = c + \tau_S \cdot (t_e - c)$$

for stipulating an efficient quantity choice at the divisional level. As above,  $t_m^* = c$  if  $t_e^* = c$  but for the interesting case of  $t_e^* = \bar{p}$ , the optimal managerial transfer price exceeds marginal cost. We can therefore conclude that even if the firm uses two sets of

books, the results of the basic transfer pricing model in Section 2 need no longer hold. The reason is that the managers' performance is evaluated on the basis of his contribution to the world wide after tax profit. If we assume, by contrast, that managerial performance would be evaluated on the basis of the division's profit contribution before taxes, a managerial transfer price of

$$t_m = c - \frac{\Delta_\tau \cdot (t_e - c)}{(1 - \tau_S - \Delta_\tau)}$$

would assure goal congruence between HQ and division *b*. Note that in the case where the managerial and the tax incentives differ ( $t_e^* = \bar{p}$ ), the optimal managerial transfer price is even set below marginal cost because otherwise the manager would ignore the positive tax effect of his quantity decision and select an inefficiently low quantity.

We conclude that even with two sets of books internal and external transfer prices must generally be determined simultaneously. A natural procedure would consist of first determining the tax minimizing transfer pricing strategy and subsequently deriving the appropriate managerial transfer prices. Additional complications arise if the transfer price limits are endogenous (Samuelson, 1982), if the firms can make specific investments before transfers take place (Bastian Johnson, 2006; Sansing, 1999; Smith, 2002a), or if the intermediate product is sold in a separate market with imperfect market conditions (Baldenius et al., 2004). In the latter case the efficient managerial transfer price equals marginal cost as we have seen in Section 2. In a world with taxes, however, compliance with the arm's length principle may force the firm to derive the tax-based transfer price from the intermediate market price. Intuitively this additional restriction limits the firm's potential for tax shifting, particularly if  $t_e^* = c$ .<sup>35</sup>

Related research has analyzed the interrelation between tax based and strategic transfer pricing by assuming a single transfer price and price competition in the downstream market.<sup>36</sup> If  $\Delta_\tau > 0$  the tax shifting incentive and the strategic effect are working into the same direction. If  $\Delta_\tau < 0$  the strategic effect contradicts the tax effect, so that the optimal transfer price is lower than the strategic transfer price in a world without taxes. Korn & Lengsfeld (2004) discuss the

consequences of violating the arm's length constraint. They assume that the expected fine is increasing in the difference between the transfer price and the market price. Assuming quantity competition in the final product market, they show that an increasing likelihood of a tax penalty in country *S* may simultaneously increase the firms' profits and the tax revenue in both countries. However, as in all strategic transfer pricing models, the result critically depends on the nature of competition in the final product market.

The above analysis clearly suggests that firm profits are usually higher with two than with one set of books because restricting the transfer pricing policy to one single price for tax and managerial purposes is equivalent to voluntarily constraining the set of possible solutions for the firm's profit maximization problem. However, recent survey results suggest that a non-negligible number of firms uses only one set of books. In particular, Ernst & Young (2003) report that over 80% of the parent companies in their firm sample use the same transfer prices for both managerial and tax purposes. By contrast, Springsteel (1999) reports that 77% of the firms within a "best practice group" use different transfer prices for the two purposes. The mixed evidence may be explained by the additional administrative expenses and the increased likelihood of a tax audit,<sup>37</sup> or by a lack of internal acceptance for a dual set of prices.<sup>38</sup>

## 7. Achievements and Directions for Further Research

The starting point of this survey was a discussion of Hirshleifer's standard transfer pricing model and its well-known shortcomings. It seems natural to evaluate the achievements of the proposed model extensions in the light of the observations made at the outset. The first observation was that Hirshleifer's analysis cannot explain the use of various transfer pricing methods in practice. The second, and more fundamental observation was that the model does not provide a convincing theory of decentralization because coordinating a divisionalized firm by means of transfer pricing offers no visible advantage over a centralized organization with mandated trade.

Our general impression is that much more progress has been made with respect to the first issue than with

<sup>35</sup>Baldenius et al. (2004) restrict their analysis to the case where  $t_e^* = \bar{p}$ . This assumption explains why they find that the firm benefits from intracompany discounts if it uses the same transfer price for tax and managerial purposes.

<sup>36</sup>See Schjelderup & Sorgard (1997) or Narayanan & Smith (2000).

<sup>37</sup>See for example, Kant (1988), Smith (2002b), or Choe & Hyde (2004).

<sup>38</sup>Similar arguments can be made against an earlier idea of Ronen & McKinney (1970) who propose the use of different transfer prices for the buying and the selling division in the context of a managerial transfer pricing model.

respect to the second one. In particular, all model extensions provide at least one economic reason for deviating from Hirshleifer's marginal cost principle. Adverse selection models justify the use of cost mark-ups by the need for granting information rents to better-informed managers. Incomplete contracting models support the use of negotiated transfer pricing as well as various forms of cost-based transfer pricing for stipulating efficient divisional investments. Strategic transfer pricing models explain the use of transfer prices based on full cost by their ability of committing managers to more aggressive pricing strategies. Finally, international transfer pricing models may favor a deviation from transfer prices based on marginal cost for shifting taxes into low-tax jurisdictions.

These results offer a sufficiently large number of explanations for the wide variety of transfer pricing methods in use but they also show that it is impossible to give a general recommendation about "the" best transfer pricing method, except for the rather theoretical case of a perfectly competitive intermediate market. Moreover, the variety and sometimes contradicting nature of theoretical results derived under fundamentally different sets of assumptions makes it even difficult to come up with a well-founded recommendation of "the right" transfer pricing method for a given resource allocation problem. At the same time these results underscore the importance of consistent and comparable definitions of the proposed transfer pricing methods. Otherwise both, the normative implications of the research and the relevance for the general understanding of existing transfer pricing methods, remains limited. For instance, there is no unique and general definition of "the" cost-based transfer pricing method and as long as different papers use the same labels for differently defined transfer procedures, the insights of this research can hardly be generalized.

By contrast, a closed theory of decentralization is largely missing. The models under review assume rather than derive organizational structures and can only establish a need for decentralization if contracting or communication is limited. Strategic transfer pricing models explicitly provide an economic argument for decentralization but the strategic advantages arise only under restrictive informational assumptions, and even if these assumptions are met, other commitment devices may be used for serving the same purpose.

We conclude that the economic transfer pricing research certainly helps to understand the economic consequences of using a particular transfer pricing method for a carefully selected set of assumptions,

and to evaluate the relative usefulness of alternative transfer pricing methods for this environment. One promising path for future theoretical research consists of combining certain aspects of different model classes for arriving at more generalizable results. A good example for this research strategy is combined analyses of tax and managerial aspects of transfer pricing as discussed in Section 6.

Despite its normative aspect this direction of future theoretical research also opens the way to future empirical studies. There is an obvious need for more theory-guided empirical work. The mixed empirical results with respect to the use of different transfer prices for tax and managerial purposes serve as an excellent example of an empirical puzzle. It would be of great interest to identify the factors that drive these contradictory results. Further theoretical research may help in deriving testable predictions not only for international transfer pricing research but also for questions related to the pure managerial use of transfer prices.

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# A Review of the Literature on Capital Budgeting and Investment Appraisal: Past, Present, and Future Musings

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**Abstract:** This chapter provides a historical appraisal of the development of current capital budgeting practices and reviews capital budgeting academic research. In the late eighteenth and early nineteenth centuries, the industrial revolution was instrumental in creating demand for capital budgeting processes and techniques. Academic research, beginning in the late 1940s and early 1950s, is categorized by its focus on appraisal techniques, individual decision-maker effects, organizational issues, and environmental factors. Experimental, analytical, agency-based, survey-based, and case-based research is reviewed. The chapter concludes with a compilation of issues identified by academic research and a set of questions that have not yet been addressed.

## 1. Introduction

In 1782, when Josiah Wedgwood first placed an order for James Watt's 10-hp rotative steam engine for his manufactory at Etruria, he had not computed the net present value of the cash flow over the life of the engine nor did he know the internal rate of return (IRR). He did, however, detail the tasks he expected of Watt's engine, which can be summarized as to grind flint, to grind enamel colours, to operate a stamper or crusher for saggars, and to temper or mix clays (Shaw, 1798–1801). The introduction of steam power had a significant effect on the Wedgwood pottery production. All the preparatory processes for raw materials, which previous to the steam engine's introduction were located near wind and water mills, were relocated inside the pot works saving considerable transportation costs. Perhaps more importantly, control over the preparation of raw materials shifted to the potter. In addition, many manual labour tasks, such as foot and hand driven wheels for the thrower, were replaced by faster steam driven activities.

Although Wedgwood was a pioneer in the acquisition of steam engines, he did not use currently advocated financial tools and techniques to evaluate these capital acquisitions. He did not explicitly identify the project's risk, its time horizon, or time value of

money, use Monte Carlo simulation analyses or compute the value of options associated with the acquisition. For example, it is doubtful that Wedgwood (or anyone for that matter) suspected that one of the Watt engines installed in Etruria in 1801 would still be working over 100 years later until 1912 when it was finally dismantled. Instead Wedgwood's investment appraisal methods relied on a combination of 40 years of business knowledge and business intuition.<sup>1</sup>

Over the last 250 years, concepts associated with investment appraisal have undergone significant evolution. Early practices of investment decision making relied on the business owner's business knowledge and intuition. For example, Pollard (1965, p. 234) points out that during the eighteenth century "the assumption that profits are not directly related to the quantity of capital, and therefore are not payment for capital or created by capital" was the maintained assumption. Profits were considered

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<sup>1</sup>Although current capital budgeting tools and techniques were not used by business owners in the eighteenth century, Pollard details how accounting information was used to help eighteenth century management decide "which methods of production or which department to adopt, enlarge, reduce or wind up" (1965, p. 219).

rewards of good entrepreneurship and were unrelated to the capital employed by the entrepreneur. Today, investment decision making focuses on the capital employed and uses a variety of financial tools that take into account time horizons, project risk, market risk, time value of money, weighted average cost of capital, option values, value chain analysis, game theories, simulations, etc. Importantly, however, investment decisions continue to rely on business experience and intuition. Further, unlike Wedgwood, capital investment decision makers today are frequently not the business owners and not direct recipients of the returns from business investments. This separation of ownership and decision rights creates inefficiencies that current capital budgeting processes are designed to mitigate. In addition, societal institutions have an interest in investment outcomes and as a result, institutions try to influence capital investment decision making. The purpose of this chapter is to review research related to capital investment processes and decision making and to point out some areas for future research.

Our journey will begin by establishing some basic definitions and concepts, reviewing a brief historical synopsis, and an analysis of the current usage of capital budgeting processes and appraisal techniques. Then, a consideration of research contributions related to development of these processes and appraisal techniques, the impact of decision makers on the investment appraisal process, the impact of organizational structure and processes, and research about institutional and other environmental issues. Finally, a related topic, post-investment auditing, will be considered briefly.

## 2. Definitions

The focus of this chapter is on the evaluation of new investments. This evaluation process is the means by which firms create value for their owners. In particular, the focus is on long-term capital expenditures. That is, those investments that are expected to provide returns over multiple future periods. Examples of these types of investments include machines, buildings, advertising campaigns, options to lease or buy, acquisitions of another business, expenditures on employee training, alliances and joint ventures, etc. Because of the long-term nature of these types of investments, in combination these investments shape the firm's strategic direction. Long-term investments are important for the long-run survival, growth, and value of the firm.

### 2.1. Accounting vs. Economic Returns

To assess the attractiveness of alternative investments, decision makers try to determine the investment's rate of return. Rate of return concepts are

important for measuring financial performance, assessing the desirability of projects, and monitoring project performance. Both economic rate of return and accounting rate of return concepts play significant roles in investment appraisal. The economic performance of an investment is its *real* rate of return earned on the *completed* project where all cash outlays and receipts are expressed in monetary units of equivalent purchasing power. Based on this idea of economic performance, the economic value of a *future* investment is defined as the present value of cash flows expected from the project, discounted at appropriate rates given by the opportunity cost of capital. Finally, an investment's economic rate of return (sometimes called the IRR) is defined as the discount rate(s) equating the present value of the investment's cash inflow stream to the present value of the investment's cash outlays. It is assumed that the economic rate of return is prospectively unobservable in a world of uncertainty.

Accounting rate of return is a measure of project profitability determined by dividing project profit by assets devoted to the project. For example, return on investment (ROI) is an example of an accounting rate of return measure. The measurement of profits and assets rely on accrual-based accounting information rather than cash flow data. The accounting rate of return method ignores the time value of money (assuming a zero discount rate) and substitutes profits for cash flows. Accounting information is very familiar to most members of the firm and is used externally by interested parties. Because of a lack of access to cash flow information, many interested parties use accounting information to analyse investments. Investment appraisal is influenced by the fact that external stakeholders and potential investors have access to accounting data and make their estimates of a firm's economic rate of return with accrual-based accounting numbers. As a result, there is a long and continuing history of research analysing and relating accounting rate of return and economic rate of return concepts (Danielson & Press, 2003).

Accounting information affects investment appraisal in many ways. There are a number of reasons for the influence of accounting data in the investment appraisal process. Loan covenants and other contractual agreements with various stakeholders (e.g., management compensation) are often based on accounting numbers. Non-contractual forces such as potential government regulation or union activities also are influenced by reported accounting data. Because reported accounting data are impacted by investment decisions, the effect of these decisions on the reported data is part of the decision process. Thus,

the availability of accounting information has a variety of effects on the decision process. Many firms continue to use the accounting rate of return as one of many methods of evaluating investments (see reported survey results later in this chapter).

### 2.2. Agency Issues

Agency problems arise related to investment appraisal because, in many modern decentralized firms, owners delegate investment decision making to managers. The separation of owners and managers creates a demand for motivation and control associated with manager decision making. Because the owners' and managers' utility functions and information sets can differ dramatically, goal congruence becomes an important concept. Owners incur costs to motivate managers to both acquire and use information about both their own ability and business opportunities in the capital investment appraisal processes. In addition, because owners are better able to diversify firm-specific risk than managers, investors' utility functions inevitably favour investments that are inconsistent with those favoured by managers.

Separation of owners and managers and the significance of capital investments for firm strategy imply top managers, e.g., the CEO and CFO, are involved in capital investment decisions. Their involvement is twofold. First, they seek out major strategic investment opportunities and second, they design investment appraisal processes used throughout the firm for capital acquisitions. The first task, seeking out major strategic initiatives, is closely linked to the strategic vision set by firm owners. The second task, designing firm-wide investment appraisal processes, is undertaken to motivate firm employees to seek out, propose, and acquire capital investments that are consistent with the owners' strategy. These people-related agency issues have attracted significant research efforts.

### 2.3. Uncertainty

One of the most difficult and intractable issues faced by decision makers and researchers is how to identify, capture, and evaluate uncertainties associated with long-term investments. Sources of uncertainty range from the mundane (cash flow estimation, number and sources of estimation error, etc.) to the more esoteric (complementarities among investments, options presented by investment opportunities, opportunity cost of investments, etc.). Uncertainties arise due to an inability to predict external market-related instabilities and internal firm-related factors. Asymmetric information among market participants creates uncertainties that can result in discontinuities and

market imperfections. For example, the inability to determine competitor plans regarding market opportunities or reactions to a firm's planned investments can make investment appraisal difficult. Internal firm uncertainties regarding both relationships among investments over time and human-related information processing capabilities, agency problems, and human decision biases also confound investment appraisal.

Investment horizon contributes to these uncertainties. Foreseeing the events of the next 12 months is difficult enough, but looking 5, 10, or 100 years ahead (as in the case of Wedgwood's steam engine) is a daunting task due to uncertainties and the limits of available processing capabilities.

## 3. Historical Development of Modern Capital Budgeting

This historical review is focused on changes that occurred in capital investment appraisal tools and processes during the emergence of non-owner managed firms. Large non-owner managed firms arose during the industrial revolution in the early nineteenth century. Table 1 provides the details associated with this development.

Prior to the twentieth century, major industrial firms did not assess their returns in relation to their invested capital (Pollard, 1965). Firm owners and managers took their investments as a given and focused on managing short-run costs (Dulman, 1989; Fleischman & Tyson, 2006). Du Pont Company was among the first to separate balance sheet investments into a "permanent account" (Chandler, 1977, p. 445). This identification of permanent investments allowed Du Pont to develop ROI criteria. ROI was calculated by dividing earnings less depreciation by the book value of investment. The ROI ratio of profits to capital employed was the most widely used method for evaluating investment profitability until the early 1960s. Thus, although time value of money and risk analyses methods were being used with projected cash flows for financial investments like insurance as early as the nineteenth century (Parker, 1968), businesses were slow to adopt such techniques for investments in real capital assets. Pollard (1965, p. 220) documents that pre-nineteenth century business owners "did take account of capital costs, both in the form of depreciation and a rate of interest, and in appropriate cases compound interest was also computed". However, these documented uses of compound interest were designed to determine costs of products or departments, not as a means of evaluating an investment opportunity.

Table 1. Diffusion history for investment appraisal methods<sup>a</sup>.

Information Source	Year	Evidence	Explanation	Impact on diffusion of sophisticated appraisal methods
Simon Stevin Dutch mathematician, scientist, and accountant	1582	<i>Tafalen van Interest (Tables with Interest)</i> Antwerp: Christoffel Plantijn	An appendix describes using present value to choose between two profitable investments	This appraisal method is applied only to loans
Arthur Mellen Wellington Railroad Engineer	1877 1887	<i>The Economic Theory of the Location of Railroads</i> (first & second editions)	Wellington was one of the first in the United States to advocate present value methods for non-financial investments.	The recommended methods were not widely adopted by railroad executives or engineering academics
Walter O. Pennell Equipment & building engineer for Southwestern Bell	1914	“Present Worth Calculations in Engineering Studies” <i>Journal of the Association of Engineering Societies</i>	Pennell demonstrated the use of present worth methods for valuing new construction and additions to existing facilities	Pennell’s implementation was flawed by not recognizing either sunk or differential and incremental costs and revenues
Pierre du Pont Treasurer at Du Pont and Donaldson Brown General Motors employee	1905 1925	Brown, “Pricing Policy in Relation to Financial Control” <i>Management and Administration</i> (1924)	Du Pont and Brown developed ROI measurements that provided a framework for capital budgeting in firms	Although not used for time value of money computations, ROI measurement is a necessary step to have an organized capital budget in large diversified firms
John C. L. Fish Professor of Engineering Economics at Stanford University	1915 1923	Textbook: <i>Engineering Economics: First Principles</i> (first & second editions)	Fish used Wellington’s ideas in his textbook and classes at Stanford	Fish became frustrated in attempts to convince firms to adopt better capital budgeting techniques
H. P. Charlesworth Senior manager and F. L. Rhodes, Head of Plant Division, both at AT&T	1925 1926	Charlesworth, “General Engineering Problems of the Bell System” (1925); Rhodes, “Engineering Cost Studies” (1926), both in the <i>Bell System Technical Journal</i>	By 1925, AT&T was using the engineering economists’ present worth methods in evaluating all major plant and equipment decisions	Both Rhodes and Charlesworth advocated the use of present worth techniques in evaluating capital budgeting in articles they wrote for professional journals; however, beyond AT&T there was limited impact on companies
Eugene Grant Professor of engineering economics at Stanford University	1930	<i>Principles of Engineering Economy</i>	Grant’s method provided theoretical improvements over Fish’s earlier work including unequal lives and incremental and differential costs and revenues	Grant did not convince many large industrial firms to adopt and as a result, Grant became frustrated
I. Fisher Economist	1907 1930	<i>The Rate of Interest</i> <i>The Theory of Interest</i>	Fisher sets out four present value-based ways of choosing between investment options	Fisher’s theory had no immediate impact on practice
F. L. Rhodes Engineer at AT&T	1925	“Engineering Cost Studies,” <i>Bell System Technical Journal</i>	Rhodes’ cost studies described the use of present worth methods at AT&T	Internal AT&T documents show early use of present worth techniques were a significant improvement over the average ROI analysis performed by other large industrials in the 1920s

R. H. Coase Economist	1938	“Business Organizations and the Accountant” <i>Accountant</i>	Coase was an economist who clearly described net present value methods to an accounting audience	Coase had little immediate impact on accounting theory and practice. Coase was only recognized in later years as a pioneer
John C. Gregory, engineer and Horace Hill, budget director for Atlantic Refining (precursor to Atlantic Ritchfield)	1946	“Interest Rate Tables for Determining Rate of Return on Profit Projects” (Dulman, 1989, p. 574)	The present value factors in the tables were continuously compounded	Hill introduced his ideas to the National Society of Business Budgeting
George Terborgh, Machinery and Allied Products Institute (a federation of trade associations in the industrial equipment industry) Accountant at Hober Paper Mills, Inc.	1949	<i>Dynamic Equipment Policy</i>	MAPI presented a formula for considering replacement of equipment. The formula included some present value computations, but was criticized for not allowing proposal rankings	The MAPI formula was adopted by a few companies for evaluating replacement projects
P. M. Chiuminatto, Accountant at Hober Paper Mills, Inc.	1949	<i>Control of Capital Expenditures—Planning and Follow Through</i> National Association of Cost Accountants Bulletin no.3	Chiuminatto illustrated capital budget management techniques and procedures based on his experience at Hoberg Paper Mills, Inc.	Chiuminatto provided an organized management framework for capital project evaluation that would be compatible with DCF procedures
Vera Lutz & Friedrich Lutz, Economics Professors at University of Princeton	1951	<i>The Theory of Investment of the Firm</i>	The Lutzes proved that present worth methods used by Atlantic Refining and Standard Oil were inferior to NPV methods	Although this book revealed some errors in previous thinking, it had little immediate impact on practice
Joel Dean, Professor at Columbia University, also owned consulting firm, Joel Dean Associates	1951–1959	Capital Budgeting (1951); “Measuring the Productivity of Capital” <i>Harvard Business Review</i> (1954)	Dean, Horace Hill, and Gordon Shillinglaw worked through Joel Dean Assoc. to advocated present value methods for capital budgeting	Through his book, numerous journal articles and his consulting, Joel Dean had a significant impact on the diffusion of sophisticated capital budgeting techniques
National Society of Business Budgeting (NSBB)	1953	“A New Method of Computing Rate of Return on Capital Expenditures” by H. Hill, commissioned by NSBB as a report to membership (see Dulman, 1989, pp. 574–575)	As a result of Hill’s report, NSBB rejected the two most common methods of evaluating capital expenditures, the payback period and accounting return on investment methods	Hill’s report spurred membership to use more sophisticated techniques for capital budgeting
James H. Lorie & Leonard J. Savage, Professors at University of Chicago	1955	“Three Problems in Rationing Capital” <i>Journal of Business</i>	Lorie and Savage showed that the NPV method was superior to rate of return method when maximizing firm worth	Lorie was associated with Joel Dean’s consulting firm and impacted diffusion through both his writings and the firm
J. Hirshleifer, M. Gordon & E. Shapiro, and E. Solomon	1955–58	“On the theory of the Optimal Investment Decision,” “Capital Equipments Analysis: The Required Rate of Return,” and “The Arithmetic of Capital-budgeting Decisions”	Hirshleifer, Gordon, and Shapiro, and Solomon were academic authors in the fields of economics, management science, and finance writing about DCF related issues	Their involvement shows the spread of time value of money ideas for capital budgeting across disciplines

Table 1. (Continued)

Information Source	Year	Evidence	Explanation	Impact on diffusion of sophisticated appraisal methods
Charles Christenson, research staff at Harvard Business School	1955	“Construction of Present Value Tables for Use in Evaluating Capital Investment Opportunities” <i>Accounting Review</i>	Christenson developed present value tables on Harvard’s MARK IV—one of the early electronic computers	These tables allowed much easier computation of present values. The tables were incorporated into textbooks such as Robert Anthony’s
Horace Hill, Senior Associate at Joel Dean Associates and Frank Norton, Professor	1955	“Capital Expenditure Management” and “Administrative Organization in Capital Budgeting” <i>Journal of Business</i>	Hill and Norton provided early documentation of capital budgeting processes and procedures used in decentralized firms	This issue of <i>The Journal of Business</i> was devoted to capital budgeting issues
Robert N. Anthony Accounting Professor at Harvard Business School	1956	<i>Management Accounting: Text and Cases</i>	Anthony wrote the first accounting text to advocate and demonstrate sophisticated capital budgeting procedures	This was the first widely used textbook to introduce and explain, through cases, the use of sophisticated capital budgeting procedures
United States vs. United Shoe Machinery Company (US vs. USMC) and Joel Dean Associates and Andrews, Anthony, and McLean	1956	US vs. USMC, 222 Fed. Rep. 350, 12n, 56, 56n; and 234 Fed Rep. 127, 10n, 11n, and 110 Fed. Supp. 295, 301, 301n	Both Dean’s and Anthony’s consulting firms played a part in promoting present value concepts through their work on the USMC antitrust case	This case illustrates the important role that institutions (the courts) and consulting firms played as diffusion agents for NPV methods
William McEachron, Assistant to Executive Vice-President of Planning and Evaluation at Standard Oil of Indiana	1957	Public presentation at American Management Association finance workshop (see Dulman 1989, p. 576)	McEachron’s presentation said that by 1955 top management had decided that any project presented to it must include a DCF analysis	By the late 1950s, a few large industrial firms were using sophisticated capital budgeting procedures on a regular basis
National Association of Accountants	1959	Accounting Practice Report #7, “The Capital Expenditure Control Program: A Survey” and Research Staff Report #35, “Return on Capital as a Guide to Managerial Decisions”	NAA practice reports showed members’ capital budgeting procedures used by member firms and showed that one firm used MAPI. The research report encouraged computation of project rates of return by DCF methods	Generally the practice report shows the lack of use of sophisticated techniques and the research report encouraged members to consider using DCF methods
Accounting Principles Board (fore runner of the FASB)	1964	“APB 5: Reporting of Leases in Financial Statements of Lessee”	APB was the first external reporting requirement stating that non-cancellable lease agreements should be valued as “the discounted amount of the future lease rental payments”	External financial reporting requirements generally lagged the business community’s use of DCF for internal investment appraisal
Sydney Pollard Professor	1965	“The Genesis of Modern Management: A Study of the Industrial Revolution in Great Britain”	Pollard provided a detailed documentation and discussion of managerial functions (including accounting) that arose out of the industrial revolution	His analysis suggested that management, during the industrial revolution, played a significant role in shaping current capitalistic ideas of rational self-interest, ambiguities of ownership and control, and class relations

J. L. Bower Professor	1970	<i>Managing the Resource Allocation Process: A Study of Corporate Planning and Investment</i>	Bower documented the path of four investment projects through a large multinational company	Bower's study shows that corporate evaluation and reward mechanisms have significant influence over the implementation capital investment projects, regardless of their NPV status
Thomas Klammer Professor	1970	"Empirical Evidence of the Adoption of Sophisticated Capital Budgeting Techniques" <i>Journal of Business</i> (1972)	A survey of 184 firms assessed usage of DCF procedures in 1959, 1964, and 1970 showed 19%, 38%, and 57% usage respectively	The survey shows a clear indication of the inter-firm diffusion of discounting procedures over time
J. B. Weaver Controller for ICI	1974	"Organizing and Maintaining a Capital Expenditure Program" <i>Engineering Economist</i>	Weaver provided significant detail outlining the capital budgeting methods at large multi-divisional firms	A variety of sources identified procedures for capital rationing and the mechanics of organizational decision making in multi-divisional firms
Alfred Chandler Business historian	1977	<i>The Visible Hand: The Managerial Revolution in American Business</i>	Chandler observed that industrial managers created innovative methods and organizational processes to administer and evaluate the performance of their firms	Chandler's book shows how managers in large firms whose technology, markets, and products were changing required a sophisticated planning apparatus to allocate resources
L. D. Schall, G. Sundem & W. Geijsbeek (professors)	1978	"Survey and Analysis of Capital Budgeting Methods" <i>Journal of Finance</i>	This survey gathered 189 responses from large firms showing 86% used either IRR or NPV or both	It provided more evidence of diffusion
Scott P. Dulman (manager at Bell Atlantic)	1989	"The Development of Discounted Cash Flow Techniques in U.S. Industry" <i>Business History Review</i>	Dulman offered a historical account of the development of DCF techniques	Dulman provides a framework for thinking about the forces that motivate DCF diffusion
J. R. Graham (professor) & C. R. Harvey (National Bureau of Economic Research)	2001	"The Theory and Practice of Corporate Finance: Evidence from the Field" <i>Journal of Finance</i>	This 1998 survey of 392 CFOs showed large firms rely heavily on present value techniques and small firms are more likely to use the payback criterion	The survey shows diffusion process in large firms is nearly complete

<sup>a</sup>Table 1 is based on a similar table in the appendix of Callahan & Haka (2004).



### 3.1. Early Recognition of Present Value Techniques

The fact that the net present value approach was applied by appraisers such as Simon Stevin of Bruges as early as 1582 (Littleton & Yamey, 1956) caused some educators to wonder “why has it taken so long for the application of discounted cash flow (DCF) criteria to non-financial investment to gain acceptance in practice?” (Parker, 1968, p. 70). As shown in Table 1, the practical use of DCF procedures for general business, capital investment evaluation diffused slowly. Although knowledge about compound interest is documented as far back as 1800–1600 B.C., identifying the cash implications of an investment has posed a challenging problem (Parker, 1968). Developments in three fields—actuarial science, engineering economy, and political economy—preceded the diffusion of DCF procedures among accountants and business practitioners. Compound interest was a prerequisite for the development of scientific life assurance in England in the eighteenth century. In the early eighteenth century, James Dodson set out the general principles for operating a life assurance business and showed how premiums should be calculated (Dodson, 1747).

Toward the end of the nineteenth century in the United States, Arthur Wellington, a railroad engineer, first described present value techniques for selecting profitable investments. His technique was improved on and added to by engineering academics (Fish, 1923; Grant, 1930) after the First World War. These academic engineers also had extensive industry experience. For example, Wellington served as a locating engineer for the Michigan Central Railroad, the New York, Pennsylvania, and Ohio Railroad, and the Mexican National Railway between 1870 and 1887. Fish was a division engineer for the Lake Shore and Michigan Southern Railway from 1905 to 1909. Grant worked at AT&T’s New York headquarters during the 1920s (see Dulman (1989) for details). Their business experiences profoundly impacted their writings on capital budgeting techniques. In addition, the history in Table 1 shows that railroad, telephone, and oil industries were more likely to be at the forefront of DCF diffusion. The large capital budgeting dollars and the long investment horizons for projects in these industries suggest that the benefits of DCF outweighed the implementation costs in contrast to other industries at that point in time (Chandler, 1977).

However, their work remained largely unknown among business managers until after World War II. Before then, industry used the average ROI criteria, developed by Du Pont and General Motors between the years 1905 and 1925 (Brown, 1924), for limited

assessments of capital investments. By the mid-1930s economists were calling for the use of net present value methods for investment decisions (for example, see Coase, 1938). Nevertheless, research shows that ROI procedures were used to evaluate projects in place and management forecasting did not go much beyond one year (Eisner, 1956). Thus, sophisticated capital budgeting that assessed the time value of money or DCF techniques were not being routinely practiced by companies before the mid-1950s.

An early evidence of the use of discounting procedures in corporations is associated with AT&T. Two managers, Charlesworth and Rhodes published articles in the mid-1920s in engineering outlets describing the use of “present worth” procedures for major plant and equipment decisions (see Table 1). However, these articles appeared to have little impact on other companies and the use of DCF procedures languished until the mid 1940s. After World War II, some engineers in the petroleum and chemical industries began evaluating projects using DCF procedures. In 1946, Atlantic Refining engineer, Gregory, and budget director, Hill, were experimenting with discounting procedures. By 1955, Standard Oil of Indiana required a DCF analysis for each project presented to top management (Dulman, 1989).

### 3.2. Diffusion of Discounting Procedures

As business school academics observed these practices through consulting and other activities, they began writing about DCF in academic publications. Throughout the early 1950s, Joel Dean and his associate Gordon Shillinglaw published articles advocating the adoption of DCF procedures. In addition, Lorie & Savage (1955), in an influential article, showed that present value criteria maximize the firm’s net worth. Finally, Robert Anthony, a professor at the Harvard Business School, was a principle agent for diffusion of DCF procedures through his widely adopted textbook, *Management Accounting: Text and Cases* (1956).

Both professional associations and consulting activities also played a role in the distribution of capital budgeting practices that recognized the time value of money. The Machinery and Allied Products Institute (MAPI) was very influential in advocating progressive capital budgeting methods. The National Society of Business Budgeting was an early advocate of discounting techniques to its members. The National Association of Accountant (NAA) published a research report that was distributed to its members in the late 1950s advocating discounting techniques. McEachron, presented Standard Oil’s DCF methods at the American Management Association finance

workshop in May 1957. All of these networking opportunities emerged in the mid-1950s and significantly impacted the opportunity for champions from different firms to access DCF knowledge and capital budgeting practices.

The construction of present value table by Charles Christenson (1955) lowered the cost of using more sophisticated financial analysis tools. These tables were published as part of Robert N. Anthony's 1956 textbook, the first widely used business textbook to advocate DCF methods (Anthony, 1956, pp. 495–497). The construction, completed by using one of the earliest available computers, and the publication of the tables along with details about their use made DCF techniques available to a much broader constituency. Prior to the availability of these tables, manual calculation of discount rates, which was too lengthy for student and managers, was the only available method. Thus, the technological innovation of the tables and the accompanying clear, concise explanation for their use in Anthony's text significantly lowered the cost of accessing DCF knowledge.

Other changes, initiated through institutional structures, provided legitimacy for DCF procedures. In the landmark United States vs. the United Shoe Machinery Company case, two consulting firms of Joel Dean and Associates (consulting with United Shoe Machinery) and Andrews, Anthony, and McLean (representing the National Shoe Manufacturers Association) were instrumental in creating an antitrust remedy for the purchase of shoe machinery. Both the legitimization of DCF techniques by a US court and the prominence of two business school

academics-based consulting firms in the court case were important for the legitimization and diffusion of DCF.

Spurred by the writings of Joel Dean and Robert Anthony, and led by the oil and chemical industries and large professional bodies such as the National Association of Accountants, most large multidivisional corporations adopted decentralized capital budgeting systems based on DCF methods. Fig. 1 illustrates the diffusion path of DCF techniques based on extensive published survey information shown in Table 2. Many of these surveys did not include details about the types of projects subjected to DCF analysis or the amount of the capital budget that was subject to DCF analysis.

### 3.3. Capital Budgeting Processes

Firms implemented capital budgeting management processes in response to the divisionalized form of business organizations. In these decentralized businesses, non-owner managers and mid-level employees possess the information necessary to initiate capital investment proposals (Chandler, 1977; Dulman, 1989). Decentralized, non-owner managed firms required new and different processes and procedures for capital budgeting. These processes and procedures have motivated significant accounting research.

During the 1950s, simultaneous with the spread of DCF procedures for project evaluation, several researchers documented the capital expenditure management processes used by firms. Hill (1955) discussed the life history of an investment process through these phases: conception, formalization, co-ordination,

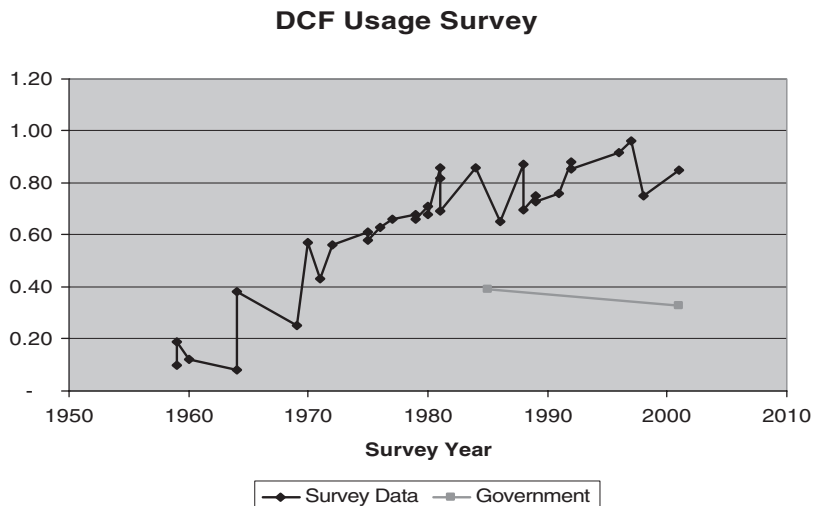


Figure 1. Diffusion of DCF techniques.

Table 2. Surveys of capital budgeting practices 1959–2002.

## Panel A

Publication year	Istvan (1961b)	Klammer (1972)	Miller (1960)	Christy (1966)	Klammer (1972)	Mao (1970)	Klammer (1972)	Fremgen (1973)	Petty et al. (1975)	Petry (1975)
Survey year	1959	1959	1960	1964	1964	1969	1970	1971	1972	1975
Number	48	149	127	108	157	8	184	177	109	284
Response rate (%)	100		64	44		Case study	50	71	22	52
Sample details	Selected large companies	a	b	Standard and poor's stock guide	a	Medium and large companies	a	c	d	d
Discounting (%)	10	19	12	8	38	25	57	43	56	61
Payback (%)	27	34	27	32	24		12	14	11	
AROR (%)	66	34	54	24	30		26	22	31	33

## Panel B

Publication year	Pike (1983)	Kim & Farragher (1981)	Gitman & Forrester (1977)	Kim & Farragher (1981)	McMahon (1981)	Klammer et al. (1991)	Pike (1983)	Moore & Reichert (1983)	Stanley & Block (1984)
Survey year	1975	1976	1977	1979	1979	1980	1980	1981	1981
Number		200	110	200	220	166	150	298	
Response rate (%)		20	38	20		32	72.1	56	
Sample details	Top 300 UK companies	e	f	e	Top listed companies in Australia	g	208 largest UK companies	b	
Discounting (%)	58	63	66	68	66	71	68	86	82
Payback (%)	73	15	9	12		5	81	6	
AROR (%)	51	10	25	8		10	49	5	

## Panel C

Publication year	Khan (1987)	Pike (1988)	Cooper et al. (1992)	Freeman & Hobbes (1991)	Sangster (1993)	Klammer et al. (1991)	Klammer et al. (1991)	Remer et al. (1993)	Pike (1996)	Burns & Walker (1997)
Survey year	1985	1986	1988	1989	1989	1984	1988	1991	1992	1992
Number	107	100	102	150	107	298	100	33	99	180
Response rate (%)	32.8	71.4	22		21.8	56	12	20	78.1	36
Sample details	US cities government	208 largest UK companies	b	Top 150 Australian organizations	Top 500 Scottish companies	b	g	b	208 largest UK companies	b
Discounting (%)	39	65	69.6	75	73	86	87	76	88	85.5
Payback (%)		92	20.6			6	4	12		73
AROR (%)		56				5	4			21

Panel D						
Publication year	Ho & Pike (1996)	Arnold & Hatzopoulos (2000)	Graham & Harvey (2001)	Ryan & Ryan (2002)	Chan (2004)	Brounen et al. (2004)
Survey year	1996	1997	1998	2001	2001	2002
Number	146	96	392	205	106	313
Response rate (%)	42.5	49	9	20.5	21.9	5
Sample details	The largest 350 companies in the TIMES 1000	Top 1000 UK companies	h, e	e	Canadian municipal governments	UK, German, French, and Netherlander CFOs
Discounting (%)	91.6	96	75.6	85.1	33	53, 48, 44, & 70, respectively
Payback (%)			75	52.6	Over half	69, 50, 51, & 65, respectively
AROR (%)			20	14.7		38, 32, 16, & 25, respectively

*Note:* Different letters indicate samples drawn from the following sources: a, Compustat Large Industrials; b, Fortune 500 firms; c, Dunn & Bradstreet's Reference Bbook for Corporate Management; d, Fortune 50 Retailing, Transportation and Utility, the top 400 of Fortune 500; e, Fortune 1000 Industrials; f, Forbes 600 companies; g, Large, publicity traded US Industrial Firms; h, 4,440 CFO members of Financial Executives Institute and Fortune 500 firms.

evaluation, request, capital budget formation, capital budget approval, project justification, authorization, project performance, and abandonment. Norton (1955) identified the following phases: initiation, screening, and approval. Norton claimed that it was difficult to administer a capital budget because of an inability to make long-run (5-year) forecasts of sales and general business conditions. The NAA produced an Accounting Practice Report (1959) based on 80 descriptions of company practices that detailed (1) how companies constructed their capital budgets, (2) methods used for appropriations requests, (3) how expenditures were measured against authorizations, and (4) details of post-completion audit processes. Weaver (1974), who was the Vice President of Corporate Planning & Appraisal at ICI, provided readers with detailed documents from and discussions about the capital budgeting process at ICI.

Bower (1970) was one of the early academic researchers focusing on capital budgeting processes. He provides a thorough documentation of the importance of the human element in internal capital budgeting processes. Using a single diversified firm, Bower documented the path of four significant investment projects. He completed extensive interviews with four levels of management, corporate, group, division, and business. His results present compelling evidence about the relationship between the business planning process and the investment process. Bower follows the investment process from inception through approval or rejection. Bower's study of the capital investment process recorded the project initiation process, the use of various dollar-related approval levels, and the importance of upper-level support as important steps in the screening process for investments.

The importance of Bower's (1970) work in showing how organizational design and human factors influence capital project advancement cannot be underestimated. He states, "a general manager sponsors a project when he believes it will be in his interest to do so rather than not to do so, given his understanding of 'the rules of the game'" (p. 59). King (1975), based on his own capital budgeting case studies, arrived at similar conclusions about the importance of organizational, environmental, and human factors. He claims that the focus in capital budgeting theory is misplaced on the project evaluation phase and should be refocused on the project search and definition phases. Bower showed that positive NPV projects will not advance if the general manager does not sponsor them. King points out that projects must be created and defined before they can be evaluated. Bower's and King's insights are the bedrock of much

of the agency theory research described later in this chapter.

Current capital budgeting practices continue to rely heavily on DCF techniques and a defined capital expenditure management processes. In addition, there is an extensive and ongoing literature focused on financial appraisal techniques in the operations research and engineering economics disciplines. This research focuses on refining and enhancing appraisal techniques for various investment characteristics. However, this engineering and operations research is beyond the scope of this chapter.

#### 4. Capital Budgeting: Decision Maker Effects

From the 1960s through the present, research efforts have been devoted to exploring and refining the theory and mathematics behind financial techniques for investment appraisal. However, a simple focus on the net present value rule provides no role for organizational policies and processes that are observed in firms and appear to be critical to firms' investment outcomes. These policies and processes exist because human factors affect capital investment decisions. Until the early 1980s, only a few researchers focused on how people and their characteristics affected investment appraisal. For purposes of this discussion, the decision-maker-related research is divided into agency theory-based modelling research and experimental psychology-based research.

##### 4.1. Agency Theory-Based Research

The landmark paper by Harris et al. (1982) laid the foundation for a series of research models that analyse agency problems resulting from intra-firm resource allocations. In the Harris et al. model, a manager's concern about his own compensation and effort drive the results. They show that when managers possess private productivity information and are effort averse it is optimal to allow managers to choose investments from a menu of choices. As shown in Table 3, the Harris et al. model has been used in a series of agency research papers as a means of modelling observed capital budgeting policies and practices. For example, Antle & Eppen (1985) use the Harris et al. model to explain why managers will demand more allocation of capital than necessary and thus create organizational slack. They show that the organizational response to slack creation is capital rationing and under-investment. Antle & Fellingham (1990) create a multi-period extension showing that long-term contracts have the potential of mitigating information asymmetry problems. Arya et al. (1993) use the Harris et al. model to show the manager's risk aversion affects the use of monetary cut-offs (capital rationing).

Table 3. Selected modelling-based capital budgeting research.

Authors	Issue	Characterizing assumptions <sup>a</sup>	Implications for capital budgeting
Harris et al. (1982)	This is the first model of intra-firm resource allocation with asymmetric information and effort incentives	There are a finite number of uniformly distributed states and agents possess private productivity information	This model identifies managers' concern about their own compensation and effort in intra-firm resource allocations
Antle & Eppen (1985)	Antle and Eppen demonstrate that organizational slack and underinvestment are consequences of information asymmetry and moral hazard	There is a single division and the agent has private information and utility for consuming unused resources (slack). The owner retains the investment decision rights	The model uses a productivity cut-off level for allocation of resources to divisions. The owner adjusts the cut-off level due to asymmetric information
Kanodia et al. (1989)	This is the first paper to model the escalation phenomena (sunk-cost effect) and show that managers may choose escalation to enhance reputation, thus affecting compensation	In equilibrium, the expected wage of a manager is strictly increasing in his reputation for talent. In a two period model, reputation for talent in period two is based on the period one decision not to abandon a failing project	Kanodia <i>et al.</i> model shows that information asymmetry and incentive to shirk interacts resulting in managers electing to continue projects, which are expected to become unprofitable
Antle & Fellingham (1990)	This multi-period extension of Antle & Eppen (1985) demonstrates that long-term contracts can alleviate information asymmetry	Assumes the agent has private pre-contract information and the owner retains investment decision rights	The model highlights the impact of long-term contracts in alleviating information asymmetry problems
Arya et al. (1993)	This extension of Antle & Eppen (1985) shows manager's risk aversion affects the use of monetary cut-offs	The model assumes contracting occurs in time one and a manager observes private information and submits a message in time two. Also, communication of the private investment-related information is assumed to be valuable	Their model shows asymmetric information and risk aversion combine to result in interdependencies between production decisions and budgeting mechanisms
Antle & Fellingham (1995)	A model of the conditions under which the introduction of a public information system can either enhance or reduce the socially efficient outcome of capital investments	An extension of Antle & Eppen (1985) with the inclusion of a cost system. Assumes costs are uniformly distributed and cost information partitions contain equal length elements	The model shows how the distributive and productive effects of information interact implying that more information is not always Pareto optimal. The results rely on the agent's interests in capturing slack
Baiman & Rajan (1995)	A model of both the manager's compensation scheme and the decentralization of investment decision rights. The model identifies where use of a cut-off mechanism is preferred to pure centralization or pure decentralization	Assumes a manager is motivated by both money and effort, contracts are incomplete, and the owner has taken on a project requiring a specific level of manager performance. Thus the capital budget decision is to invest in an already chosen project	The paper studies how to reassign decision rights between owners and managers to mitigate inefficiencies resulting from hold-up problems. It models conditions where owners maintain a cut-off, below which the manager makes capital budgeting decisions

Table 3. (Continued)

Authors	Issue	Characterizing assumptions <sup>a</sup>	Implications for capital budgeting
Harris & Raviv (1996, 1998)	Observed capital budgeting spending limits are modelled as a response to information asymmetry problems and manager's desire for empire building	Assumes a detailed, costly audit is available to headquarters that will uncover the manager's private information and that managers derive utility from managing a larger division (more capital invested). The only other manager compensation is straight salary	The paper investigates how a post-audit strategy, capital allocations, and manager salary as a function of requested capital are maximized given constraints implied by manager's private information and preference for empire building
Reichelstein (1997)	Shows that residual income is the unique linear performance measure that achieves goal congruence	Owner knows the cash flow patterns, manager has the same discount rate as owner and depreciation rules are indeterminate	No real agency conflict is modelled, but the paper provides a base line result for later work
Arya et al. (2000)	This is one of the first papers to model the manager's project information search and related information systems design issues	The information system affects managers' expectations about project evaluation. A risk neutral, effort averse manager receives a fixed salary and consumes slack from investments. Projects are funded by a risk neutral principal after the search	The paper shows that both coarse and/or delayed, and verified and/or self-reported information to the principal can mitigate the investment hold-up problem by motivating a diligent search by the manager
Antle et al. (2001)	The first model to combine real options and incentive considerations by modelling the optimal information system given manager incentives and the owner's option to delay the decision	Antle et al. assumes a two period model with an investment opportunity available in time periods one or two but they are mutually exclusive. Thus, at time one, the owner has the option to invest at a later date	The information system characteristics define the strength of manager incentives and the desirability of investing in either period one or two
Arya & Glover (2001)	Arya & Glover show that the owner's option to wait to make a capital investment decision has value when incentives are based on diversification	This two-period model assumes risk neutral agent knows the NPV of two projects. The owner has an option to delay the first-period investment	By delaying the period-one decision, the owner can condition the approval on the agent's cost report in period two. This makes the option to wait valuable
Dutta & Reichelstein (2002)	The paper demonstrates the optimality of delegating the investment decision and using residual income to compensate managers	Assumes a multi-period model where cash flows are uncertain and managers are risk and effort averse with superior information	Depreciation methods and capital charge rates allow the owner to separate long-term investment incentives from the provision of periodic effort incentives
Baiman & Rajan (2002)	One of few studies to consider how investments are affected by inter-firm	Assumes buyer and supplier are asymmetrically informed and the	The focus on tradeoffs between productive efficiencies from new

	relationships. They model the effect of information transfer on the investment behaviour of the buyer and supplier	setting is non-cooperative, further, contracting is incomplete. Buyer invests to improve quality and supplier must invest to reap quality benefits	investments and opportunistic use of information between buyers and suppliers moves capital investment appraisal issues outside the traditional principal-agent intrafirm model
Christensen et al. (2002)	This model examines the role of risk in the use of residual income for performance evaluation and its relationship to capital investment decisions	Assumes the manager is risk averse, has private pre-decision information, manager effort is unobservable and costly, and the investment is costly to the owner	The paper shows weighted average cost of capital is flawed when residual income is used in the managers' compensation. Cost of capital rates should be lowered to offset increased firm-specific risk that managers face. Alternatively, rates should be raised when managers will receive pre-decision information
Dutta (2003)	Dutta considers manager retention related to capital projects that require the manager's unique capabilities	The manager is assumed to have private pre-contractual information about the project's rate of return. The manager can leave the firm and undertake the investment independently	Dutta's results show that owners use compensation features such as residual income, option-based contracts, and reduction in the hurdle rate as the retention problem becomes more severe
Baldenius (2003)	The paper models the impact of empire building in capital budgeting and the dual use of a capital charge rate in residual income and the hurdle rate in investment appraisal	The manager has pre-contractual private information. His effort choices are unobservable, and there are private benefits to the manager from controlling assets (known by the owners)	The results demonstrate that the optimal capital charge rate for residual income computations exceeds the required hurdle rate as a result of empire benefits (investment return components that accrue directly to the manager)

<sup>a</sup>Unless otherwise stated, models are single period, assume managers are effort and risk averse, and principals are risk neutral.



Other agency models have been derived to explain observed capital budgeting practices such as monetary cut-offs for decision-making authority in decentralized organizations (Arya et al., 1993; Baiman & Rajan, 1995); the manager's project search process (Arya et al., 2000); the consideration of options in project evaluation (Antle et al., 2001; Arya & Glover, 2001); the use of residual income in compensating managers (Christensen et al., 2002; Dutta & Reichelstein, 2002); linkages between compensation features and manager retention (Dutta, 2003); and the impacts of empire building on hurdle rates and compensation (Baldenius, 2003). These models rely on the characteristics of investment decision-makers (knowledge, risk profile, ability, aversion to effort, compensation, desire for empire building, reputation, etc.) to model the owner's response (compensation form, capital rationing, hurdle rates, decentralization, information system characteristics, etc.).

Much remains to be done, but agency modellers are identifying assumptions and model results that predict when various capital investment processes and procedures are likely to arise in non-owner managed firms. Multi-period models that capture interesting information and performance measurement issues are the challenges. Modelling sequential actions and the arrival of information between decisions is important to understand how agents are motivated to collect information (learn) and use the information in the best interest of the firm, and how the manager allocates resources (capital budget expenditures) across periods. Unfortunately, these models pose significant tractability problems (Lambert, 2001).

Most agency models have been unable to capture the specific features of firms that result from being embedded in economies characterized by competing firms, government policies, scarce resources, etc. Baiman & Rajan (2002) provide an example of some of the issues that arise by considering the wider economy. By modelling a non-cooperative setting between a buyer and supplier, Baiman and Rajan are able to investigate information transfer between firms and the resulting trade-offs between productive efficiencies and opportunistic use of information. Their model demonstrates why networks of firms arise in the economy.

Although agency models are frequently characterized by restrictive assumptions, these models have provided a source of guidance to experimental researchers investigating capital budgeting processes.

#### 4.2. Experimental Psychology-Based Research

Agency theory research assumes agents have the capacity and ability for rational economic decision

making. In addition, agency theory characterizes individual utility functions as having a desire for more economic wealth, risk aversion, and less effort. Alternatively, psychology-based research focusing on investment appraisal assumes decision makers have systematic cognitive representations and biases that influence decision outcomes (see Birnberg et al. (2006) for a broader discussion of psychology theory research on management accounting). Table 4 provides a chronological listing of the experimental, psychology-based research on investment appraisal. As shown in the table, this research has primarily focused on psychology-based explanations for the underweighting of opportunity costs and observed escalation of commitment to failing investments. Other areas receiving less research attention include group and cultural impacts on investment decisions.

Economic-based capital investment theory stresses that opportunity costs should be considered in resource allocation decisions. Opportunity costs of a resource used in an investment decision are the net benefits the resource could generate if it were employed in the best foregone alternative. Every investment decision involves the sacrifice of an alternative use for that resource called the opportunity cost of the investment decision. Accounting systems do not traditionally explicitly identify opportunity costs of investment decisions. Frequently it is the responsibility of the decision-maker to identify and consider investment decision opportunity costs.

Becker et al. (1974) was the first accounting study to identify decision makers' tendency to underweight or ignore opportunity costs compared to outlay costs in investment decision making. Their research inspired a stream of studies attempting to see if various environmental (as opposed to cognitive) factors could explain the underweighting of opportunity costs. Neumann & Friedman (1978) showed that subjects consider opportunity costs when they are explicitly provided. Friedman & Neumann (1980) showed that both students and certified public accountants tend to ignore opportunity costs when they are implicit. Finally, Hoskin (1983) showed that subjects exposed to explicit opportunity cost information made more accurate decisions than when implicit opportunity cost information was provided.

Three research studies have provided psychology-based explanations for the propensity of decision makers to ignore opportunity costs. Northcraft & Neale (1986) used information processing explanations based on how investment decisions are framed. They argued that making opportunity costs explicit alters the framing of the investment decision and leads to better decisions. Chenhall & Morris (1991)

Table 4. Selected experimental-based capital budgeting research.

Topic and authors	Characterizing assumptions	Implications for capital budgeting
<i>Opportunity costs</i>		
Becker et al. (1974), Neumann & Friedman (1978), Friedman & Neumann (1980)	These are a series of early studies, motivated by economic theory, suggesting that outlay and opportunity cost information should be equally weighted in investment decision making	Mixed results of these studies provided little reliable implications. No competing psychological explanations are provided for why subjects would use (or ignore) opportunity costs
Hoskin (1983)	This paper assumes subject risk propensity and whether opportunity costs are implicit or explicit will affect use of opportunity costs in resource allocations decision	Study results show subjects used opportunity costs and made more accurate decisions when explicit opportunity cost was provided. Subject risk attitude did not affect the use of opportunity costs
Northcraft & Neale (1986)	An experiment using an information processing explanation to show that when opportunities costs are implicit, investment decisions can be framed as a certain loss or a larger or no loss	Results showed that making opportunity costs explicit can alter the framing of investment decisions and reduce escalation
Chenhall & Morris (1991)	This study assumed decision makers' cognitive styles (intuitive—global problem frame vs. sensing—specific problem frame) are moderated by project sponsorship affecting the use of opportunity costs	The subjects' treatment of implicit opportunity costs is influenced by cognitive style. Responsibility for initiating the project affects the impact of cognitive style on use of implicit opportunity costs
Vera-Muñoz (1998)	Assumes knowledge structures, gained through education or experience and stored in memory, guide problem solving. High knowledge subjects, in particular, are motivated to retrieve a particular knowledge structure	A counterintuitive outcome shown in this study is that high-GAAP accounting knowledge interferes with a decision maker's ability to incorporate opportunity costs into a capital budgeting decision. However, this result did not hold in personal resource allocation decisions
<i>Escalation</i>		
Staw (1976)	Assumes managers are motivated to redeem poor performance or demonstrate the ultimate rationality of the investment choice	This paper was first to introduce self-justification theory as an explanation for escalation
Harrell & Harrison (1994)	This research used agency theory to investigate escalation	They show managers escalate under the combined effect of information asymmetry and incentives to shirk
Ghosh (1997)	Ghosh examined whether accounting controls (feedback, reports of cost-benefit of future expenditures and preparation of a progress report) mitigate escalation behaviour	Ghosh's results show precise feedback and information about future benefits reduce escalation. He also shows preparation of project progress reports moderates additional resource commitment
Rutledge & Karim (1999)	This paper assumed moral development and ethical principles affect escalation behaviours when adverse selection conditions are present	The presence of adverse selection conditions had the greatest escalation impact on subjects with low ethical reasoning levels
Ho & Vera-Muñoz (2001)	A study about opportunistic investment choices of division managers related to division performance (high vs. low) and causal attributions (internal vs. external) of performance	Managers were more likely to make goal incongruent investment choices (escalate) when division performance was low and external causal attributions were present

Table 4. (Continued)

Topic and authors	Characterizing assumptions	Implications for capital budgeting
Cheng et al. (2003)	This research assumes self-set hurdle rates can be effective in reducing escalation by increasing cognitive dissonance and reducing escalation	Shows project hurdle rates can act as a control device in organizations to reduce escalation of commitment
Chang & Ho (2004)	Chang & Ho explored the efficacy of student surrogates in escalation decision settings. In particular, the responsiveness of students to business context issues was examined	Student investment decisions showed no association between the likelihood of project continuance and how much funding they would allocate to the project. Also, managers and students have significantly different likelihood judgements and funds allocation decisions
<i>International issues</i>		
Chow et al. (1997)	National culture affects escalation behaviour through project responsibility (self vs. other) and framing (positive vs. negative)	Results show weak effects for both responsibility and framing. Significant differences were observed between US and Chinese nationals who showed higher preference for project continuance
Harrison et al. (1999)	National culture and private information affect escalation	Both US and Chinese subjects showed escalation when they possessed private information and incentives for gain. However Chinese subjects had a lower propensity for escalation than US subjects
<i>Group effects</i>		
Whyte (1991, 1993)	Whyte assumed group processes have an impact on escalation behaviour	Subjects who were more personally responsible for sunk costs were more likely to escalate and the group process strengthened the escalation
Rutledge & Harrell (1993)	Prospect theory was used to motivate the investigation of group polarization interaction with framing to cause escalation	When individuals were more (less) responsible for the investment or if investment alternatives were negatively (positively) framed, groups were more likely to increase (decrease) escalation
<i>Other</i>		
Kida et al. (2001), Moreno et al. (2002)	These papers assume managers' capital budgeting choices are influenced by both affective reactions, such as frustration and anger, and financial information	Affective reactions can result in risk taking in gain contexts and risk avoidance in loss contexts contrary to prospect theory predictions
Chang et al. (2002)	This paper assumes a framework (project-related, decision-maker-related and environment-related) can be used to categorize and synthesize the experimental capital investment research	The paper highlights previous research results and discusses future areas for research
Rankin et al. (2003)	Asymmetric information can be mitigated by owner's non-binding budget announcement. Uses Antle & Eppen's (1985) agency model to motivate hypotheses	In the absence of full and costless commitment by the owner, non-binding budgetary announcement can mitigate asymmetric information problems. Results for agents were contrary to economic predictions suggesting they would ignore the announcements

suggested cognitive information processing style (intuitive vs. sensing) causes a framing effect that is moderated by the subject's responsibility for initiating the project. They showed that subjects with (sensing) intuitive cognitive styles (do not) tend to consider opportunity costs in investment decisions. Vera-Muñoz (1998) posited that knowledge structures developed through education and experience guide decision makers' information processing. She showed the counter-intuitive result that high-accounting knowledge interferes with a decision maker's use of opportunity costs in a business (but not personal) resource allocation decision.

Escalation of commitment to failing investment projects was identified initially in psychology studies (e.g., Staw, 1976). These studies demonstrated that subjects who initiated (inherited) failing projects were more (less) likely to invest additional resources in the project. Staw (1981) identified multiple real world examples of escalation including the Vietnam War, development failure of an airbrake that nearly killed a pilot, Lockheed's costly L1011 jet program or British Columbia's decision to host the world fair (Ross & Staw, 1986). Burgelman (1994) details the random access memory exit decision made by Intel Corporation in 1991. Intel's decision transformed the company from a memory-based company into a microcomputer company. Burgelman details how the capital budgeting internal selection process played a significant role in the transformation.

Accounting experimentalists have explored explanations for escalation behaviour. Harrell & Harrison (1994) identified variables based on agency theory assumptions of adverse selection (see Kanodia et al. (1989), in Table 3) and showed that subjects with both private information and incentives to shirk had a higher tendency to continue a failing project. Once convinced that escalation was a systematic phenomenon, researchers began exploring cognitive processes that might inhibit or initiate escalation. Rutledge & Karim (1999) identified moral development as a moderating variable in escalation behaviour. Cheng et al. (2003) focused on hurdle rates through their impact on cognitive dissonance as a mitigating or control factor in escalation behaviour. Ho & Vera-Muñoz (2001) posited that loss aversion and manager attributions influence manager decisions resulting in goal incongruent investments. Their work complements agency theory predictions by suggesting manager attributions; framing effects or moral development in addition to effort aversion may explain goal incongruent investment choices.

Experimental work has investigated cultural and group impacts on escalation. Two studies with

conflicting results investigated differences in escalation behaviour between United States and Chinese subjects. Chow et al. (1997) found Chinese nationals exhibited a higher tendency to escalate. Alternatively, Harrison et al. (1999) found that Chinese subjects showed a lower propensity to escalate. Similar conflicting and unexplained results have been found regarding group effects on escalation. Whyte (1993) showed that group processes strengthened escalation and Rutledge & Harrell (1993) theorized that the project's frame (positive or negative) would moderate the group effect on escalation.

A recent study by Chang & Ho (2004) introduced the possibility that student subjects, who do not have experience with the business contexts in which capital budgeting decision are made, are poor surrogates in escalation studies. They showed that degree of project completion and new information about competitors' actions affects managers and students differently. Chang & Ho (2004) found that managers with substantial project planning and evaluation experience have a stronger tendency to continue (and devote resources to) projects when degree of completion is high and market information is favourable. In contrast, student subjects showed no sensitivity to either degree of completion or market information.

Taken together, Tables 3 and 4 provide a compelling set of research issues related to capital budgeting processes and investment appraisal. Agency research provides a set of testable hypotheses that can be contrasted with similar cognitive or affectively motivated hypotheses (see Moreno et al., 2002; Rankin et al., 2003). Experimental work that carefully documents the cognitive processes that motivate managers' decisions can be used to enrich and extend agency research. For example, Kanodia et al. (1989) suggested that escalation behaviour is a result of managers' economic reputation incentives. However, several experimental studies suggested cognitive explanations (e.g., attributions, framing or ethical reasoning) may interact with economic incentives to exacerbate or mitigate escalation effects. These cognitive explanations are also useful in explaining capital budgeting procedures and processes observed in corporate practices.

## **5. Capital Budgeting: Organizational and Environmental Considerations**

Josiah Wedgwood's capital expenditures on steam engines were impacted by a variety of environmental and organizational factors. For example, the move of his pottery operation to his new manufactory at Etruria was simultaneous with Adam Smith's explication of the division of labour principles. These principles transformed what had been handicraft

output by individual craftsman to a well-developed factory production process. This organizational transformation was a necessary precursor to obtain the production advantages offered by the steam engine. In addition, Wedgwood was constantly trying to shape the environment in which his firm operated. For example, he lobbied government bodies to improve the roads. In addition, he acted as the treasurer for the project that resulted in the construction of the Trent and Mersey canal. The canal eventually passed directly in front of Etruria, allowing an easy means of transport with the ports of Liverpool and Hull (Shaw, 1798–1801). Wedgwood's story shows how capital budgeting decisions, processes and outcomes depend on organizational and environmental characteristics.

### 5.1. Organization Research

Research about capital budgeting organizational factors was sparked by a series of field studies in the early 1960's, described earlier in this chapter. These field studies (see Table 5) documented a variety of capital budgeting practices in large, non-owner managed firms. For example, managerial gaming, self-interested behaviour, short horizon decision-making, and cash flow inflation were linked to organizational reward schemes (e.g., Berg, 1965; Istvan, 1961a; Sihler, 1964). For example, Berg (1965) studied the allocation of funds for strategic decision in a large US engineering conglomerate. He documented the gamesmanship among managers that resulted from the company's measurement, control, and reward schemes. Games resulted in investments that interested the manager, had short horizons, and high discount rates. Based on interviews with 147 financial executives, Istvan (1961a) documented that project originators were chronically optimistic in their cash flow estimates. Haka (1982, p. 124) quotes executives that suggested hurdle rate adjustments are automatically followed by project originators making cash flow adjustments to meet new hurdle rates. These research results documented the significant impact that organizational control and reward systems can have on the investment process.

An initial series of empirical studies tried to link successful firm performance to the organization's adoption and use of more sophisticated financial tools for capital investment decisions (e.g., Christy, 1966; Haka et al., 1986; Klammer, 1973). The mixed results from the attempts to link improved firm performance with the use of sophisticated financial evaluation tools motivated researchers to consider contingent factors such as those identified through the field studies, as variables that might mitigate the successful use of these financial tools in organiza-

tions. Haka (1987) showed that the firm's reward structure and environmental predictability were correlated with improved firm performance after adopting DCF investment appraisal methods. In addition, researchers documented that a firm's information system (Gordon et al., 1979; Larcker, 1981), long-term compensation arrangements (Larcker, 1983) and the decentralization of investment decision making (Haka, 1987) affect their capital budgeting choices and outcomes. Finally, some authors have argued persuasively that current capital budgeting practices in firms ignore synergies and complementarities among investments (Carr & Tomkins, 1996; Miller & O'Leary, 1997; Shank, 1996).

Researchers in finance have raised important capital budgeting issues. Jensen (1986) makes a compelling case that when significant free cash is generated by a firm and the firm's opportunity set of projects is poor, managers are likely to squander resources in negative NPV projects. Additional work by Jensen (1993) suggests that the internal capital budgeting management systems are not designed to motivate management to abandon failing projects, products, and lines of business. Jensen's concerns were echoed in a historical analysis completed by Baldwin & Clark (1994) that suggested a decline in US competitiveness was a result of internal investment practices. In some cases, failure of the internal control mechanisms have resulted in firms exiting from capital markets. These are serious charges that need additional attention by researchers.

### 5.2. Environmental Research

In addition to organizational factors, product and factor markets, government institutions, and capital markets have been shown to affect capital budgeting. In particular, environmental predictability of product and factor markets is a key variable in capital budgeting analysis and choice. Several authors, shown in Table 5, demonstrate an association between the type of capital budgeting procedures used, firm performance, and environmental market uncertainty (Chen, 1995; Haka, 1987; Mouck, 2000). In addition, the lack of a competitive product factor market has been identified as a barrier to optimal investment choices. This investment hold-up problem occurs when relationship-specific optimal investments are not undertaken because there is a lack of competitive market pressures. Baiman & Rajan (2002) extended agency theory models beyond the traditional boundaries of the firm to address these inter-firm investment barriers.

Government and institutional pressures were discussed by Miller (1991) as the significant motivation

Table 5. Selected organizational and institutional research related to capital budgeting.

Topic and authors	Characterizing assumptions	Implications for capital budgeting
Norton (1955)	Surveys of the literature describing administrative practices associated with capital budgeting are useful to academics and practitioners	Norton describes the initiation, screening, and approval processes being used for capital expenditures. There is no discussion of financial evaluation tools. Conclusions suggest that much remains to be done to develop systematic capital budgeting practices
Istvan (1961a), Sihler (1964), Berg (1965), Bower (1970), Weaver (1974), King (1975, 1982)	By understanding the capital budgeting practices of organizations, we will be able to create theories that explain those practices	Some of the first field research that undertook on-site, in-depth investigations of capital budgeting practices and procedures. Istvan's interviews with 147 financial executives showed project originators are chronically optimistic. Berg characterized the capital budgeting process as a game that motivated self-interested investments, short horizons, and high discount rates. Bower noted that interdependent subunits made inconsistent project proposals. Sihler found overestimation in cash flows. Weaver provides detailed information about capital budgeting processes. All researchers concluded that reward schemes played a significant role in the capital budgeting process
Christy (1966), Klammer (1973), Kim (1975, 1982), Haka (1982), Haka et al. (1986)	The use of more sophisticated financial evaluation tools in investment appraisal (e.g., discounted cash flow or project risk analysis) should improve firm performance	These studies assessed the link between the use of sophisticated capital budgeting procedures and firm performance. Kim found that firms using sophisticated techniques have higher rates of operating profit. Other researchers did not find links between use of these techniques and improved firm performance
Gordon et al. (1979)	Managers have the ability and want to use sophisticated capital budgeting techniques	Based on interviews with senior executives, the reason for the lack of use of sophisticated capital budgeting techniques was information systems did not provide the correct information
Larcker (1981)	The stage of the capital investment decision process (problem identification, alternative development or selection) affects the preferred characteristics of the information used in capital budgeting decisions	Results of an experimental survey from 53 corporate executives showed that in all phases, subjects preferred <i>ex ante</i> to <i>ex post</i> information, but equally weighted financial and non-financial information. In the selection phase, internal was more heavily weighted than external information
Larcker (1983)	Changes in executive compensation contracts that weight long-term performance more heavily will motivate managers to undertake more capital investments and result in improved market performance	Results indicate that (when compared to similar non-adopting firms) firms adopting performance plans exhibit a significant growth in capital expenditures and a favourable security market reaction to the announcement of the performance plan adoption

Topic and authors	Characterizing assumptions	Implications for capital budgeting
Jensen (1986)	Executives are more likely to squander resources on negative NPV projects when a firm has substantial free cash flow and poor investment opportunities	Used the oil industry to show that an excess of cash coupled with poor investment opportunities motivated managers to invest in poorly performing projects
Haka (1982), Haka (1987)	Organizational and environmental characteristics influence the effectiveness of using more sophisticated capital budgeting financial tools (discounted cash flow techniques, DCFT)	Positive correlations between the effectiveness of DCFT and predictable environments, the use of long-term reward systems, and the degree of decentralization of the capital budgeting process are demonstrated
Cooper & Selto (1991)	External reporting requirements affect capital investment decisions	Experimental study showing that expensing (capitalizing) R&D results in decentralized managers' choosing fewer (more) R&D projects, spending less (more) on R&D, and generating lower (higher) present value outcomes
Miller (1991)	Modern financial tools for capital appraisal were developed and implemented in the United Kingdom as a result of institutional pressures	Four concepts are introduced as a means of understanding the processes of accounting innovation: problematizations, programmes, translation, and action at a distance. Miller showed how capital appraisal techniques were used as a tool by government to alter managerial decision making
Jensen (1993)	Internal control systems, including capital budgeting processes and procedures, have failed (hinder efficient exit strategies) to address the over-capacity problems created by increases in productivity	Used the investment in physical plant and R&D for 432 large publicly owned companies between 1980 and 1990 to show that about 25% of the companies over-invested and many others lost competitive position
Baldwin & Clark (1994)	The decline in US global competitiveness in the 1970s and 1980s is a result of internal investment processes and practices that caused a focus on short-term financial results	A historical analysis of capital budgeting systems in US companies after the Second World War to show that financial evaluation tools obscured the value of investment in organization capabilities (human capital, systems of information, and combinations of assets)
Chen (1995)	The importance of various financial evaluation methods (payback, DCF techniques, etc.) is related to firm characteristics and CEO compensation characteristics	Survey results from 115 firms show firms consider NPV techniques to be more important for expansion projects than for replacement projects. The dependence of CEO compensation on accounting earnings was related to higher (lower) use of payback (DCF) and lower perception of environmental uncertainty and larger size was associated with higher importance of DCF
Firth (1996)	Move towards a free market economy will make capital budgeting procedures more likely to be implemented	A survey of foreign-owned joint venture enterprises in the People's Republic of China show that the use of capital budgeting procedures and techniques increased in the Chinese partner and after the creation of the joint venture the increase was higher for US firms

Shank (1996), Carr & Tomkins (1996)	When competitive advantage, value-chain, and cost driver analyses are more heavily weighted in capital budgeting processes, firms will be more successful	Shank uses an example to show that competitive strategy should dominate traditional financial analysis in capital budgeting. Carr and Tomkins use a sample 51 case studies of 44 firms in Britain and Germany to show differences in performance were related to placing more weight on the three types of analyses and less weight on traditional financial capital budgeting techniques
Miller & O'Leary (1997)	Firms must coordinate their capital spending across diverse, but mutually reinforcing assets to extract Edgeworth complementarities	Shows how Caterpillar during 1990–1994 changed its capital budgeting practices to recognize that coordinated capital investments across design, manufacturing, and marketing can garner economies of scope and more rapid response to environmental change. The process used investment bundles, close coordination between top executives and plant-level managers and managing the investment implementations as a bundle
Chalos & Poon (2000)	Capital budgets are prepared by groups and teams. Team characteristics will affect team performance on capital budgeting	177 managers in 55 teams from a single organization were surveyed and interviewed. Results show a direct effect of participation in the preparation of the capital budget and a mediating effect of team information sharing and performance-based budget emphasis on performance
Mouck (2000)	The theory of market economics is based on a set of assumptions that do not characterize the high-tech, knowledge-based sectors of the economy. These sectors are too unpredictable for the meaningful application of traditional capital budgeting techniques	Mouck used computer simulations based on assumptions that the market economy is a complex adaptive system of agent/artefact networks and related opportunities of economic action. These situations cannot be characterized by rational choice. In these situations computer simulations like those that simulate the emergence of artificial life are more useful
Lee (2001)	Institutional factors significantly influence the ability of state-owned enterprises to manage their own investments	A case study of Shanghai Sunve Pharmaceutical Corporation showed the difficulty state-owned enterprises encounter in their investment processes as a result of state-designed institutional factors
Guiding (2003)	Agency theory predicts different owner–operator structures can influence the capital budgeting process	The hotel industry is used to study two types of hotels; the owners hire either their own employees or a management company to operate the hotel. More formalization and a greater propensity for cash forecast biasing are observed in a divorced owner–operator structure
O'Connor et al. (2004)	Western management techniques, including DCF techniques, are adopted by joint ventures in other countries that are not using these techniques	Interviews and survey evidence from managers in China at four state-owned enterprises and two of their joint ventures show that joint ventures are an effective vehicle for diffusing capital budgeting procedures in state-owned enterprises.



for the diffusion of DCF procedures in UK industries. Cooper & Selto (1991) suggested institutional pressures associated with mandated external reporting requirements for capital markets can affect capital budgeting decisions.

Several authors have considered the spread of capital budgeting procedures globally. These papers assess the impact of cross-border influences on capital budgeting practices. Firth (1996) and O'Connor et al. (2004) studied how more sophisticated capital budgeting procedures are diffused from developed economies to the Chinese economy. They show that joint ventures are a vehicle for diffusion of capital budgeting processes and practices across national boundaries. Other authors suggest governmental practices can encourage or mitigate the diffusion of managerial practices such as capital budgeting procedures (Lee, 2001; Xiang, 1998).

### 6. Post-Auditing of Capital Projects

Project monitoring and follow-up have received less attention than other areas. Table 6 provides details about post-auditing for capital budgeting projects research. Istvan (1961a) provided some of the first documentation of post-audit use. He interviewed 147 executives from 48 firms. Only 24 firms indicated that they performed post-audits and only 19 included post-audits of all major projects. The remaining five firms did selective post-auditing. Frequently, the project originator conducted the post-audit and collected the post-audit data. Istvan found that the post-audit was used for education of proposal originators and in some cases for evaluating their capital budgeting abilities.

More recent research demonstrates that the percentage of firms using documented, sophisticated post-audit procedures has not changed much in 30 years (Myers et al., 1991; Pierce & Tsay, 1992). As Istvan commented, "in view of the important benefits of the post audit claimed by both theorists and practitioners, it is surprising that all firms do not make such a study part of their capital-expenditure decision-making process" (1961a, p. 38). The reticence of firms to employ post-audits is consistent with experimental (Harrell & Harrison, 1994), agency (Kanodia et al., 1989) and empirical research (Jensen, 1993) that has demonstrated the reluctance of managers to abandon projects. The slow implementation of capital investment audit procedures and the documented failure of management to use these procedures to evaluate projects or project originators (Myers et al., 1991; Scapens & Sale, 1985) and retrench spending are consistent with the failure of internal control systems to adequately adjust capital spending in firms.

### 7. Discussion and Future Research Directions

This section provides an overview of the historical development of the research on capital budgeting. In addition, a summary of what has been learned from 50 years of capital budgeting and investment appraisal research is outlined. Finally, some suggestions about future research related to unanswered question about what we might like to know are identified.

#### 7.1. Historical Development

Fig. 2, Panel A shows the antecedent conditions that provided the genesis for modern capital budgeting. The idea that the time-value of money should be considered in valuing future cash flows existed and was used to value financial assets as early as the fourteenth century (Stevin, 1582). However, the conditions that motivated the use of discounted valuations of cash flows for investments in non-financial assets emerged slowly over the following 300 years. In particular, both the size of non-financial investments and the number of non-owner managed firms increased during the industrial revolution. These simultaneous changes created fertile ground for use of more sophisticated evaluation techniques and for the capital budgeting processes in use today.

Engineers in large US firms, such as railroads and oil companies, pioneered valuation approaches for investments and capital budgeting processes in the 1920s and 1930s. During the 1930s through the 1950s, larger non-owner managed firms put in place capital budgeting control systems that identified planned capital investments going forward (Chiuminatto, 1949; Hill, 1955; Rhodes, 1925). However, until the 1950s, more sophisticated valuation techniques, that recognized the time value of money, were not widely used by businesses. During the 1950s, practicing controllers began to network with each other, with consultants, and with academics (Dean, 1951, 1954; Klammer, 1972; National Association of Accountants., 1959a, b).

Fig. 2, Panel B shows the 50-yr history of capital budgeting research. This research began when academics began using field studies to examine the practices firms used to create and evaluate capital budgets (Berg, 1965; Bower, 1970; Istvan, 1961a). Later, as DCF concepts began to diffuse, researchers turned toward documenting that diffusion process through survey research (cf. Fremgen, 1973; Graham & Harvey, 2001; Klammer et al., 1991; Pike, 1983).

Operations researchers, interested in the mathematical logic associated with discounting procedures, created methodologies to deal with the many variations in cash flows, operations, and financing faced by firms. Experimental research focusing on individual investment decision-makers' cognitive impacts began

Table 6. *Capital budgeting post-audit-related research.*

Topic and authors	Characterizing assumptions	Implications for capital budgeting
Istvan (1961a)	Field studies of capital budgeting can reveal post-audit procedures used in companies	Post-audits were carried out by project originators and used as an aid for improving their own forecast
Rockley (1973)	A survey of managers can identify whether post-audit procedures are useful to management	Post-audit reports were not used for corrective action
Scapens & Sale (1981, 1985)	Divisional decentralization should be associated with accounting controls. In particular, decentralized investment decision making should be associated with post-completion audits	Analyzed capital budgeting practices of UK and US firms. Although 84.2% of US and 36.3% of UK firms reported using post-auditing, the audit was not used to evaluate either the project originator or abandon unprofitable projects. The results did not support the hypothesized relationships
Pike (1982, 1984, 1986), Pike & Wolfe (1987)	Surveys of managers can identify the use of post-audit procedures	These studies show a steady increase in the use of post-auditing for investments by companies over time
Myers et al. (1991)	Previous firm surveys about the use of post-audits in capital budgeting overstate the use of this procedure	Results showed that 213 (76%) of 282 respondents from a population of 690 large US companies conduct post-audits. However, only 47% (34%) conducted regular post-audits of strategic (administrative) assets. In addition, authors conclude that only 71 (33.3%) firms had adequate post-audit procedures
Gordon & Smith (1992)	The effectiveness of investment post-audits is related to information asymmetry, capital intensity, amount of capital expenditures, and ownership structure	Found that firm performance (long-term excess return to shareholders) is a function of the appropriate match between post-audit sophistication and firm-related variables
Neale & Buckley (1992)	The observed differences between post-audit rates in the US subsidiaries operating in the UK and UK firms can be explained by management control and systems control	The differences in post-audit activity between US subsidiaries in the UK and UK firms are not driven by environmental factors, but are a direct result of ownership. That is, US parent organizations export their post-audit control systems
Pierce & Tsay (1992)	There is limited US historical evidence about post-audit importance and its association with company size, capital intensity, number of projects or project size	Two surveys of Fortune 500 firms, taken 10 yr apart, are analyzed to show that post-completion audit practices changed very little between 1978 and 1988
Smith (1993)	Informational impediments and management conflicts of interest result in dysfunctional abandonment decisions	A sample of 62 firms showed that a firm (not) having an investment monitoring system had a (negative) positive relationship between abandonment decisions and firm performance
Chenhall & Morris (1991)	Post-audit information is more valuable for managerial learning when the environment is more stable	Survey information from 85 managers supported a two-stage process where environmental uncertainty moderates learning in the first stage and learning affects future performance in the second stage
Azzone & Maccarrone (2001)	Post-audit processes have three phases: early start-up, intermediate operational, and final end of life cycle	Survey of 124 Italian firms garnered 34 responses where 24 firms had adopted a post-audit system

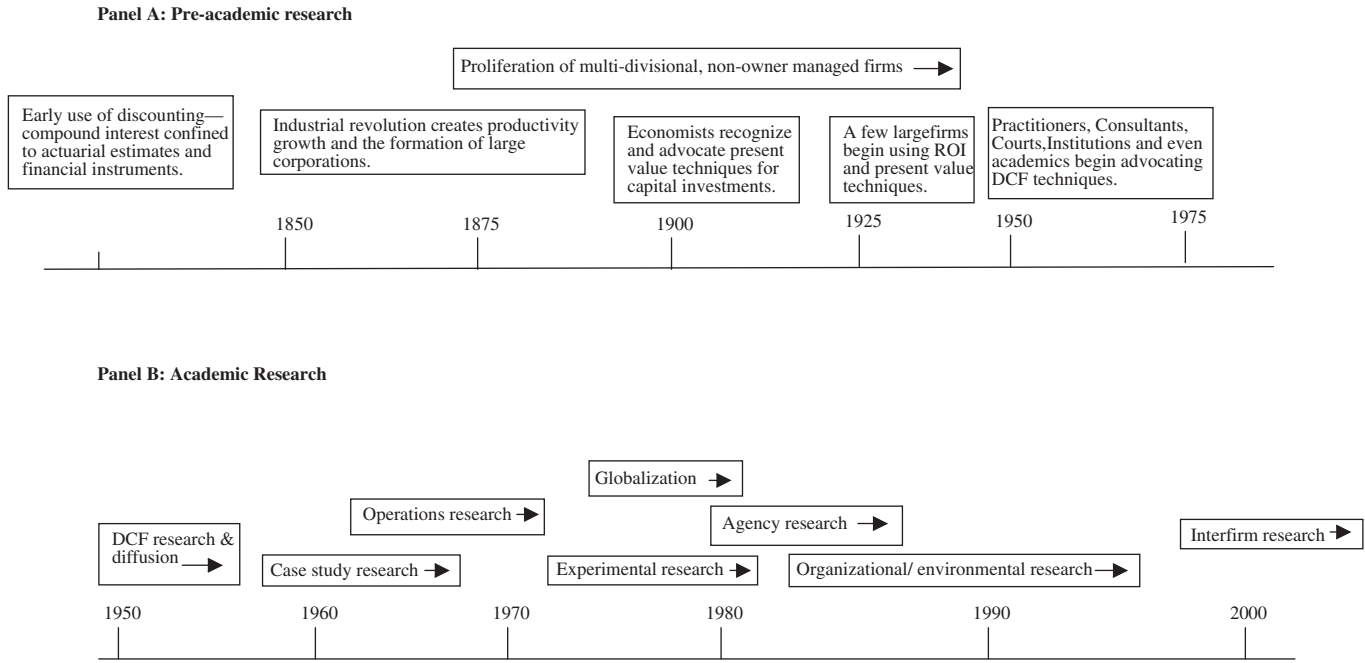


Figure 2. Evolution of capital budgeting techniques and processes and related research.

in the mid-1970s and later expanded to include group impacts on individual decision makers. Agency theory that developed in the late 1970s and early 1980s gave rise to analytical models of capital investment processes. These models suggest that current capital budgeting procedures are a means of reducing agency costs. Finally, beginning in the early 1980s, organizational and environmental research used a variety of survey and field-based methods to try to explain current capital budgeting practices as a response to environmental (e.g., competition or uncertainty) and organizational (complementarities or asset specificity) situations. The methodological variety and rich set of topics in published research on capital budgeting result in triangulations where common themes emerge.

### *7.2. What have We Learned?*

Survey and historical research shows that the diffusion of capital budgeting financial evaluation techniques has been fairly rapid and were abetted by practitioners (Charlesworth & Rhodes-AT&T, 1925; Gregory & Hill-Atlantic Refining, 1946), consultants (Dean & Anthony, 1950s), institutions (Miller, 1991-British Govt.; US courts, 1956), associations (MAPI-Terborgh, 1949; NSBB, 1953; NAA, 1950s), and academics (Anthony, 1956; Dean, 1954; Lorie & Savage, 1955).

Field and experimental research shows that human characteristics play a significant role in investment decision making and in the creation of capital budgeting internal control processes. Field studies reveal that investment decision makers view the capital budgeting process as a game and respond to the incentives in the game (Berg, 1965; Bower, 1970). Experimental research suggests that cognitive processes affect decisions. Studies show opportunity costs are underweighted (Becker et al., 1974; Friedman & Neumann, 1980), escalation occurs and abandonment is difficult (Jensen, 1986; Kanodia et al., 1989; Staw, 1976) and knowledge structures and cognitive styles affect decisions (Chenhall & Morris, 1991; Vera-Muñoz, 1998). Other research shows incentives and utilities can cause non-goal congruent decisions (Rutledge & Karim, 1999; Staw, 1976). Group and team-related research shows decision making in groups can strengthen an individual's escalation disposition (Chalos & Poon, 2000; Rutledge & Harrell, 1993).

Many research studies support the role of information asymmetry as an explanation for the existence of a variety of capital budgeting processes and controls (Antle & Eppen, 1985; Ghosh, 1997; Harrell & Harrison, 1994). Research on organizational control systems shows that long-term contracts help alleviate

information asymmetry (Antle & Fellingham, 1990; Haka, 1987; Larcker, 1983); that the principal will trade off costly auditing for agent spending limits to counter empire building (Harris & Raviv, 1996, 1998); and that information systems can motivate (or hinder) a diligent search by the managers (Antle et al., 2001; Arya et al., 2000; Larcker, 1981). Agency costs (due to both information asymmetry and risk) have been shown to motivate the use of a different capital charge rate for residual income and a separate hurdle rate for investment appraisal (Baldenius, 2003; Christensen et al., 2002). Finally, some research shows the control system can hinder the consideration of complimentary investments (Carr & Tomkins, 1996; Miller & O'Leary, 1997; Shank, 1996) because the control system creates information asymmetries.

Research investigating environmental factors has shown more sophisticated evaluation tools and procedures do not translate into better performance in the market place (Baldwin & Clark, 1994; Haka et al., 1986; Jensen, 1993; Kim, 1975; Klammer, 1973). The investment opportunity set is critical. In addition, institutional factors can play a significant role in capital budgeting procedures and decisions (Cooper & Selto, 1991; Miller, 1991). Environmental uncertainty affects the use and importance of various capital budgeting techniques for evaluating investment decisions (Chen, 1995; Haka, 1987). A limited set of research has investigated cross-border diffusion of capital budgeting processes. This research shows diffusion occurs through firm alliances such as joint ventures (Firth, 1996; O'Connor et al., 2004). Finally, recent research shows that inter-firm relationships affect the investment opportunity set (Baiman & Rajan, 2002).

### *7.3. What might We Want to Learn?*

Although Josiah Wedgwood may not have completed official post-investment audits, Pollard's (1965) work suggests entrepreneurs of his time paid careful attention to the returns from their investments. It is not clear that the same attention is provided by non-owner managers. One issue for research consideration is why does post-investment appraisal seem to be ineffective? Research shows that companies do not use capital investment audits very extensively and when they do perform such audits, they do not seem to result in termination or abandonment of non-performing investments.

Consequently, researchers wonder why firms' internal control mechanisms do not help avoid excess expenditures of free cash flow in the first place. That is, upper management and boards of directors continue to fund capital projects that are likely to underperform (based on Jensen's (1993) analysis). Are

there internal control practices that could be identified and implemented in firms to help avoid investing in non-performing projects when excess free cash flow is present? If researchers better understood how the top-level control structure (Board and CEO and upper management) interacted to effect investment decision making and control, perhaps post-audits could be used more effectively.

A comprehensive research program is necessary to determine how the product factor markets, the capital markets and the legal/political/regulatory systems interact with firms' internal control systems to discipline managers' investment decision making. Most research to date has been piecemeal, looking at only parts of this challenging question. Related issues are how firm ownership structures interact with the markets and regulatory systems to affect investment decision making and control.

Other important research areas, identified by early case study researchers (Berg, 1965; Bower, 1970; Istvan, 1961a), remain to be addressed. For example, early case study research emphasized the importance of the information search process. Yet, little has been done to study organizational structures that encourage (inhibit) information search and learning about investment opportunities. Additional research about the cognitive factors that affect investment decision making (e.g., knowledge structure, cognitive style, and affective reactions) could provide important information about why chosen investments do not always provide promised returns. Another issue is related to differences in the time horizons of owners, managers, and investments. Systematic differences in these horizons could explain investment controls and/or resulting investment decisions.

Finally, only limited speculation has been devoted to considering how factors such as internal controls, decision-makers' cognitions, and the investment environment interact to affect capital acquisition. The rich tapestry that surrounds capital budgeting processes and investment appraisal differs significantly from the processes used by early entrepreneurs such as Josiah Wedgwood. Gaining a more complete understanding of the current capital investment ecosystem should make available significant global benefits associated with the more efficient and effective use of capital.

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# Management Accounting and Operations Management: Understanding the Challenges from Integrated Manufacturing

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**Abstract:** Innovations in operations management, like just-in-time, total quality management, automation, have produced a new manufacturing paradigm that challenges management accounting design and practices. The new manufacturing paradigm, which we conceptualise as integrated manufacturing, focuses upon the lateral flow of products and services, and thereby confronts management accounting ideals of hierarchical flows of information for planning and control. In this chapter, we take a closer look at management accounting research and the responses that have been made to the challenge from the new operational practices. We examine the extent to which changes in management accounting practices are observed, and the way in which design changes are recommended within organisations committed to the new manufacturing paradigm. Furthermore, we reflect upon the role of accounting as a management tool in integrated manufacturing, and on possible future research questions, so as to enrich our knowledge of the management accounting/operations management interface.

## Introduction

Innovations in operations management (OM) have challenged management accounting (MA) for more than two decades (Berliner & Brimson, 1988; Cooper, 1995; Johnson, 1992; Kaplan, 1983, 1990; Maskell, 2003). Automation, just-in-time (JIT) and total quality management (TQM) are examples of practices that have changed manufacturing systems (Hayes & Wheelwright, 1984; Schonberger, 1986, 1996; Womack et al., 1991) and are today considered to be basic elements in the OM discipline, and pivotal in the pursuance of competitiveness. Like MA, OM is a discipline with its own propositions for how to manage organisations. Where MA is based on accounting numbers in hierarchical flows of information enabling planning and control, OM is more concerned with technological, architectural and organisational principles established to facilitate the lateral flow of goods and services. Myriads of new OM techniques such as CAD/CAM, kanban, cross-functional teams and process mapping ingrained in JIT, TQM or automated practices focus on the integration of functional departments, activities and organisational goals, and

change the very nature of the planning and control tasks in operations, which, in turn affect the role of MA.

The aim of this chapter is to discuss innovations in OM from an MA point of view. We start by characterising the new manufacturing paradigm—how can it be conceptualised and what does it consist of? In addition, we analyse how the challenge from the new manufacturing paradigm has been portrayed in MA research—we examine the extent to which changes in MA practices have been observed, and whether new MA designs are recommended by the research. We also reflect upon the role of MA within the new manufacturing paradigm, and point to possible research questions for future research.

In this chapter we draw on Dean & Snell's (1991) notion of *integrated manufacturing*, in order to understand and conceptualise the distinctive features of innovations in OM and the new manufacturing paradigm. Dean & Snell characterise the new manufacturing paradigm as being made up of three practices—automation, TQM and JIT, which in turn are related to a wide range of sub-practices and techniques. These

include substantial architectural, organisational and technological innovations proposed within the OM discipline in recent years, which represent the ambition to integrate stages, functions and goals in the manufacturing process of world-class manufacturing (Hayes & Wheelwright, 1979; Schonberger, 1986, 1996) and lean production (Krafcik, 1988; Womack et al., 1991; Womack & Jones, 1994, 1996b).

Thus, the aim in this chapter is to understand the responses that have been made within the MA discipline in regard to new operational practices. We intend to describe the literature that directly addresses the challenge from integrated manufacturing and the changing characteristics of MA design and practices that have been appointed. Subsequently, we will reflect upon possible research questions for the future, in order to gain new insight into the relationship between MA and OM.

The remainder of the chapter is structured as follows. In the next section, we introduce the new manufacturing paradigm. In particular, we focus on Dean & Snell's (1991) term 'integrated manufacture', which is the representation we apply to modern OM practices. In Section 3, we describe how the challenge from innovations in OM has been debated in MA research, and discuss in particular the roles of new organisational forms, performance measurement, cost calculations, standard and target setting, and reward systems. These issues are important, in terms of understanding how OM has been related to MA in research. Section 4 discusses the messages gathered from our review of the research. Finally, we make concluding remarks and present perspectives for future research in the field between MA and OM.

## 2. Innovations in OM—Pursuing Integrated Manufacturing

Several analyses of recent years' innovations in OM can and have been made. In this chapter, we draw on Dean & Snell's notion of integrated manufacturing (Dean & Snell, 1991) to conceptualise the new manufacturing paradigm. Integrated manufacturing encompasses JIT, TQM and automation, and characterises the new manufacturing paradigm as a matter of integration. However, before we describe Dean & Snell's conceptualisation in more detail, we would like to present a few pioneering attempts to make strategic manufacturing priorities in firms—Skinner (1969, 1974) and Hayes and Wheelwright (Hayes & Wheelwright, 1979, 1984; Wheelwright & Hayes, 1985)—who present the argument for heightened attention to manufacturing in the modern world. They point to the lack of competitiveness in American manufacturing industries compared to

Asian and European manufacturers in the 1970s and 1980s (see also Clark et al., 1985; Teece, 1987), and the urge to rethink manufacturing and the principle of OM, and by doing so, they set the stage for integrated manufacturing and the roles of automation, JIT and TQM.

### 2.1. Putting OM on the Strategic Agenda

Skinner (1969, 1974) was one of the first to point to the strategic role of manufacturing/operations. He suggested that factories which focus on a limited set of tasks will be more productive than similar factories with a broader array of tasks (Schmenner & Swink, 1998; Skinner, 1974). Skinner's response to 'the productivity crisis' in the early 1970s in the US was to offer an optimistic view, suggesting that what was needed was not to feel powerless in competing against cheaper foreign labour. Instead, manufacturers had the opportunity to change the management of manufacturing (Skinner, 1974, pp. 113–114). From his study of approximately 50 plants in six industries, he pinpointed three concepts in focused manufacturing which he considered dealt with the productivity dilemma: (1) there are many ways to compete besides producing at low costs, (2) a factory cannot perform well on every yardstick, (3) simplicity and repetition breed competence (*ibid.*, p. 115).

Table 1 compares the conventional factory with the focused factory. Skinner emphasises that the aim is 'to focus the entire manufacturing system on a limited task precisely defined by the company's competitive strategy and the realities of its technology and economics. A common objective produces synergistic effects rather than internal power struggles between professionalized departments' (Skinner, 1974, pp. 118–119). This approach is assisted by focussing the factory's relative competitive ability. Moreover, it is supported by avoiding the tendency to add staff and overheads in order to save on direct labour and capital investment, and by letting each manufacturing unit work on a limited task instead of the usual complex mix of conflicting objectives, products and technologies (*ibid.*, p. 119).

Like Wickham Skinner, Robert H. Hayes and Steven C. Wheelwright also discussed the factors that explain the poor competitiveness of American industries in the 1970s and 1980s. Hayes and Wheelwright coined the term 'world class manufacturing' (Hayes & Wheelwright, 1979, 1984; Wheelwright & Hayes, 1985). They developed world-class manufacturing based on in-depth analysis of the practices implemented by Japanese, German and US firms that exhibited outstanding performance. Hayes & Wheelwright (1984, p. 375) offer six design suggestions: (1)

Table 1. *The conventional and the focused factory (Adapted from Skinner, 1974, p. 120).*

Production system elements	Conventional factory	Focused factory
Equipment and process policies	One large plant; special purpose equipment; high-volume tooling; balanced capacity with functional layout → Low manufacturing costs on steady runs of a few large products with minimal investment.	Separate old, standardised products and new, customised products in two plants within a plant (PWP). New PWPs provide general purpose equipment, temporary tooling and modest excess capacity with product-oriented layout.
Workforce management policies	Specialised jobs with narrow job content; incentive wages; few supervisors; focus on volume of production per hour → Low costs and efficiency.	Create fewer jobs with more versatility. Pay for breadth of skills and ability to perform a variety of jobs. Provide more foremen to solve technical problems at the workplace.
Production scheduling and control	Detailed, frequent sales forecasts; produce for inventory, economic lot sizes of finished goods; small, decentralised production scheduling group → Short delivery lead times.	Produce to order, special parts and stocking of common parts based on semi-annual forecast. Staff production control closely schedules and centralizes the movement of parts.
Quality control	Control engineers and large inspection groups in each department → Extremely reliable quality	No change
Organisational structure	Functional; production control under superintendents for each area; inspection reports to top → Top performance of the objectives of each functional department, i.e. many tasks.	Each PWP is organised by programme and project, in order to focus organisational efforts on bringing new products into production smoothly, and on time.

build the skills and capabilities of your work force, (2) build technical competence throughout management, (3) compete through quality, (4) develop real worker participation, (5) rebuild manufacturing engineering, (6) tortoise and hare approaches to industrial competition. Furthermore, Hayes and Wheelwright emphasise incremental improvement practices rather than strategic leap changes in corporate development.

## 2. 2. *Integrated Manufacturing*

One of the complexities involved in understanding the challenges from the new manufacturing paradigm arises from the fact that innovation in OM cannot be represented by a single principle. For instance, the work of Skinner and Hayes & Wheelwright is reflected in other conceptualisations of competitive manufacturing systems, such as [Schonberger's \(1986\)](#) world-class and [Womack et al.'s \(1991\)](#) and [Womack & Jones \(1996a\)](#) lean manufacturing systems, and each commentator emphasises different elements and techniques in their description of how a competitive manufacturing system should be obtained. Thus, myriads of techniques such as kanban control, lot size

reduction, scheduling, setup time reduction, statistical process control, cellular manufacturing, flexible specialisation, poka-yoke, cross-functional teams and employee involvement are mobilised as constituents of the new manufacturing paradigm.

In this chapter we draw upon [Dean & Snell's \(1991\)](#) notion of integrated manufacturing, as it conceptualises the new manufacturing practice in three practices: advanced manufacturing technology (automation), JIT inventory control and TQM. Advanced manufacturing technology, TQM and JIT inventory control work in concert to transform manufacturing organisations, and they complement one another. For example, JIT enhances total quality, because a reduction in inventory exposes quality problems that were previously hidden, and total quality facilitates JIT, because poor quality is one of the main reasons for maintaining 'just-in-case' levels of inventory. Advanced manufacturing technology may also be closely linked with total quality and JIT. For example, [Majchrzak \(1988\)](#) observed that 'flexible automation creates an increased dependence on quality control'. However, [Warner \(1987\)](#) argued that these techniques can substitute one another, with a company using JIT

or TQM in place of advanced manufacturing technology. Moreover, MA researchers have commented upon the complexities of framing operational innovations (Chenhall, 1997; Mia, 2000) and different researchers draw upon different conceptualisations. For instance, Ittner & Larcker consider TQM to form the foundation for other advanced manufacturing techniques such as JIT production, flexible manufacturing and business process reengineering, whereas Banker et al. consider TQM to be one of four elements in modern manufacturing practices.<sup>1</sup>

In order to understand the role of the individual elements in integrated manufacturing, we draw on the notion of complementarities put forward by Milgrom & Roberts (1995). They see complementarity as a way of giving precision to the notions of 'fit' and 'synergies' among the elements of an organisation's strategy and structure. Complementarity means that

<sup>1</sup>Banker et al. (1993b) measure new manufacturing practice on four scales:

- 1) JIT Scale
  - i) Our schedule is designed to allow time for catching up, due to production stoppages for quality problems.
  - ii) Direct labour undergoes training to perform multiple tasks in the production process.
  - iii) Plant employees are rewarded for learning new skills.
  - iv) We usually meet the production schedule each day.
- 2) TQM Scale
  - i) Workers are rewarded for quality improvement.
  - ii) If I improve quality, management will reward me.
  - iii) Production is stopped immediately for quality problems.
  - iv) I inspect my own output.
- 3) Teamwork Scale
  - i) During problem-solving sessions, we make an effort to get all team members' opinions and ideas before making a decision.
  - ii) Our plant forms teams to solve problems.
  - iii) In the past 3 yr, many problems have been solved by small group sessions.
- 4) Decentralisation Scale
  - i) I can do almost anything I want without consulting my boss.
  - ii) Even small matters have to be referred to someone higher up for a final answer (reverse scale.)
  - iii) This plant is a good place for a person who likes to make his own decisions.
  - iv) Any decision I make has to have my boss's approval (reverse scale).
  - v) There can be little action taken here until a supervisor approves a decision (reverse scale).

activities are complements, doing (more of) any one of them increases the returns from doing (more of) the others (*ibid.*, p. 181). Thus, the idea is that value is created when elements of integrated manufacturing are clustered in ways that exploit potential complementarities between the various elements. Following Milgrom & Roberts' successfully integrated manufacturing systems, links develop between elements of integrated manufacturing such as kanban systems, higher quality in production marked by fewer defects, speedier communication with customers and processing of orders, reduced lot sizes with correspondingly lower levels of inventory, speedier delivery from inventory, lower setup and wastage and lower marginal costs of product redesign. Complementarities also explain why it is difficult to change a system, and why centrally directed change may be important for altering systems. Changing just a few of the system's elements at a time to their optimal values may not achieve the benefits that are available from a fully coordinated move, and may even have negative payoffs (Milgrom & Roberts, 1995, pp. 190–191).

For this reason, the intertwining of the three manufacturing practices is neither coincidental nor superficial. Dean & Snell (*ibid.*, p. 778) propose that each of the practices represents a different facet of integrated manufacturing, a paradigm of manufacturing management whose core concept is the elimination of barriers between different aspects of manufacturing operations.

*Advanced manufacturing technology* (automation) includes computer-based technologies such as computer-aided design, engineering, manufacturing and process planning (CAD, CAE, CAM and CAPP). These technologies are sometimes combined into flexible or computer-integrated manufacturing systems (FMS, CIM), where the potential for integration is a key characteristic of advanced manufacturing technology.

*Just-in-time* (JIT) is a system for reducing 'lead time', inventory and thereby cost. With JIT, plants receive purchased parts just in time for use in manufacturing (Schonberger, 1986; Womack et al., 1991). A number of other techniques relate to the JIT concept. For example, the kanban system of minimising work-in-process inventory by using cards to pull parts through a factory is often associated with JIT control. Other related techniques include minimising lot sizes by reducing machine setup and changeover times, and establishing close working relationships with a small number of suppliers.

*Total quality management* (TQM) is the most elusive of the three components of integrated

manufacturing, because of the many connotations of the term 'quality'. Like JIT, total quality involves a few, relatively simple central concepts, and what Dean and Snell call 'an amorphous array of peripheral associated practices'. The core ideas include doing things right the first time, striving for continuous improvement and understanding and meeting customer needs. Associated practices include statistical process control, quality function deployment and Taguchi methods. Quality was initially limited to factory floors, but total quality is now understood to apply to all areas of enterprises.

Companies eliminate barriers in three ways: (1) integrate the stages of production, (2) integrate functional departments and (3) integrate manufacturing goals. Thus, Dean and Snell talk about three different forms of integration: stage integration, functional integration and goal integration.

With regards to stage integration, Dean & Snell (1991, p. 778) emphasise that 'the practice underlying integrated manufacturing integrates the stages of manufacturing processes in terms of time, space and information. JIT eliminates work-in-process buffers between production stages, and any steps, such as the movement of parts, that do not add value to the product. Consistent with total quality's premise of doing things right the first time, inspections and rework between stages are also eliminated. Companies practicing these techniques often create "cells" in which machines performing successive operations on similar products are located adjacent to one another in a plant. Such measures dramatically reduce time and space between stages'. Table 2 summarises these ideas.

Dean & Snell (*ibid.*, p. 779) say that integrating functions is the second key aspect of integrated manufacturing. Advanced technology promotes functional integration by linking departments electronically, and by providing access to common databases. Total quality control promotes integration by encouraging people to focus on their internal customers, that is, members of other subunits of the organisation who rely on others' work in order to accomplish their own work. Total quality's problem-solving processes also require collaboration among diverse functions. Along the same lines, JIT's goal of throughput time reduction 'cuts across many factory fiefdoms—equipment, layout, quality, materials handling, production planning, inventory control and cost accounting' (Schmenner, 1988). Thus, integrated manufacturing integrates diverse functions in terms of information, focus and responsibility, and thereby breaks down traditional departmental barriers.

Dean & Snell (*ibid.*, p. 779) argue that goal integration concerns the three strategic goals of

manufacturing—cost, quality and lead time—involving in synergies rather than trade-offs (Schonberger, 1986). This was first appreciated when quality experts (e.g. Crosby, 1979) recognised that poor quality transcended the commonsense trade-off between quality and cost. Schmenner (1988) and others argue that JIT's focus on lead-time reduction forces managers to make changes, such as in factory layout, that improve both quality and cost. This logic differs radically from the logic of trade-offs among strategic goals that it replaces. Thus, integrated manufacturing also has integrated objectives.

The trade-off perspective can be traced back to the seminal work of Skinner (1974), who described the various strengths and weaknesses of organisations, and how they can be used as a means of differentiation from competitors. Likewise, production systems have different operating characteristics. Skinner states that the task of manufacturing strategy is to configure production systems to reflect the priorities and trade-offs inherent in an organisation's competitive situation and strategy. Hayes & Wheelwright build on these ideas when they state: 'It is difficult (if not impossible) and potentially dangerous for a company to try to compete by offering superior performance along all of these dimensions simultaneously, since it will probably end up second best on each dimension to some other company that devotes more of its resources to developing that competitive advantage' (Hayes & Wheelwright, 1984, p. 41). A number of authors have questioned whether there are necessarily trade-offs between competitive priorities. Ferdows & DeMeyer (1991), although acknowledging that trade-offs sometimes exist, argue that they can be avoided by adopting a cumulative approach, which begins by establishing a strong foundation of high-quality operations. Hill (1988) observed two weaknesses in the trade-off perspective. First, manufacturing does not have a unique, low-cost position; Hill demonstrated that differentiation can be a means of achieving an overall, low-cost position. As mentioned above, this is consistent with the 'quality free' discussion of quality by Crosby (1979). More recently, reflections on hypercompetition (D'Aveni, 1994) have criticised the trade-off perspective. D'Aveni notes that a dynamic approach should incorporate the way in which competitors react, and relate to all four bases of competition: cost and quality, time and know-how, strongholds and deep pockets.

Dean and Snell summarise the roles of automation, JIT and TQM as follows: 'each of the focal manufacturing practices contributes to the realization of integrated manufacturing. In a pure case, the

Table 2. Comparison between integrated and conventional manufacturing (Adapted from Dean & Snell, 1991, p. 780).

Dimensions	Conventional manufacturing	Integrated manufacturing
Stages	Successive value-added stages are buffered by moving, storing and inspecting parts. Tests and rework are often necessary. Work-in-process inventory is used to decrease interdependence between stages. Activity that adds no value predominates.	Stages are integrated in terms of time, space and information. Advanced manufacturing technology integrates stages electronically, just-in-time inventory control eliminates work-in-process inventory, and total quality management reduces rework, test and inspection. Value-added activities predominate. Machines are grouped to reduce moves between stages.
Functions	Functional responsibilities are clearly differentiated. People are not concerned with problems in other functions. Functions use different information systems and databases.	Continuous improvement (total quality management) requires cross-functional problem-solving and focus on internal customers. Advanced manufacturing technology promotes common databases. Throughput time reduction (just-in-time inventory control) requires collaboration across functions.
Goals	Firms see themselves as trading off cost, quality and lead time. Employees in each function strive to achieve only one goal, at the expense of the function's goals.	Firms see goals as compatible rather than in opposition, especially when reducing lead time. Good quality costs less. Functions strive to improve all goals simultaneously, advanced manufacturing technology and total quality management facilitate this process.

system would involve a streamlined flow of automated, value-added activities converting raw materials into finished goods, uninterrupted by moving, storage or rework. All functions are connected electronically, with a cooperative focus on continuous improvement in cost, quality and lead time. In short, integrated manufacturing eliminates barriers between stages and people, making possible the joint pursuit of several strategic manufacturing goals'. (*ibid.*, pp. 780–781)

In this chapter, we argue that innovation in OM typically deals with the lateral flows within and beyond the firm. Like MA, OM is concerned with the transformation of inputs into outputs, but in contrast to MA, OM develops and explicates how this transformation takes place in detail. In a sense, while MA is concerned with juxtaposing a series of questions about decision making, responsibility and accountability on the process of transformation, automation, TQM and JIT are more focused on the specific steps in the transformation process. As a consequence, the objects of OM are related to throughput mechanisms including the design of manufacturing and service production systems, the design of products and services, the design of relations beyond the firm, the design of (factory) layout and the flow of services and products, the design of production and service

technology and also the design of work organisation. This is a very broad spectrum of objects, which testifies that OM attempts to develop propositions about most things in a firm: the only caveat is that these objects have to be subordinated to the flow of the product or service in the supply, manufacturing and consumption processes.

### 3. Challenges from Innovations in Operations Management from a Management Accounting Point of View

MA research has considered innovations in OM to pose a challenge for more than two decades (Berliner & Brimson, 1988; Bromwich & Bhimani, 1994; Johnson & Kaplan, 1987; Kaplan, 1983, 1984, 1990). In this section, we analyse the responses to the new manufacturing paradigm given in MA research. As mentioned above, we draw on Dean & Snell's (1991) notion of integrated manufacturing in our understanding of the new manufacturing paradigm. However, in the review it is the individual researcher's own definition of integrated manufacturing—related to automation, TQM or JIT — which forms the basis for characterising the relationship between MA and OM.

Figure 1 identifies five challenges related to integrated manufacturing that are addressed in the MA

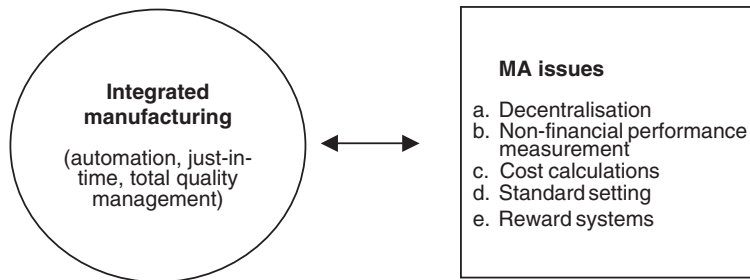


Figure 1. OM challenges from a MA perspective.

research: (a) decentralisation, (b) non-financial performance measurement, (c) cost calculations, (d) standard setting and (e) reward systems. These five challenges are not a comprehensive list of all aspects addressed in the MA research focussing on innovations in OM. However, we believe that these points give a representative picture of how the MA research has responded to the challenge from integrated manufacturing.

Our discussion of how innovations in OM affect innovations in MA has a number of parallels with Wruck & Jensen's (1994) analysis of the changes following from TQM. Wruck & Jensen argue that the effective use of TQM requires changes to three components of the 'organizational rules of the game' (distribution of decision rights, performance measurement systems and reward/punishment systems). Thus, changing the organisational rules of the game by introducing new operational practices can be related to the decentralisation of decision rights (a), the performance measurement system ((b)–(d)) and the reward systems that tie both monetary and non-monetary rewards to performance (e). These issues will be addressed, one by one, in the following sections.

### 3.1. Decentralisation

Integrated manufacturing is closely related to decentralisation or empowerment (Hayes & Wheelwright, 1984; Schonberger, 1986; Womack & Jones, 1996a), as it is presumed to improve coordination and motivation in the new operational setting. Workers on the shop floor and in teams (rather than top management) have the knowledge of how to operate, and are able to swiftly adapt to changing conditions. The complexities and dynamics which are often present in new operational settings are presumed to be dealt with by means of a lateral rather than hierarchical coordination, in order to ensure quality, flexibility, innovation and productivity in operations (Hayes & Wheelwright, 1984; Womack et al., 1991). New organisational devices such as multi-skilled workers, the

use of cross-functional teams and self-management principles, which may be related way back (Galbraith, 1973; Thompson, 1967), are considered to be a response to the complex and dynamic environments that require fast and innovative responses, as these organisational forms encourage cooperation and coordination among functional subunits. Moreover, decentralisation is often presumed to raise motivation, as responsibility is considered to be a driving force (Schonberger, 1986). Thus, 'organic' organisational forms (Parthasarthy & Sethi, 1993) are presumed to replace more 'mechanical' forms in terms of planning as well as control.

As MA research has been addressing the point that decentralisation affects the role of accounting in terms of planning as well as control for decades (Bruns & Waterhouse, 1975; Chenhall & Morris, 1986; Libby & Waterhouse, 1996; Merchant, 1981), it has been important for MA research to confirm whether integrated manufacturing actually leads to decentralisation and distribution of responsibility to lower levels within the organisation. For instance, Fullerton & McWatters (2002) report that firms implementing a higher degree of JIT elements, such as lean manufacturing practices, quality improvements and kanban systems, are more likely to increase empowerment in decision making, and the question of decentralisation is confirmed as pivotal by many other MA researchers, in terms of understanding the role of accounting in integrated manufacturing (Ittner & Larcker, 1995; Wruck & Jensen, 1994).

In parallel with the hypothesis that organic rather than mechanical organisational forms are present in integrated manufacturing, Abernethy & Lillis (1995) examine the extent to which firms pursuing flexible manufacturing strategies increase the use of integrative liaison devices to reduce the rigidity of functional structures.<sup>2</sup> They hypothesise that spontaneous contact and 'integrative liaison devices' (such as task forces and committees) allow regular, personal and intensive contact among experts and decision makers



from different departments, greatly facilitating collaboration among functional units, and that these coordination mechanisms provide a means of breaking down the functional barriers imposed by mechanistic organisational structures (*ibid.*, p. 244). They find a correlation between flexibility and the use of integrative liaison devices such as cross-functional teams, as means of avoiding the need to rely on performance measurements to promote coordination in the direction predicted.

The relationship between the new organisational form and decentralisation is problematised by Selto et al. (1995), who studied organisational structure, context and processes simultaneously. Using archival and survey data, they report that misfits between the worker empowerment required by JIT/TQM practices and existing authoritarian management styles partially explain relative workgroup performance, as do other conflicts within workgroups, and between operators and supervisors. Selto et al. (1995) found the role of top managers important in these lateral flows in which employees are supposed to be empowered, and issues of coordination and control ingrained in mutual interactions that transcend stages and functions in the manufacturing system. Young & Selto (1993) also find poor relationships between workgroup-based organisational design and performance measurement.

Wruck & Jensen (1995) observed how the distribution of responsibility to teams lead to a 'team mania' in their field study of TQM efforts in Sterling Chemicals, in which there were too many teams for managers to direct, and many teams worked diligently on relatively unimportant or poorly defined problems. Moreover, teams that did manage to develop valuable ideas had no organisational support for their implementation (*ibid.*, p. 262). Wruck & Jensen illustrate how Sterling addressed 'team mania' by forming a hierarchy of quality committees, and adopting a requirement that each quality team recruit a management sponsor and develop a one-page team chartering document, and how an efficient allocation of decision rights, according to Wruck and Jensen, separates decision making on the shop floor from decision control, while utilising the valuable specific knowledge of the team members.

The issue of decentralisation creates a tension between certain commentators' portrayal of the role of accounting in integrated manufacturing and MA principles. For instance, Johnson argues that 'business must eliminate top-down accounting-based controls. Accounting-based control information motivates the work force to manipulate processes for financial ends. Global competition requires companies to use bottom-up information that empowers the work force to control processes for customer satisfaction' (Johnson, 1992, p. 1). These ideas confront the presumption made in many MA texts (Anthony, 1965; Jensen & Meckling, 1992; Merchant, 1985) where decentralisation is inevitably linked with performance measures of the output of the individual responsibility centre. How far are the promoters of new operational literature willing to go? Does it mean that no top-down monitoring is necessary in these organisational settings? And does the notion of organic organisational forms, which is presented as an alternative to mechanical organisations forms, imply that no measurements are needed with regards to coordination? What about the role of transfer prices—new cost calculations that seem to account for the total cost of manufacturing and design practice—do they not play a significant role in terms of informing decision makers in the system of the externalities of their decisions—e.g. from the life cycle perspective? These questions will be addressed in more detail in the following sections.

### 3.2. Non-Financial Performance Measurement

One of the most common responses to integrated manufacturing in MA research is the importance of new non-financial performance measures, e.g. the reduction of waste, quality, flexibility, productivity (Dixon et al., 1990; Kaplan, 1983; Maskell, 1991). Kaplan (1983) was one of the first to announce that non-financial performance criteria had to be taken seriously in the design of MA for modern manufacturing. Wruck & Jensen (1994) discuss the characteristics of performance measures for TQM, and argue that TQM performance measures differ from traditional measures in three ways. First, they emphasise measurements of productivity and quality from the standpoint of the customer. The customer-oriented approach helps to prevent an organisation from becoming inwardly focused. Second, performance measures track day-to-day progress, and are operations-oriented rather than dollar-denominated. Such measures supplement, and sometimes even replace, traditional accounting measures such as product cost, labour rates, material or labour variances, and profitability. In TQM organisations, dollar-denominated

<sup>2</sup>Abernethy and Lillis refer to research from the strategic discipline, where research has identified the direct implications of manufacturing flexibility in the structural arrangements required to facilitate coordination of multifunctional tasks (Bowen et al., 1989; Nemetz & Fry, 1988; Parthasarthy & Sethi, 1993).

performance measures change form, and tend to be more disaggregated and functional or task-specific than traditional measures isolating the contribution of particular activities to performance. This helps employees to understand what actions they can take to improve overall performance. Young (1992) also points out that new performance measures are crucial in JIT settings. He argues that without appropriate measures to evaluate and control the critical measures of success in a JIT system, its level of performance could be incorrectly assessed.

Banker et al. (1993a, 1993b) find empirical evidence for a positive relationship between the accessibility of non-financial information on the shop floor and the existence of both TQM and JIT practices. Banker et al. (1993b) address whether the adoption of the new manufacturing practices necessitates changes in quality and the availability of productivity information to employees, and charts showing defects, schedule compliance and frequency of machine breakdown are posted on the shop floor. Using a sample of 362 worker responses from 40 plants, they conclude that reporting manufacturing performance measures (MPM) to line personnel is positively related to the implementation of JIT, teamwork and TQM practices. Worker morale is also positively related to new manufacturing practices and performance information. Thus, the expected linkage between manufacturing practices and performance reporting systems does exist.

Mia (2000) adds that this is because managers working in JIT manufacturing environments have little or no slack resources available to cushion against the difficulties caused by defective raw materials, production errors, irregular supply and demand schedules or to mask inefficiencies which makes the *performance-related information* provided by MA systems critical in such an environment. Mia's data from personal interviews with the financial controllers of 55 organisations located in Australia (of which 28 had adopted JIT and the rest had not) suggest that those organisations that have adopted JIT, and that have a high (low) provision of information, earn high (low) profits.

To better understand the role of non-financial performance measures, it is necessary to understand the purposes of the measures. The performance measures may serve the purpose of planning or control, and enable top-managers to intervene in integrated manufacturing. They *direct attention* to the goals of the integrated manufacturing system, as performance measures help strategy implementation, or ensure that employees on the shop floor *do not shirk* and pursue their own personal goals (March & Simon,

1958). In addition, non-financial performance measures may also be used in local information systems designed to facilitate operational learning and improvements (Jönsson & Grönlund, 1988).

### 3.2.1. Performance Measurement for Coordination

As manufacturing strategy changes towards a more integrated mode and quality, flexibility and innovation become critical success factors, so performance measures also have to change, as they have to direct attention towards new organisational goals (Nanni et al., 1992). This proposition has parallels to more general studies in MA research that report how strategy affects the design of management control systems (Govindarajan & Fisher, 1990; Govindarajan & Gupta, 1985; Langfield-Smith, 1997; Simons, 1987),<sup>3</sup> and it is supported by empirical research.

For instance, Daniel & Reitsperger (1991) study how quality strategies correlate with quality information in 26 Japanese automotive and consumer electronics firms. Quality strategy was measured by eight questions addressing whether managers adhere to a traditional economic conformance level (ECL) quality management strategy or a 'zero defect' quality management strategy. The result indicates that management control systems of a zero defect quality strategy are more likely to include regular goal setting and more frequent feedback on quality than those supporting an ECL quality strategy (Daniel & Reitsperger, 1991, p. 601). Ittner & Larcker (1997) also find that firms placing emphasis on quality in their competitive strategies tend to make greater use of quality-related strategic control practices, which implies that feedback on quality results (e.g. defect rates, cycle time, warranty claims, etc.) is reported to the management.

Moreover, Abernethy & Lillis (1995) suggest that the successful implementation of manufacturing flexibility requires a shift from manufacturing efficiency to interfunctional cooperation, using measures that take up customer-initiated demands. Citing Eccles (1991), they expect that firms pursuing flexibility will shift 'from treating financial figures as the foundation for performance measurement' to a broader set of measures designed to support flexibility in the form of strategic flexibility. These measures are likely to include qualitative and quantitative indicators of customer responsiveness, such as cycle times on product

<sup>3</sup>In fact, several studies in accounting research have documented that nonfinancial performance measures such as customer satisfaction (Ittner & Larcker, 1998b), defect rates and on-time delivery (Banker et al., 2000; Nagar & Rajan, 2001) are leading indicators of financial performance.

variations, delivery performance and an assessment of the ability of manufacturing to vary product characteristics or develop new products that are appropriate. Abernethy & Lillis find a significant negative correlation between flexibility and the use of efficiency-based performance measures (see also Perera et al., 1997). However, Lillis (2002) illustrates that profit centre strategy influences the formulation of performance measurement systems (PMSs), but she did not find that the choice of performance measures matches strategic orientation. The PMS here appears to be generic, a finding which is also confirmed by Ittner et al. (2003). In parallel, Fullerton & McWatters (2002) found only limited support for the proposition that employees on the shop floor also have a clearer understanding of company strategy when non-financial performance measures are introduced. Thus, apart from the fact that non-financial performance measures (in general) are common in integrated manufacturing systems, the empirical research does not explain as to how new manufacturing strategies determine the choice of specific non-financial performance measures.

### 3.2.2. Non-Financial Performance Measurement for Control

In integrated manufacturing systems, mechanisms like direct observation, mutual monitoring, self-management and even technology are referred to as mechanisms that will prevent employees from shirking when decision rights are distributed from the top to the bottom within the organisation. For instance, Alles et al. (1995) argue that monitoring by numbers is not as important in modern manufacturing systems as in traditional systems, because the relatively low stock level will not give employees the possibility of hiding or shirking. Alles et al. specifically analyse worker motivation and inventory level decisions in relation to management control and incentive systems when firms change to a JIT system. They argue that by reducing Work-in-Process (WIP) buffers, JIT improves the information available to managers by giving them better insight into the production process, and by facilitating their observation of bottlenecks in the line, and process flaws and improvements made by workers. Direct observation of the JIT production process provides effective visibility, and workers are not motivated to shrink and hide. Technology has ousted opportunism.

However, what is the role of performance measures in terms of control in such an organisational setting? To what extent are performance measures replaced as a control mechanism (by direct

observation, mutual monitoring, etc.), and to what extent are they used for control? Several studies, surveys (Drury & Tayles, 1994) and case studies (Jazayeri & Hopper, 1999; Lind, 2001; Patell, 1987), report that PMSs (not at least financial) still have significant roles to play, even though the situation has changed—e.g.

there are more cost centres in JIT settings (e.g. Foster & Horngren, 1987) and ‘pseudo’ profit centres have played a significant role in integrated manufacturing systems (e.g. Kaplan & Cooper, 1998). Furthermore, the units of responsibility often change from individuals to teams (Scott & Tiessen, 1999). Thus, new types of responsibility centre are emerging in integrated manufacturing, but the need for monitoring and control by means of measurement (both financial and non-financial) still remains.

### 3.2.3. Performance Measurement for Operational Decision Making and Learning

Another point is that central accounting systems or diagnostic systems (Simons, 1995) cannot pursue learning and improvement objectives as well as the local ones (Chew et al., 1990; Jönsson & Grönlund, 1988). For instance, Johnson (1992) says that information about operational improvement and learning differs from traditional accounting information, which represents what he labels remote control systems. Citing Wheelwright, he says that in order to increase workers’ problem-solving skills, new forms of information are needed so that it is possible to ‘determine what the problems are and how they ought to be solved... this, of course, requires a very different kind of information system, one that is real-time- and problem-identifying/problem-solving-oriented’ (Wheelwright, 1987, p. 90). From this point of view, the new non-financial performance measures seem to be decoupled from hierarchical accountability and pay-for-performance contracts.

Several authors discuss how decision-making responsibility is passed to lower levels of the organisation, and see an increased need for relevant information to support operations and decision making at these levels (Banker et al., 1993b; Scott & Tiessen, 1999). Grönlund & Jönsson (1990) point out that the supporting information required to manage local cost control differs from that of the top-down accounting system. The objective of a local information system is to detect causes of unacceptable performance registered in the central system. Thus, the local system is always complementary to the central one (Grönlund & Jönsson, 1990, p. 188), and Chew et al. (1990) say that local innovations concerning information should

be developed by independent production units, because active centralised management of the process can inhibit the development of new ideas. While Jaikumar's (1990) process control costing information is financial, it is not necessarily derived from the accounting system. In a sense, it comes 'bottom-up' from processes, not 'top-down' from central accounting systems. Baines & Langfield-Smith (2003) find that several of the non-financial measures concerning self-managed teams are very reliable—on-time delivery, material scrap loss and product defects. Non-financial measures relevant to managers for enhancing team development—employee education/training and team performance—also scored high. Baines & Langfield-Smith explain why firms place greater reliance on information which may support differentiation strategies by noting its ability to support team structures, and providing feedback on advanced manufacturing technology (Baines & Langfield-Smith, 2003, p. 692).

However, it is not clear to what extent the non-financial performance measures in integrated performance measures are part of the local and global PMSs in the individual organisational setting, and to what extent decoupling is necessary in terms of improving knowledge about operations and decision making. These issues are crucial in terms of understanding the role of non-financial performance measures in integrated manufacturing.

### 3.3. Cost Calculations

Changes in JIT systems, TQM practices, automation, etc., have not only been associated with new non-financial performance measures in the MA literature, but also with changes in cost accounting (see also Davila & Wouters (2006) in this handbook). It is claimed that changes in integrated manufacturing change the cost structure of organisations (Berliner & Brimson, 1988; Johnson & Kaplan, 1987). Increased logistical, balancing, quality and change transactions (Miller & Vollmann, 1985) affect the nature of costs in integrated manufacturing. In particular, the pursuit of flexibility, quality and through-put has initiated a debate about recalculating the cost of integrated manufacturing.

#### 3.3.1. Flexibility and Cost Accounting

Flexibility, an organisational goal in integrated manufacturing, is often considered to have an impact on cost accounting, and can be defined in numerous ways (Sethi & Sethi, 1990). In the accounting literature, it is often defined as the ability to produce a wide range of continually changing products with a minimal degradation of performance (Anderson, 1995; Banker et al., 1990; Foster & Gupta, 1990),

since the ability to produce diverse products at low costs is critical in integrated manufacturing systems (Schonberger, 1986; Womack et al., 1991). Cost allocation has been a favoured topic, and it is suggested that traditional absorption cost systems using volume-based allocation bases for allocating indirect costs are obsolete in modern manufacturing settings (Drucker, 1990; Kaplan, 1983, 1984, 1985; Miller & Vollmann, 1985). Integrated manufacturing differs significantly, since there is no correlation with production volume. Activity-based costing (ABC) has been presented as a solution for sorting out product costs (Cooper & Kaplan, 1988, 1991; Kaplan, 1988). ABC is seen to provide more accurate product cost information, which is needed in order to align with the new operational reality and provide useful accounting information for decision makers (Berliner & Brimson, 1988; Foster & Horngren, 1987; Johnson & Kaplan, 1987; Kaplan, 1983).

However, whereas theories in economics, OM and MA predict that producing a heterogeneous product mix increases costs and reduces operating performance (Johnson & Kaplan, 1987; Panzar & Willig, 1977, 1981; Skinner, 1974), there have been mixed results in accounting studies, and there is no systematic link between product mix heterogeneity and the overhead costs of manufacturing (Anderson, 1995; Banker & Johnston, 1993; Banker et al., 1990; Foster & Gupta, 1990; Kekre & Srinivasan, 1990).<sup>4</sup> Banker et al. (1995) find empirical support for the ABC claim that more accurate costing systems based on transactions or activities, rather than volume, are needed. They report that overhead costs are not driven by production volume, but by transactions resulting from production complexity. Mensah (1988), in his study of automated production environments, also points to the relative insignificance of direct labour

<sup>4</sup>Anderson (1995, p. 364) concludes that 'the absence of a systematic relation between product mix heterogeneity and manufacturing overhead costs may be caused by limitations of the variables typically used to capture product mix heterogeneity. Variables commonly used to proxy for the range of products produced (e.g. number of products produced.), changes to existing products (e.g. number of engineering changes), and additions of products (e.g. number of product introductions) fail to distinguish similarities and differences among products. Consequently, even studies that find the hypothesized relation between these proxies and manufacturing overhead costs offer no insight into sources of inflexibility. The prominence of product similarities and differences in theories of economies of scope, focused factories, and activity-based costing suggests that this failure may lead to poorly specified tests'.

costs, and suggests that the greater degree of integration of service and production departments in automated production environments influences the allocation method. He demonstrates that the reciprocal allocation method, linked with the dual allocation approach, has the properties required for an appropriate budgetary control system in automated production environments. However, Gosse (1993), in his field study of the role of cost accounting in Computer Integrated Manufacturing (CIM) in four factories, finds limited support for cost accounting changes due to CIM in practice. Immediate changes in cost identification procedures are unlikely, but they may take place over time. CIM firms are likely to change their cost assignment procedures by charging production support costs directly when incurred rather than allocating support costs from pools. Eventually, CIM firms may be motivated to subdivide their overhead pools into separate, resource-oriented support pools.

### 3.3.2. *Quality and Cost Accounting*

Quality is another key performance indicator in integrated manufacturing systems that has initiated new cost identification and categorisation. Like cost of flexibility, the cost of quality improves the accounting systems for decision making as well as control, making them reflect the new operational reality where quality is a significant organisational goal.

Quality cost has been defined as ‘all expenditures associated with ensuring that products conform to specifications or with producing products that do not conform’ (Ittner, 1996, pp. 114–115); quality costs are the ‘costs incurred because poor quality can exist, or because poor quality does exist’ (Morse et al., 1987). The idea of the cost of quality is not new. It originated in the early 1950s in the quality control literature (Feigenbaum, 1956, 1957; Juran, 1979/1951), where the ECL model was one of the primary models introduced to explore the dimensions of quality costs. The economic conformance model is now included in numerous MA text books (see e.g. Garrison & Noreen, 2003; Horngren et al., 2002; Kaplan & Atkinson, 1998), and helps to conceptualise quality cost by dividing it into appraisal and prevention costs (conformance costs) and internal and external failure costs (non-conformance costs), and thereby producing significant insight into the economics of quality, and a framework for discussing ‘an optimal quality’ level.

The ECL model proposes a cost-minimising quality level, achieved by balancing prevention and appraisal costs against internal and external failure costs. The point at which marginal prevention and

appraisal costs equal marginal failure costs is the optimal ECL. This model posits a trade-off between the costs of failure and the cost of conformance. Ponemon et al. (1994) and Ittner (1996) are some of the few studies that provide empirical evidence about relationships among the four traditional categories of quality, the magnitude of the trade-offs between conformance and non-conformance costs, or the lag between increased conformance activity and reductions in quality failure. Ponemon et al. (1994) find a cost-to-quality relationship, and a trade-off between conformance costs and external failure costs. They also provide evidence of unknown associations for both prevention and appraisal expenditures and internal failure costs. Likewise, Ittner (1996) finds evidence that additional investments in prevention and appraisal activities were associated with significant reductions in non-conformance costs in the current or following year.

Several accounting researchers (Daniel & Reitsperger, 1992; Ittner, 1996) suggest that many proponents of traditional quality cost theory have interpreted the trade-offs portrayed in the ECL model to mean that non-conformance costs can only be reduced by increasing expenditure on conformance activities. Continuous improvement (included in modern OM practices) advocates have criticised this interpretation, claiming that ongoing quality improvements can be achieved with little or no incremental investment. As Fine (1986) and Marcellus & Dada (1991) argue, the ECL model is too restrictive in a dynamic context where learning takes place, and suggests that learning should be explicitly integrated into the framework. According to the ECL model, the ECL would never occur with zero defects, but Crosby (1979) and Deming (1986) point to evidence that a variety of Japanese manufacturers have achieved both higher quality and lower costs than their American competitors by applying this model to their production system. In other words, it is argued that the ECL model seems to have a blind spot for learning and progress in production and operational systems.

Following these arguments, Foster & Sjoblom (1996) address quality improvement drivers. They discuss the traditional learning curve of quality improvements in organisations, but broaden the discussion of learning by introducing the distinction between autonomous and induced learning (Dutton & Thomas, 1984) in production and operations in organisations. They find that up-stream variables such as product design, infrastructure, supplier and customer-related variables are key drivers of quality improvement, and support a much broader perspective than the traditional ‘learning-by-doing’ (the

traditional learning curve model), or the autonomous learning, which may be supplemented by induced learning. Ittner et al. (2001) find more support for quality-based learning models that assume learning as a function of both proactive investments in quality improvement and autonomous learning-by-doing, than for models that assume learning as a function of reactive investments in quality improvement alone. They find that benefits from different types of prevention expenditure vary, and that past non-conformance expenditures provide learning opportunities that allow the organisation to cope more efficiently with future failures, thereby reducing subsequent non-conformance costs (*ibid.*, p. 563).

Another twist to the quality cost debate is given by Taguchi's quality loss function (QLF) (Albright & Roth, 1992; Campanella, 1999; Kim & Liao, 1994; Roth & Albright, 2004; Sedatole, 2003). The QLF introduced by Taguchi (Taguchi & Clausing, 1990) compares the hidden quality costs to the traditional defective–non-defective dichotomy. The defective–non-defective dichotomy approach considers no hidden quality cost. For instance, Albright & Roth (1992) illustrate how quality costs of farm implements, paperboard and magnetic cassette tapes are caused by the variation of the actual characteristic values from the target specifications. While some of the product quality costs are recorded in current accounting systems, a large portion of the quality costs is not. These unrecorded costs are the opportunity costs of non-conforming quality. Consequently, zero defect (Crosby, 1979; Deming, 1986) and robust quality (Taguchi & Clausing, 1990) can be understood to be two quality philosophies used to help companies to compete in the global marketplace (Roth & Albright, 2004). Roth & Albright (2004, p. 44) note: 'With the zero defects philosophy the only cost attributed to variation occurs when products fall outside the specification limits. Thus, the cost of variation depends on whether the product can be reworked, if there are constraints on production and the distance between product specification limits. On the other hand, a robust quality program claims that any variation is undesirable, and causes costs to be incurred by the manufacturer, consumer or society. An estimate of these costs is provided by the quality loss function'.

The debates about the QLF in the MA literature distinguish between symmetric and asymmetric characteristics of the quality function (Kim & Liao, 1994; Sedatole, 2003). Kim & Liao (1994, p. 10) exemplify this with the variation of the contents of a manufactured drug affecting the quality of its effectiveness of treatment on users. If a particular content is too low,

the drug may become ineffective and cause dissatisfied customers. On the other hand, if a particular content is too high, the drug may have a serious negative effect on users. Kim & Liao develop various asymmetric loss functions, and consider different levels of sensitivity along a loss function in estimating hidden quality costs, and Sedatole (2003), in her empirical study, confirms asymmetries and suggests an asymmetric total cost curve, because the strength of the relation between quality measures and future quality-related warranty costs increases with the expected net benefits to the customer of the warranty work.

### 3.3.3. Throughput and Cost Accounting

Another concern in integrated manufacturing that has affected the design of cost accounting is the concern for throughput. JIT (Schonberger, 1986) and time-based management (Schmenner, 1988; Stalk, 1988) mobilise throughput as a key strategic parameter, and Eliyahu Goldratt's ideas of the theory of constraints (TOC) in particular have addressed the relationship between cost accounting and throughput (Goldratt, 1990; Goldratt & Cox, 1989/1984). TOC discusses throughput as an opposition to building inventory. Excess inventories can increase cycle time, decrease due date performance, increase defect rates, increase operating expenses, reduce the ability to plan and ultimately reduce sales and profits. At any rate, because excess inventories can create so many problems, Goldratt is against accounting practices that provide artificial incentives to build inventories.

This emphasis on throughput has also been reflected in MA research (Dugdale & Jones, 1996; Kaplan, 1983; Noreen et al., 1995). For instance, Kaplan (1983) emphasises that the inventory costing system should be integrated with the production planning and scheduling system needed in the factory, so that production managers are rewarded for their efficient utilisation of bottleneck resources and reduced inventory levels throughout the factory (*ibid.*, p. 700). Bruggeman & Slagmulder (1995), in their field study of Belgian manufacturing companies, address the impact of technological change on costing systems and illustrate how new manufacturing technology leads to more emphasis on throughput control.

TOC introduces a minimal variable costing system, where only three variables are relevant: throughput, measured as cash received from sales less the cost of materials; operating expenses, which are all organisational expenses other than material costs; and inventory, measured as assets acquired (facilities, equipment and materials) but not yet converted to cash. The goal is to maximise throughput while attempting to keep

steady, or preferably reduce, operating expenses and inventory. Under the TOC, direct materials are treated as a variable cost, while direct labour and all other costs are treated as fixed. This minimises the incentives to overproduce, and maximises the incentives to focus on throughput subject to the capacity of the individual production activities of the firm.

MA scholars have noted that the application of the TOC to production decisions is an extreme form of direct costing or the contribution margin approach to decision making, including the limitations it may have (Noreen et al., 1995; Robinson, 1990). For instance, Noreen et al. note that 'Goldratt advocates variable costing for the same reasons it always has been advocated—it is closer to cash flows, can be used more easily than absorption costing to estimate relevant costs and benefits, and, most important, does not contain incentives to build inventories just to improve absorption costing profits. The argument is even more valid now than in the 1950s, when arguments were raging concerning absorption and variable costing. We now know that excess work-in-process inventories are a much bigger problem than anyone had thought' (Noreen et al., 1995, p. 16).

The problem with the direct costing approach, in both its traditional and the TOC version, is that the fixed costs keep growing. To Kaplan & Cooper (1998, p. 132), the TOC addresses the problem of 'how to maximize throughput when the organization has a fixed supply of resources, when its expenses and spending for the next period—other than for materials—have already been determined, when its products have already been designed, when its prices have been set and when its customer orders have been received. The solution is to maximize the through-put processed by the bottleneck or constraining resource'. However, the assumption that operating expenses are fixed costs is problematical. This assumption raises the question of how operating expenses reached their current level. If operating expenses are fixed, why are they not fixed at a low rather than a high level? Also, the assumption that operating expenses are fixed, independently of product volume, mix and complexity, implies that all organisations in the same industry and the same line of business should have the same level of operating expenses (*ibid.*, p. 133).

This is why several writers have proposed a combination of the TOC and ABC (Kaplan & Cooper, 1998, p. 134; Kee, 1995). The TOC is designed to solve the problem of a short-term product mix and the scheduling of bottleneck resources, but this is a problem according to ABC, because during such a short period, all organisational expenses, other than materials and energy, have already been committed

(Kaplan & Cooper, 1998, p. 134). The TOC and ABC are not in conflict, but complement one another, with TOC providing short-term optimisation to maximise short-term profits (when operating in a constrained production environment), and ABC providing the instrumentation for a dynamic optimisation of resource supplies, product design and mix pricing, and supplier and customer relationships for long-term profitability (Kaplan & Cooper, 1998, p. 135).

Yet another accounting concept—back flush accounting—has been introduced as appropriate to ideas embedded in JIT paradigms (Berliner & Brimson, 1988; Foster & Horngren, 1987). Back flush costing systems focus firstly on the output of an organisation, and then work backward when allocating costs between the cost of goods sold and inventory. In back flush accounting or JIT costing, 'in contrast to work-order accounting, the direct materials [are] posted directly to a "raw and in-process" account as they are received. All other costs are charged using a back flushing technique, in which completions trigger the relief of inventory, using the bill of materials to determine the items and quantities that should be deducted. These changes result in the absence of a separate account for raw-material inventory, the absence of work orders, and direct labor being treated as a factory overhead' (Berliner & Brimson, 1988, p. 105).

In general, capacity level and excess capacity have been addressed in the MA literature. As Kee (1995, p. 49) notes, the excess capacity of production activities is determined, in part, by a constraint or bottleneck activity in the firm's production structure. A constraint or bottleneck restricts production, thereby limiting resource usage by non-constrained activities, and leading to excess or unused capacity. Banker et al. (1988) examine the impact of stochasticity in the production process on relevant costs based on a dynamic assessment of capacity constraints. They develop a model to analyse the behaviour of relevant costs with respect to changes in the expected duration and variability in set-up and processing. An implication of this analysis is that for profit maximisation, capacity will exceed expected demand, if production rates or demands are stochastic. They underline the fact that conventional MA principles used to evaluate relevant costs have been developed under the assumption of deterministic manufacturing settings. Manufacturing operations, however, are complex and stochastic. Leitch (2001) is another who also illustrates the effect of stochasticity, capacity and lead time on WIP and throughput in a pull production environment, this time using a simulation approach. In this dynamic environment, production variation, capacity and lead time are found to be significant cost

drivers in terms of their effect on WIP inventory and throughput. The effects of these cost drivers do not necessarily follow from the logic used in earlier, push production environment research.

Another issue related to capacity in manufacturing systems is lot sizes. For instance, Karmarkar et al.'s (1985) study provides strong support for the importance of lot-sizing techniques in operational performance (lead time, WIP). Standard operations research models (such as economic order quantity [EOQ] models) are often used to set batch sizes. These models trade inventory holding costs off against the production efficiencies from producing in large lots, thereby reducing non-productive setup between consecutive jobs. These simple EOQ models, however, fail to take account of the *externalities* created by large batch sizes in a 'complex' job shop. A complex job shop is one in which multiple products are produced on many different machines. Each part often requires time on several machines, and many types of part (each requiring a machine setup) compete for the same machining resource, which implies queuing. However, according to Karmarkar (1987), there are several decision variables that can affect the queuing behaviour in complex shops. These include lot sizes, release times of batches to the shop and coordination of release times, sequencing at machines, capacity at work centres, product mix and the heterogeneity of items.

Zimmerman (1987) argues that queuing externalities (inventory holding costs of delayed jobs) are ignored in traditional cost accounting systems. Even when the top management wants smaller batch sizes, unless the cost accounting system is modified to measure the inventory holding costs, middle managers will not be rewarded for reducing lot sizes, and they will be reluctant to attempt to do so. If the cost accounting systems measure, and the incentive system rewards, efforts to reduce direct manufacturing costs (ignoring inventory holding costs), managers will have less incentive to take account of the queuing externality in their lot-sizing decisions. A successful PMS will reward parts manufacturing managers for delivering the right parts at the right time, at an acceptable level of quality and at minimum total cost (which includes the cost of queuing externalities).

#### 3.3.4. *Life-Cycle Costing*

Life-cycle costing is yet another cost concept that can be related to the quest for understanding the nature of cost in integrated manufacturing. In line with lean thinking (Womack et al., 1991), Brimson & Berliner (1988, p. 139) propose a concept of life-cycle management that 'focuses on those activities that occur

prior to production to ensure the lowest total life-cycle cost'. Because more than 90% of a product's cost is determined in preproduction phases, front-end planning is required to capitalise on opportunities for eliminating waste. Accounting emphasis should be expanded to include not only the production phase (where production costs are incurred) but also the design phase (where production costs are determined). These ideas are also reflected in target costing (Cooper & Slagmulder, 1997; Horváth, 1993; Monden & Hamada, 1991; Sakurai, 1989; Shank & Fisher, 1999). For further discussion on this, please see the chapter on target costing by Ansari et al. (2006) in this handbook.

#### 3.4. *Standard Setting*

Integrated manufacturing has also challenged MA in regard to standard setting. Standards are significant in MA, as they provide input for planning and control in organisations, and several issues are related to the question of standard setting: Who has the knowledge to set the standards (bottom-up or top-down)? Is it possible to use standards for planning, due to uncertainty and dynamics? Do superiors or subordinates have incentives to bias standard setting, and will subordinates make a game of the realisation of targets? At what level are they applied for individuals or groups/teams? What are the motivational consequences of participating in the target and standard setting process? What should the target be, in order to ensure the highest motivational effect (high but achievable or stretch targets)? Of the many concerns related to standard and target setting, only a few have been addressed in relation to integrated manufacturing systems. This is unfortunate, because of the dynamics and complexities in operations and products, decentralisation, the concern for continuous improvement, teams rather than individuals as performing entities and the significance of lateral rather than hierarchical accountability in integrated manufacturing systems that all seem to affect standard and target setting practices.

The issue of standards and planning is affected by the dynamic organisational setting, as found in modern OM practices, due to flexibility and customer orientation. For example, Kaplan (1983) notes that the standard is challenged in new manufacturing for customer-designed products and flexible manufacturing systems. He asks whether standards can be kept current and relevant when product characteristics are changing, when there are short production runs tailored for each customer or when the production method changes for each batch depending upon which machines are available when the order is



processed? (Kaplan, 1983, p. 700). Kaplan notes the pressure on practices of standard setting and planning in flexible and customer-oriented organisational settings. Berliner & Brimson (1988) argue that automation, which to a large extent enables customisation and flexibility, creates a new possibility for standard setting: 'The availability of automated tools and techniques during the design process will allow greater flexibility in choosing design alternatives to minimise total life-cycle cost. Once the design has been finished, an "optimal" standard cost can be developed, based on the best routing for the facility at optimal capacity (Berliner & Brimson, 1988). Capacity constraints (lack of capacity or failure to properly maintain existing capacity) and multipurpose equipment can have a major impact on the actual routing employed, and the resulting cost structure, particularly in manufacturing environments where the total production time is relatively long (weeks and months rather than days). The additional cost associated with these capacity constraints is often lost in the variance analysis. In relatively stable manufacturing environments, the cost associated with capacity constraints could be calculated as the difference between the "optimal" standard cost and the actual costs. The difference could be segregated by causal factors, and by affected manufacturing processes for management reporting (Berliner & Brimson, 1988, p. 102)

According to MA, 'continuous improvement', which is a dominant idea in integrated manufacturing (Womack et al., 1991), also affects the role of standards. There are two consequences. One is the need for update standards provided by continuous improvement, and the second is the incentive for continuous improvement when using standards. These concerns have been crystallised in the debate of Kaizen costing versus the traditional standard costing system. Kaizen is the Japanese term for continuous improvement, and Kaizen costing is continuous improvement applied to cost reduction in the manufacturing stage of a product's life. While Kaizen costing reduces the costs of existing products, Kaizen systems also increase the quality of products and the safety of production processes (Cooper, 1995, p. 239). Monden & Hamada (1991, p. 25) explain Kaizen costing practice in their study of Japanese automobile companies, saying that, 'Kaizen costing has not been implemented according to standard costing. This means that the companies do not implement the traditional cost variance analysis based upon the gap between the standard cost and the actual cost for each period. Kaizen costing is implemented outside the standard cost system as part of the overall budget control system. In essence, the actual cost per car for

the latest period is the Kaizen cost budget, which must be reduced in each successive period in order to meet the target profit'. Some see conventional standard cost systems as an enemy to continuous improvement (or Kaizen), as standard cost systems produce incentives to strive for efficiency within a particular system at the expense of searching to improve the system. Johnson (1992) notes that, 'achieving standard direct cost "efficiency" targets leads to larger batches, longer production runs, more scrap, more rework, and less communication across processes. Ironically, managers' efforts to achieve high standard cost efficiency ratings have tended over time to increase a company's total costs and to impair competitiveness, especially by increasing lead times.... Indeed, motivating people to act in response to standard cost variances will, in most cases throw processes farther and farther out of control'.

Kaizen cost systems have several important characteristics (Kaplan & Cooper, 1998, p. 61): (1) the focus is to inform and motivate process cost reduction, not to obtain more accurate product costs; (2) cost reduction is a team, not an individual, responsibility. (3) Frequent, even batch-by-batch, actual costs of production are calculated, shared and analysed by the front-line employees. In many instances, the team itself, not the accounting staff, collects and prepares the cost information. (4) The cost information used by the teams is customised to their production environment, so that learning and improvement efforts are focused on the areas where there are highest cost-reduction opportunities. (5) 'Standard costs' are continually adjusted to reflect both past reductions in actual costs and targeted improvements in future costs. This ensures that proven innovations in process improvement will be sustained, and will set a new level for further improvements. (6) Work teams are responsible for generating ideas to achieve cost reduction targets; they have the authority to make small-scale investments, provided they can be demonstrated to have cost reduction paybacks.

Cooper & Kaplan reflect upon the cost accounting systems in two manufacturing systems—Peoria (Kaplan & Hutton, 1997b) and Romeo (Kaplan & Hutton, 1997a)—and discuss incentives for continuous improvement and state that, 'the contrast between the traditional (Peoria) plant, treating its workers as variable costs and meeting top-down targets for cost, and the plant (Romeo) committed to continuous improvement in quality, yields, throughput, and cost reduction was remarkable. Note that the traditional plant used a controlling system with standard cost targets, and a flexible budgeting and variance analysis system operated by middle-level supervisors and

managers. The continuous improvement plant, in contrast, used a informing system of daily reporting of actual outcomes on nonfinancial and financial measures—quality (scrap), throughput, machine downtime, and spending—to empower its front-line work teams’ (Kaplan & Cooper, 1998, p. 64). Cooper & Kaplan underline how the budgeting system at Peoria encouraged game playing, manipulation and sand-bagging to build more slack into budgeted quantities and to avoid short-term unfavourable variances (*ibid.*, p. 63), things that are dealt with in Romeo by reporting actual performance rather than planned performance.

Daniel & Reitsperger (1991), in their study of relationships between management control systems and quality strategy, report a relationship between quality strategy and standard setting. They indicate that the management control systems supporting a zero defect quality strategy are more likely to include regular goal-setting than those supporting a traditional ECL quality strategy (Daniel & Reitsperger, 1991, p. 601). From a more critical perspective, intensive case studies of accounting in regard to new manufacturing environments have reported continuous cost reduction systems crumbling in the face of employee resistance (Ezzamel & Willmott, 1998; Ezzamel et al., 2004). These studies indicate that other (more fundamental) factors affect employee motivation.

### 3.5. Reward Systems

Proponents of integrated manufacturing have been critical of the very idea of linking performance measurements with rewards. For instance, Schonberger states that there is little or no room for incentive pay plans in a mature WCM plant (Schonberger, 1986, p. 35), Deming explicitly argues that such practices are counterproductive (Deming, 1993), and Crosby argues that money is a lousy motivator (Crosby, 1989). However, Hackman & Wageman (1995) argue that a solution that avoids performance contingent extrinsic rewards entirely, and relies on intrinsic motivation, has significant opportunity costs: ‘The best motivational state of affairs is obtained when an organisation does not rely exclusively on either intrinsic or extrinsic rewards, but, instead, structures the work in a way that fosters intrinsic motivation (for example, by providing challenge, autonomy and direct feedback from customers) and then supports that positive motivation with performance contingency extrinsic rewards’ (*ibid.*, p. 329). These studies indicate that other (more fundamental) factors affect employee motivation.

Reliance only on intrinsic rewards is also challenged by the empirical studies of rewards systems

in integrated manufacturing systems. For instance, Ittner & Larcker (1995) examine the association between TQM practices and reward systems, and their impact on organisational performance. Ittner & Larcker consider TQM to provide the foundation for other advanced manufacturing techniques, such as JIT production, flexible manufacturing and business process reengineering. Their study indicates that what they label ‘basic production-oriented TQM practices’ are related to ‘information and reward systems that place greater emphasis on team and nonfinancial performance, more frequent provision of quality information to all organizational levels, and greater use of “bottom-up” data-gathering techniques such as statistical process control. In companies with more advanced quality practices, external benchmarking of products, processes and services is more frequent, strategic information is communicated more broadly throughout the organization and reports on quality plans and achievements are reviewed more frequently by the board of directors, reflecting the integration of the quality program into the organization’s overall business strategy’ (Ittner & Larcker, 1995, p. 2).

Like Ittner & Larcker (1995), Fullerton & McWatters (2002) confirm that JIT and TQM imply that workers gather their own ‘bottom-up’ information, such as statistical process control (SPC), Pareto analyses, histograms and flow charts, rather than being dependent upon ‘top-down’ information (Fullerton & McWatters, 2002, p. 715). Fullerton & McWatters’ study also indicates that firms more committed to JIT are more likely to tie compensation rewards to non-traditional performance measures. And thus, they confirm that compensation incentives are given to encourage team-oriented quality work in JIT-oriented firms. However, there is no significant relationship between the degree of JIT practices used and compensation rewards for compliance with budgets, and there are a number of variances, supporting earlier research by Abernathy & Lillis (1995).

Chenhall (1997) also notes that non-financial performance measures are used for performance evaluation in modern manufacturing settings. He examines the interaction between TQM and reliance on Manufacturing Performance Measures (MPM) to evaluate managers. He finds that TQM will be enhanced where there is a greater reliance on MPM. In TQM settings, MPM typically focus on developing quality products, such as: customer satisfaction measured by the quality of the final products, on-time delivery and responsiveness to customer needs; and on various aspects of the value chain associated with quality production, such as the throughput time of materials, defect-free production, minimum inventories, vendor

quality and reliability, high productivity and low cost. He finds support for the association between TQM and performance used as part of managerial evaluation. For firms developing TQM capabilities, the results support the usefulness of development measures of managerial performance targeted directly at manufacturing practices, and the study suggests that a lack of attention to developing MPM may help to explain why some TQM initiatives fail.

From the studies, it is clear that new non-financial performance measures seem to be included in pay-for-performance contracts in integrated manufacturing systems. However, not much has been reported about their inclusion. Studies have shown that the majority of firms still use traditional accounting criteria much more than non-traditional criteria for both internal and external performance evaluation (Ittner & Larcker, 1998a). Thus, more knowledge of the extent to which non-financial performance measures are included in pay-for-performance contracts, the way in which they are weighted, and the extent to which subjective performance evaluation (Baker et al., 1994) is needed in integrated manufacturing systems would appear to be relevant.

#### 4. Discussions and Conclusions

If manufacturing is integrated by means of techniques such as JIT, TQM and automation, is there any room left for MA? Several promoters of integrated manufacturing systems criticise accounting, and it sometimes seems as if integrated manufacturing is better off without accounting. For instance, Johnson (1992) argues that, 'accounting systems encourage a form of "management by remote control" where managers assume that they control operations with information about the accounting results of operations—like a driver using the rear view mirror to drive a car or a tennis player watching the scoreboard to play tennis'. Moreover, standard costing are rejected as basis for continuous improvement (Womack & Jones, 1994), and variability reduction (Schonberger, 1986) and gaming around target settings (Johnson, 1992) have challenged conventional ideas about standard and target setting in accounting. Furthermore, Schonberger (1986), Deming (1993) and Crosby (1989) vividly discard the idea of pay-for-performance contracts in integrated manufacturing. Thus, it is understandable to have one's doubts about whether there is anything left of the MA discipline in the integrated manufacturing systems.

However, our literature review indicates that significant changes have been observed and suggested in order to adapt to the new operational practices, and it is clear that MA still plays a significant role in

terms of managing integrated manufacturing systems, even though more important research dealing with the interface between OM and MA is yet to come, in order to clarify the role of MA.

As Snell & Dean (1991) suggest, automation, TQM and JIT are major innovations in operational practices in companies around the world, and they contribute to the integration of stages, functions and goals in what has been called a new manufacturing paradigm. New architectural, organisational and technological elements have been introduced, but they are primarily concerned with the lateral flow of goods and services in the organisation—they focus on the questions of *integration*. But what about *differentiation*? OM is intent on understanding organisational processes as inherently 'one thing', which means that attention to the separation of duties, responsibilities, obligations and decision rights is a minor concern. MA's continuing interest in mechanisms that differentiate between responsibilities and decision rights focuses more on who implements strategies and plans in the firm. What is at stake here is the preferred theory of the person as an integrated part of a set production system (as in OM), or the theory where the person is a source of uncertainty (as typically reflected in MA research). MA challenges OM here; but conversely, OM also challenges MA to think less in structural terms, and more in process terms. This is obviously a paradox. OM claims that the process is the unit of analysis, but we are told very little about the process mechanisms at work. MA may have more to offer about the processes of decision making that actually spread out around the use of information to impact on operating processes.

One of the most characteristic findings in the MA literature on the challenge from integrated manufacturing is the call for non-financial performance measures. The reflections of strategic success factors such as quality, flexibility, time and productivity in performance measures are crucial in the design of appropriate information systems. However, what is more ambiguous is the role of the non-financial performance measures. Are they part of the top-managers' planning and control systems, or are they meant to be part of the local information system for operational learning and improvement? It is clear that non-financial numbers are relevant to workers on the shop floor, but it is less clear why and how these measures should be included in MA systems oriented towards top managers' planning and control. There is an unresolved tension between the different roles of non-financial performance measures in regard to local and central information systems that build on two different sets of logic (e.g. Jönsson & Grönlund, 1988): one

is oriented towards operational learning and continuous improvement, while the other is oriented towards control. Thus, the vagueness of the role of non-financial performance measures in integrated manufacturing still leaves us with a significant question for the future. To what extent do strategy and strategic performance measures play a role on the shop floor? And what kind of logic is represented in local information systems that enable operational learning and continuous improvement? How are they combined with an MA system oriented towards top-down planning or control?

Another trait of the MA research is the focus on the *economics of integration*, and in particular, the need for new cost calculations in terms of providing decision makers in integrated manufacturing systems with better information. For instance, the cost reduction potential of the 'integration of functions' such as the production and design interface can be made clear by means of life-cycle costing, which helps design for manufacturability. Moreover, the economics of flexibility and quality reflected in ABC and quality costing provide input to decision makers about the limits of the integration strategy. New cost calculations are also introduced in order to produce incentives to increase throughput by means of back flush or throughput accounting, which have been specifically adapted to JIT settings. One possible role of MA research here is to investigate trade-offs between types of manufacturing systems.

Yet another issue that relates to understanding the economics of integration is the question of the consequences of new manufacturing practices in terms of organisational performance. We have not addressed these issues in our review of changes in MA, but research has been carried out in order to understand the performance effects of, for instance, JIT (Balakrishnan et al., 1996; Fullerton et al., 2003; Kinney & Wempe, 2002) and TQM (Ittner & Larcker, 1995). OM research suggests that performance is 'easy' to understand, but from an MA perspective, this is obviously a simplification. It is not only performance effects that are difficult to ascertain, sometimes it is also difficult to know what a performance indicator means and how it is causally related to other indicators (Ittner et al., 2003) What is 'quality'? And how do quality issues relate to flexibility and cost issues?

From the review, it is also clear that practices of standard setting are challenged by integrated manufacturing in terms of variability reduction, continuous improvement and gaming and manipulation that may arise from target setting (an observation that has also been made elsewhere). Dynamics and uncertainty are threads of integration in manufacturing

systems, which is why variability reduction is pursued (Schonberger, 1986). This makes deviance or variability in itself a problem. Moreover, the focus on continuous improvement confronts the rigidity that may arise from the very idea of a standard. These issues are again reflected in questions about the role of standards in supporting top-down planning, or are they elements in a local information system for operations improvement and learning? However, research has only provided scarce insight into particular practices. It is clear that continuous improvement affects the role of target setting, but to what extent do targets motivate and initiate continuous improvement? And what is the role of relative performance measures when planned targets motivate game playing (Johnson, 1992). Using the fulfilment of targets to reward people may encourage them to lie (Jensen, 2001, 2003), and it may be necessary to 'go beyond' budgeting (Hope & Fraser, 2003a, 2003b). A more thorough examination of the role of relative performance measures in integrated manufacturing may be a job for future research.

Moreover, in the integrated manufacturing literature MA is often portrayed as a mechanism that differentiates rather than integrates the organisation. However, in the MA literature, integration is, ironically, an aim of PMS design. For instance, transfer prices are designed to communicate the 'total costs' of a particular service or product in the organisation, and activity-based and life-cycle costing seek to integrate 'externalities' that may arise from uncoordinated functional decision making. Furthermore, non-isolated cost allocations and performance measurements which produce incentives for coordination and mutual monitoring between functional departments (e.g. Zimmerman, 2003, p. 360) are a step towards integration. In this perspective, MA does have a lot to say about integration, and this could be examined further in the future, as this will tell us more about the incentives for integration that accounting numbers could produce for the new manufacturing paradigm.

In terms of reward systems, Wruck & Jensen (1995) note that integrated manufacturing promoters like Crosby correctly observe 'that poorly designed and implemented pay-for-performance systems destroy value by rewarding people for doing the wrong things'. The conclusion he draws from this, however, may be too aggressive, when he says that all forms of monetary pay-for-performance should be abandoned. He fails to discuss the fact that every organisation has a reward system that includes both monetary and non-monetary rewards in its implicit and explicit contracts with employees. The critical issue is whether or not rewards are associated with contributions to firm

value. Rewards systems do not appear to have been abandoned in integrated manufacturing systems—they are considered to be important, not least in terms of integrating individual and organisational goals. Rewards systems, if designed properly, may be a powerful way of motivating employees. Adopting pay-for-performance does not necessarily mean establishing a complex system that ties a myriad of disaggregate performance measures to individual rewards. On the contrary, Wruck & Jensen observed that 'integrated manufacturing firms tie rewards to simple performance measures, including subjective performance evaluations or overall firm profitability (through profit-sharing) or firm value (through employee equity ownership plans)' (*ibid.*, p. 275). The balance between intrinsic and extrinsic rewards, and subjective and objective performance evaluation, would appear to be fruitful issues to address in future work, in order to elaborate on the role of reward systems in integrated manufacturing systems.

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# A Review of Quantitative Research in Management Control Systems and Strategy

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**Abstract:** This chapter reviews and critiques quantitative research that focuses on the relation between management control systems (MCS) and strategy. This quantitative research typically relies on survey evidence, and to a lesser extent, interviews and archival data. The focus of research up to the late 1990s was on the fit between the design of MCS and strategy. Controls included cost controls, budgetary controls, and performance evaluation and reward systems. These controls are usually related to business strategy. However, some papers studied operational strategies, such as quality, manufacturing flexibility, and product-related strategies. Recently, more complex characterizations have emerged that focus on the role of MCS in influencing strategic change, through interactive controls, and balanced scorecard approaches, which integrate a range of measures to enable strategic outcomes. It is concluded that our knowledge of the relationship between MCS and strategy is still somewhat limited. The chapter finishes with an outline of methodological limitations and areas for future research.

## 1. Introduction

Over the past 20 years there has been a growing interest in the relationship between management control systems (MCS) and strategy. Much of this research rests on the premise that MCS should be tailored explicitly to support the strategy of the business to enhance competitive advantage and encourage superior performance (Dent, 1990; Simons, 1987a, 1990). There is evidence that high organizational performance may result from a matching of an organization's environment, strategy, and internal structures and systems (Govindarajan, 1988; Govindarajan & Gupta, 1985). MCS encompass internal structures and systems.

Strategy was not regarded explicitly as a variable in MCS research until the 1980s. This is surprising considering that the field of business strategy or business policy has become increasingly important since it emerged in the 1950s (see Chandler, 1962). Much of the empirical research that has addressed MCS and strategy has followed a contingency approach and searches for systematic relationships between specific elements of the MCS and the particular strategy of the organization (Chenhall & Langfield-Smith, 1998; Govindarajan & Gupta, 1985; Simons, 1987a). These

studies typically draw on organizational theories, and to a lesser extent, behavioral and agency theories. Case studies have also been undertaken to investigate the role of the MCS in supporting and influencing strategic processes within organizations (Archer & Otley, 1991; Roberts, 1990; Simons, 1990). Many case studies draw on "alternative" theoretical frameworks, such as institutional theory, structuration theory, and actor network theory, that derive from sociology or philosophy, while other case studies rely on organizational, behavioral, and agency theories.<sup>1</sup>

Most of the quantitative studies have focused on business or competitive strategy. However, since the mid-1980s, in the operations management literature there has been a growing interest in researching the way that manufacturing strategies can be used to gain competitive advantage (Buffa, 1984; Hayes et al., 1988; Schonberger, 1986). Normative studies and single case studies have explored the relationship between MCS and strategy at the manufacturing level

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<sup>1</sup>Baxter & Chua (2003) use the term "alternative management accounting research" to characterize seven non-positivist approaches.

(see, for example, Kaplan, 1990; Nanni et al., 1992), and quantitative research that focuses on MCS and quality strategies, manufacturing flexibility, product innovation, and customer-focused strategies emerged in the 1990s (for example, Daniel & Reitsperger, 1991; Davila, 2000). More recently, both quantitative and qualitative research studies have considered broad, strategically focused techniques, such as the balanced scorecard (BSC), and their role in supporting and encouraging behavior that will enhance organizational performance.

An earlier review of MCS and strategy research, Langfield-Smith (1997) provided a review of survey-based research up to 1992 and case study research up to 1995, and highlighted a range of deficiencies and areas for future research. The review concluded that research was fragmentary and findings were sometimes conflicting. The objective of this chapter is to review and critique quantitative research that utilizes survey or archival data to study the relationship between MCS and strategy from its beginnings in the 1980s up to 2005, to consider the state of knowledge in this area, explain limitations, and suggest improvements that may be incorporated into future studies. This research is not an exhaustive survey of the literature, as it focuses primarily on quantitative papers that have appeared in the major accounting journals.

The chapter is structured as follows. In the first section, the changing domain of MCS is considered. The second section contains a description of terminology and frameworks from the strategy literature, and an outline of strategy variables used in quantitative MCS research. In the third section, specific studies will be examined and critiqued, and various themes will be identified. This is followed by methodological limitations of the research reviewed, and suggestions for future research are presented in the final section.

## 2. Management Control Systems

Management control was defined by Anthony (1965) as “the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organization’s objectives.” This definition encouraged researchers to envisage MCS as encompassing the largely accounting-based controls of planning, monitoring of activities, measuring performance, and integrative mechanisms. However, it also served to artificially separate management control from strategic control and operational control. MCS have also been described as processes for influencing behavior (Flamholtz et al., 1985). MCS provide a means for gaining cooperation among collectives of individuals

or organizational units which may share only partially congruent objectives, and channeling those efforts toward a specified set of organizational goals (Flamholtz, 1983; Ouchi, 1979). MCS are also formal, information-based routines and procedures managers use to maintain or alter patterns of organizational activities (Simons, 1995, p. 5).

Controls have been categorized in many ways, for example, formal and informal controls (Anthony et al., 1989), output and behavior controls (Ouchi, 1977), market, bureaucracy, and clan controls (Ouchi, 1979), administrative and social controls (Hopwood, 1976), results, action, and personnel controls (Merchant, 1985a), bureaucratic and organic controls (Chenhall, 2003), and diagnostic and interactive controls (Simons, 1995). These classifications are not independent and thus overlap. A brief discussion of these classifications will illustrate the breadth of the definitions of controls used in research.

Formal controls include rules, standard operating procedures, and budgeting systems. These are the more visible, objective components of a control system, and thus, are the easiest controls to research. Most empirical research that studies MCS and strategy has focused on formal controls. Formal controls may include output or result controls, which provide *ex-post* feedback, and these are often financially oriented. They aim to ensure that specific outcomes will be achieved and involve monitoring, measuring, and taking corrective actions. Controls that focus on feed forward control (*ex ante* controls) include administrative controls (standard operating procedures and rules), personnel controls (human resource management policies), and behavior controls (the ongoing monitoring of activities and decisions).

Informal controls are not consciously designed. They include the unwritten policies of the organization and often derive from, or are an artifact of, the organizational culture. Ouchi (1979) described clan controls that derive from the shared values and norms, or the culture of the organization.<sup>2</sup> Clan controls (or social controls) are usually informal, rather than formal controls. However, some formal controls also derive from the organizational culture. For example, the formal stated organizational mission or

<sup>2</sup>The terms “clan control” and “social control” are often used synonymously. However, Ouchi’s (1979) definition of clan control requires that there be a norm of reciprocity, that is, a belief in a source of legitimate authority and social agreement on the range of shared beliefs and values necessary for the “clan” to exist. Social controls can exist when there is agreement on purposes or outcomes, but perhaps not shared belief systems.

objectives may reflect the values and beliefs of the dominant culture. Informal controls are important aspects of MCS and the effectiveness of formal controls may be dependent on the extent and effectiveness of informal controls that are also in place (Flamholtz, 1983; Otley, 1980).

Up to the 1980s, these conventional definitions of MCS seemed to be adequate, but in the 1990s, it was argued that they needed to be reviewed to accommodate changing business conditions (Otley, 1994). Thus, the role of MCS in the formation and implementation of strategy became an area of interest in both the academic and professional management journals, and our understandings of how MCS may support strategy developed. Simons (1990, 1991, 1994, 1995) argued that the focus of MCS design should not be on the types of controls that are needed to support an organization's strategy, but on the distribution of management attention among controls. He argued that managers use controls "interactively" to signal strategic uncertainties and to manage those uncertainties. Other controls are used diagnostically on "automatic pilot" to monitor outcomes and correct deviations from preset goals. Simons broadened the role of MCS as impacting on strategy formulation, implementation, and change.

From the mid-1990s, the focus of MCS research on the senior management level became less relevant with an increasing interest in employee empowerment (Otley, 1994; Simons, 1995). It became more common for lower level managers and employees to be actively involved, not only in the day-to-day processes that were once the domain of middle and senior managers, but also in undertaking activities that are of strategic significance. Thus, the artificial boundaries between operational, managerial, and strategic control, as initially described by Anthony (1965), were no longer relevant. In addition, the orientation toward accounting controls and accounting information, which dominated much of the MCS research up to the mid-1990s, was found to be not sufficiently broad to capture more contemporary approaches to effective control. The dynamic nature of MCS and its potential role in influencing strategy formulation, implementation, and strategic change became an area of increasing interest for research (Dent, 1990; Simons, 1990).

### 3. Strategic Frameworks

In this section, some strategic concepts and frameworks will be outlined to explain the foundation of research that addresses MCS and strategy. In addition, the strategic typologies and variables that have been used in empirical research on MCS and strategy will be described and compared.

#### 3.1. Defining Strategy

Strategy has been defined in many ways. For example, strategy has been described as a pattern of decisions about the organization's future (Mintzberg, 1978), which take on meaning when it is implemented through the organization's structure and processes (Miles & Snow, 1978). Johnson (1987, pp. 4–5) stated that strategic decisions occur at many levels of managerial activity. They are concerned with the long-term direction of the organization, the scope of an organization's activities, the matching of organizational activities to its environment and resource capabilities, the allocation of major resources within the organization, and consideration of the expectations and values of the organization's stakeholders.

Corporate strategy is concerned with decisions about the types of businesses to operate in, including what businesses to acquire or divest, and how best to structure and finance the company (Johnson & Scholes, 1989, p. 9). It focuses on the way resources are allocated to convert distinct competencies into competitive advantage (Andrews, 1980, pp. 18–19). Business (or competitive) strategies relate to each business unit of the organization and focus on how individual strategic business units (SBUs) compete within their particular industries, and the way that each SBU positions itself in relation to competitors. Operational strategies address how the various organizational functions contribute to the specific business strategy and competitiveness of the organization. Much of the research that studies the relationship between MCS and strategy focuses on business strategy. However, since the mid-1990s, there has been a shift toward understanding the nature of MCS in supporting operational strategies (particularly various types of manufacturing strategies), and to a lesser extent corporate strategy.

#### 3.2. Strategy Formulation and Implementation

Strategic management has been conceptualized as the rational progression from strategy formulation to strategy implementation (Snow & Hambrick, 1980). Strategy formulation is the managerial activity (often of a cognitive nature) involved in forming strategies, while strategy implementation is concerned with translating the chosen strategy into actions (Johnson & Scholes, 1989, p. 15). These actions include allocating resources and designing suitable administrative systems, including MCS (Preble, 1992). Quantitative research on MCS and strategy often (implicitly) addresses not only strategy implementation (see, for example, Govindarajan, 1988), but also the role of MCS in effecting strategy formulation (Simons, 1990) and strategic change (Abernethy & Brownell, 1999).

Descriptions of strategy formulation and implementation often imply that strategy is an outcome of a deliberate stream of decisions. However, not all implemented strategies arise in the same way (Mintzberg, 1978, 1988). Intended strategies are those that are formally planned, but may not always be realized due to unrealistic expectations, misreading of the environment, or changes in plans during implementation. Realized strategies may develop from those intended strategies, or may emerge incrementally. An MCS that is designed to support a certain intended strategy may not contribute to organizational effectiveness if that strategy is never realized, and a different strategy emerges. However, in empirical research, the importance of the distinction between intended and realized strategy is rarely acknowledged.

Like many areas of research, different discipline bases and paradigms have been used to study strategy. Some research follows a positivist approach, assuming that strategy is an outcome of rational choice. Alternatively, strategy may be considered a craft or may be a subjective interpretation of organizational actors.

Mintzberg (1987) and Quinn (1980) stress the ambiguous and messy nature of strategic decisions, and the need to design systems that allow for flexibility and encourage creativity in strategic planners. In such situations, formal control systems may be counterproductive as they impose constraints and discipline (Goold & Quinn, 1990). An extreme view is that rational normative models of strategy exist in organizations only as ritual, and that the “true” strategy of an organization is not the one formally espoused in mission statements and company documents; strategy develops and resides in the minds of key managers. Using a normative model of strategic decision making, Schwenck (1984) illustrated how cognitive simplification processes may limit the rational procedures within each stage of the model. Porac et al. (1987) explained how cognitive constructions of managers consist of beliefs about the actions of competitors, suppliers, and customers, and the causes of success and failure. A manager may choose to engage in certain strategic activities based on those beliefs. This cognitive view of the strategy process is difficult to adopt in research that embraces a positivist position when objective measures of strategy are sought, but may be used in case study approaches where subjective perceptions of strategy can be more easily accommodated.

### 3.3. Operationalizing Strategy

Hambrick (1980) proposed four different approaches to operationalizing strategy: textual description,

partial measurement, multivariate measurement, and typologies. Textual description was seen as appropriate for case study research and theory building, but too weak for theory testing as descriptions cannot be generated in large enough numbers to produce generalizable results. Also, the reliance on the researcher’s qualitative judgment limits comparison across cases and the replication of studies. Partial measurement of strategy involves considering variables such as market share, or a particular manufacturing strategy (for example, one based around high-quality products), but does not capture the full breadth of an organization’s strategy. Multidimensional measurement is common to strategy and marketing research and involves measuring a series of variables and conducting large-scale statistical analyses of associations. However, the sheer complexity of the outcomes of these studies may make it difficult to detect the internal logic of a particular strategy. Typologies are comprehensive profiles of different strategic types and have the advantage of emphasizing the integrative components of each strategy. The particular focus of a typology (for example, the rate of product change or degree of cash flow emphasis) makes measurement possible. There is strong support for the development and use of strategic typologies in empirical research (Miller, 1981; Schendel & Hofer, 1979) as a way to “bring order to an incredibly cluttered conceptual landscape” (Hambrick, 1984, p. 28). The different strategy typologies and variables that have been used in research that relates MCS and strategy will be discussed and compared.

### 3.4. Strategic Variables

Miles & Snow (1978) described three successful organizational types—defenders, prospectors, and analyzers.<sup>3</sup> This typology addresses business strategy, and focuses on the rate of change in products or markets. Defenders have a narrow product range and undertake little product or market development. The functions critical for organizational success are finance, production, and engineering with less emphasis on marketing and research and development. The functional organizational structure reflects the specialization of products, markets, and technology. Prospectors are described as continually searching for market opportunities and also as being the creators of change and uncertainty to which their competitors must respond. The marketing and research and development functions dominate finance and production, so efficiency and profit performance are not as

<sup>3</sup>The reactor was an unsuccessful organizational type and is not discussed in this chapter.

important as maintaining industry leadership in product innovation. Analyzers combine the strongest characteristics of defenders and prospectors.

Porter (1980, 1985) described the three generic strategies of cost leadership, differentiation, and focus. Each of these intended strategies provides a basis for a sustainable competitive advantage within an industry and potentially defines the context for actions in each functional area of the organization. The successful implementation of each strategy involves different resources and skills, supportive organizational arrangements, and control systems. Cost leadership implies that the organization aims to become the lowest-cost producer in its industry. The source of this competitive advantage may arise from factors such as economies of scale, access to favorable raw material prices, and superior technology. An organization with a differentiation strategy focuses on providing products with attributes that are highly valued by its customers. These include quality or dependability of the product, after-sales service, the wide availability of the product, and product flexibility. In a focus strategy, a company dedicates itself to a segment of the market that has special needs that are poorly served by the other competitors in the industry. Competitive advantage is based on either cost leadership or differentiation.

Miller & Friesen (1982) categorized firms as conservative or entrepreneurial, based on the extent of product innovation. The two types differed in their degree of environmental hostility, organizational differentiation, environmental heterogeneity, and technocratization. Conservative firms engage in innovation with reluctance, usually as a response to serious challenge. Entrepreneurs aggressively pursue innovation, and control systems were used to warn against excessive innovation.

The classification of build, hold, harvest, and divest focuses on variations in strategic mission (Gupta & Govindarajan, 1984). The choice of strategic mission signifies the organization's intended trade-off between market share growth and the maximizing short-term earnings. A business that follows a build strategy aims to improve market share and competitive position, even though this may decrease short-term earnings or cash flow. This can only be achieved if the firm has some competitive superiority within an industry. Under a harvest strategy, a firm strives to maximize short-term profit and cash flow rather than increase market share. A hold mission is often used by businesses to protect market share and competitive position, aiming to maintain market share while obtaining a reasonable return on investment. These firms often operate with a high market share in

high-growth industries. A divest strategy occurs when a business plans to cease operations.

### 3.5. Integrating the Strategy Variables

The range of strategic variables that have been used in research that study the relationship between MCS and strategy can create confusion and may hamper the integration of research findings. To assist in integrating this research, the differences and similarities between the various strategy classifications can be considered. These differences can be viewed as related to scope and focus. For example, the typology of defender versus prospector has a broad scope, while the competitive positioning of cost leadership versus differentiation is much narrower. The entrepreneur versus conservative classification is focused on the extent of product innovation, while build versus harvest specifies the goal of a business unit, which may be based on the market share versus short-term profit trade-off. The strategies followed by particular business units can be described along three dimensions: typology, strategic mission, and competitive position. When the detailed descriptions of these typologies and variables are reviewed, common characteristics particularly in relation to the degree of environmental uncertainty are revealed, which leads to the configurations proposed in Fig. 1.<sup>4</sup> For example, a viable combination may be for prospectors to pursue a build mission and compete via differentiation. However, it may be inconsistent for a prospector to aim for a harvest strategy and pursue differentiation. While further empirical research needs to be undertaken to validate the combinations proposed in this diagram, the classifications will be used in the following section to integrate and compare the findings of quantitative research studies.

## 4. Analysis of Research Evidence

This section contains an analysis of quantitative research that examines the relationship between specific aspects of MCS and strategy. First, early normative studies and empirical contingency research are reviewed and classified by theme. This is followed by a review of more recent research that addresses operational strategies, and studies that utilize BSC and the levers of control frameworks.

In early contingency research that studied the relationship between MCS and strategy, strategy was defined and measured in many ways. In the following discussion, the strategy variable within each research

<sup>4</sup>Govindarajan & Shank (1992) presented a matrix of potential fit between strategic mission and competitive position, but did not consider prospector/defender typologies.

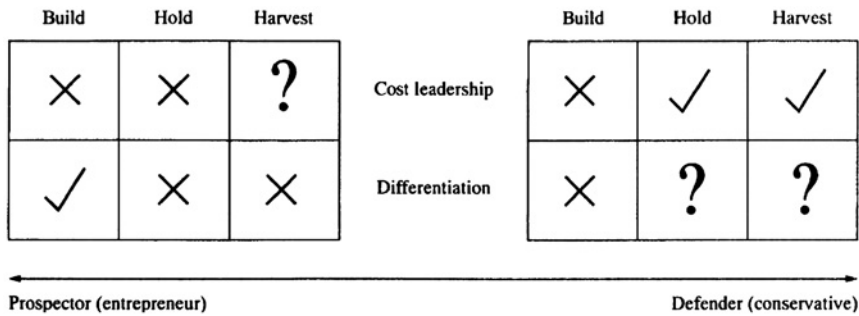


Figure 1. Strategic dimensions.

study has been classified as relating to either prospector or defender strategies, in line with the schematic in Fig. 1. This allows the research evidence to be more easily integrated. Table 1 contains a summary of the empirical research studies that are reviewed, explaining the way that MCS and strategy are defined and measured.

4.1. Broad Control Systems and Strategy

From the early literature, two contrasting pictures emerge of the nature and role of control systems in organizations following a defender-like strategy and prospector-like strategy. Miles & Snow (1978) characterized the planning and control systems of defenders as very detailed, focusing on reducing uncertainty, emphasizing problem solving, but being unable to assist in new product development or to locate market opportunities. As finance and production are the focus, technological efficiency will be important. Control systems are likely to be centralized and there may be a heavy reliance on feed forward control. Control may also be achieved through creating highly specialized work roles, formalized job descriptions, and standard operating procedures. The combination of simple sequential relationships between subunits, repetitive operations, the absence of non-routine decisions, and the stable environment can foster simple and inexpensive forms of cooperation. Similarly, Porter (1980) suggested that highly structured organizations supported a cost leadership focus. Miller & Freisen (1982) focused their strategy classification on the ability of a firm to pursue product innovation. They described conservative firms (defenders) as requiring a control system that signals the need for innovation by indicating significant decreases in market share, reductions in the sales of old or obsolete products, and declining profitability.

Miles & Snow (1978) described prospectors as having difficulty implementing comprehensive planning systems due to the changing demands of their environment. Control systems may focus more on

problem finding rather than problem solving, and flexible structures and processes may assist the organization to respond rapidly to environmental change and to create such change. However, coordination may be expensive and difficult due to overlapping project teams and shared information and resources. Marketing and research and development are the dominant functions. The use of broadly defined jobs and the lack of standard operating procedures may encourage innovation. Control may be decentralized and results-oriented. Porter (1980) saw a differentiation strategy as also relying on control through coordination, rather than on formal controls, to encourage creativity and innovation. It has also been argued that firms that follow an entrepreneurial strategy (similar to a prospector strategy) require a control system that signals when productivity and efficiency have fallen, to indicate when innovation needs to be curbed (Miller & Freisen, 1982).

The above descriptions suggest a level of consistency between the organizational and control characteristics of a defender and cost leader, and a prospector and differentiator. This further supports the proposed fit between these two dimensions of strategy.

4.2. Control Systems and the Level of Competition

Before the 1980s, there were no quantitative research studies that examined explicitly the relationship between strategy and control systems. However, Khandwalla (1972) studied the relationship between control systems and competition, which is an aspect of the environment that may determine the nature of an organization's strategy. He distinguished between three forms of competition—product, process, and marketing—and found the more intense the level of competition, the greater was the reliance on formal control systems. In particular, he argued that intense product competition may require complex organizational forms, with departments for research and development, new product testing, and scanning for

Table 1. Conceptualization and measurement of MCS and strategy in quantitative research.

Research study	Method/Focus	Management control systems		Strategy	
		Conceptualization	Measurement	Conceptualization	Measurement
Khandwalla (1972)	Postal survey to study effect of competition on use of management controls	Use of broad financial and non-financial controls	Use of controls: standard costs, incremental costing, flexible budgeting, internal auditing, performance auditing, use of IRR/PV, statistical quality control, inventory control, systematic means for evaluating staff	Intensity of competition in their industry	Three items concerned with price competition, marketing competition, and product competition, weighted by importance and aggregated
Miller & Friesen (1982)	A wide-reaching survey administered during interviews to study innovation in conservative and entrepreneurial firms	Includes the use of: Management information systems; Cost centers; Profit centers; Quality control by sampling, etc.; Standard costing; Formal appraisal of personnel	Controls—6 questions on 5-point scale, responses averaged	Entrepreneurs and conservative firms	The average response to a range of product innovation and risk-taking questions
Govindarajan & Gupta (1985)	Postal survey to 46 SBU managers in 8 firms	Incentive bonus schemes	Subjective assessment weighted by relative importance attached by superiors to SBU performance on 12 dimensions (5-point Likert scale); 12 dimensions on 3-point Likert scale	Build, hold, harvest strategies	Single strategy question
Merchant (1985b)	Interviews and survey of 54 profit center managers in one company to explore how discretionary decisions are controlled	The impact of controls on decisions	Net income targets; Expense targets; Headcount targets; Procedural controls; Meetings	Used managers' own classification based on planned rapidity of growth	Managers asked directly
Simons (1987a)	Postal survey developed from interviews and	Use of controls	33 scaled control systems variables reduced to 10	Prospector and defender strategies	Assessment of industry experts and two



Table 1. (Continued)

Research study	Method/Focus	Management control systems		Strategy	
		Conceptualization	Measurement	Conceptualization	Measurement
	prior research to study the relationship between control systems and strategy		factors which accounted for 75.2% of the variance: Tight budget controls; External scanning; Results monitoring; Cost control; Forecast data; Goals relating to output effectiveness; Reporting frequency; Formula-based bonus remuneration; Tailored control systems; Control system changeability		descriptive paragraphs from Snow & Hrebiniak (1980)
Govindarajan (1988)	Questionnaire developed from interviews with managers and the literature	Budget evaluative style	Based on Hopwood (1972)/Otley (1978) measure	Differentiation and low cost strategies	Developed new instrument—few details provided
Govindarajan & Fisher (1990)	Postal survey to SBU managers	Reliance on output control or behavior control	Developed instrument—percentage reliance on either strategy for individual products	Differentiation and low cost strategies	Developed instrument—importance of functions for implementation of SBU strategy, and weighted average of degree of resource sharing across SBUs
Daniel & Reitsperger (1991)	Postal survey to managers in Japanese companies	Frequency and type of goal and feedback information	Eight dimensions—source not provided	Quality strategies	Developed for this research
Daniel & Reitsperger (1992)	Postal survey to managers in Japanese and US companies	Goal-setting and feedback for production and quality internal failures	Developed for this research	Quality improvements	Developed for this research
Daniel & Reitsperger (1994)	Postal survey to compare the MCS used to implement quality strategies of Japanese	Provision of quality goals and quality feedback information	Goal setting for quality: Three yes/no items relating to provision of goals for rejects, rework, and scrap;	Adoption of a zero-defect quality strategy	Based on five items concerned with quality-cost trade-offs and the locus of responsibility with quality

	and US electronic companies		Quality feedback: frequency of performance feedback for rejects, rework, scrap units, and cost		
Abernethy & Lillis (1995)	Semi-structured interviews of business units in manufacturing firms	Relative importance of efficiency-based performance measures; integrative liaison devices (structural arrangements)	Three most critical performance measures from a list of 18 measures, drawn from Kaplan (1983), Howell & Soucy (1987), and Chase (1990); Reliance on five integrative liaison devices: spontaneous contact between department, regular meetings between departments, inter-departmental task forces, permanent teams, and permanent liaison roles; Adapted from McCann & Galbraith (1981); Mintzberg (1983); Van de Ven et al. (1976)	Manufacturing flexibility, defined as technological difficulty in making product changes, strategic commitment, and turnaround time to meet customer demand	Response to two questions: proportion of turnover from non-standard products lines, extent to which manufacturing process provides flexibility to offer customer product variations; rating for the three dimensions taken from interview transcripts
Daniel et al. (1995)	Postal survey of Japanese and US electronic companies to study the implementation of quality strategies through MCS and rewards systems	Provision of quality goals and quality feedback information	See Daniel & Reitsberger (1994)	Adoption of a zero-defect quality strategy	See Daniel & Reitsberger (1994)
Ittner & Larcker (1995)	Analysis of consulting company survey data to analyze the association between TQM practices and information and rewards systems in the automotive industry	Adoption of quality-oriented information and reward systems	33 survey questions reduced to 7 factors; included use of bottom-up data gathering techniques, extent of benchmarking, importance of team versus individual	Extent of TQM adoption	41 survey questions reduced to 12 factors; related to the 7 attributes associated with TQM; these include top management participation in TQM, a quality department that

Table 1. (Continued)

Research study	Method/Focus	Management control systems		Strategy	
		Conceptualization	Measurement	Conceptualization	Measurement
Ittner & Larcker (1997)	Analysis of consulting company survey data to see if a quality strategy is associated with the adoption of strategic control practices in the automotive industry	Nine constructs categorized as: strategy implementation practices, internal monitoring practices, external monitoring practices	performance; new measure 36 items factored into 9 control systems constructs; developed for this study; new measure	The extent of adoption of a quality strategy	serves a consulting and coordination role; new measure Four items: Importance of quality in the strategic plan, the resolution of conflicts between being high quality and low cost, the resolution of strategic conflicts being high quality or on schedule, and the concern with quality; new measure
Ittner et al. (1997)	An analysis of archival data to study the factors that influence the relative weights of financial and non-financial performance measures in CEO bonus contracts	Relative weight placed on non-financial performance measures in CEO annual bonus contract	Keyword search of proxy text files of company's compensation committee reports in Lexis/Nexis, to identify use of non-financial measures in onus contracts	Adoption of prospector strategy; adoption of a quality-oriented strategy	Indicators of prospector strategy: ratio of R&D to sales, market-to-book ratio, rate of employees to sales and number of new product introductions; data base search to identify companies who have been a finalist or won a major quality award
Carr et al. (1997)	Postal survey of New Zealand manufacturing companies to see if ISO-accredited companies differed from non-ISO companies in business strategy and their implementation of TQM practices	Reporting of physical and financial quality measures	Adapted from Daniel & Reitsperger (1991), relating to the frequency of provision of specific internal and external failure measures: seven physical quality measures, five financial quality measures, and four cost variances and capacity utilization	Emphasis on cost-oriented versus quality strategy	Five items from Parthasarthy & Sethi (1993): Importance of operating efficiency, competitive pricing, pursuit of economies of scale, industry reputation for cost cutting strategies and volume discounts, relative to quality factors

Gosselin (1997)	Postal survey of manufacturing companies to study the effect of strategy and structure on adoption and implementation of ABC/ABM	Adoption of activity-based management	Adoption of ABM over three stages	Prospector and defender strategies	Two descriptive paragraphs from Snow & Hrebiniak (1980), validated by examination of annual report
Perera et al. (1997)	Postal survey of manufacturing firms to that follow customer-focused strategy maintain an emphasis on non-financial measures to enhance performance	Use of non-financial performance measures	Selection of 10 performance measures from Abernethy & Lillis (1995) that relate to customer-focused strategy, plus 5 new measures	Customer-focused strategy, comprising dimensions of cost, quality, flexibility, and dependability of supply; these are proxied by advanced manufacturing practices focused on delivering customer-focused strategies and advanced manufacturing technologies	Seven items based on Chenhall (1997); six items from Inkson et al. (1970)
Chenhall (1997)	Interview and survey of manufacturing firms to study how reliance on MPM to evaluate managers' performance moderates the relationship between TQM and organizational performance	Reliance on MPM to evaluate managers	Five items: extent to which MPM were used to evaluate divisional managers performance, extent to which specific targets were set for MPM, degree to which these targets were subject to revision, and the use of measures to determine remuneration and promotion; new measure	Extent of development of TQM	Seven items: material procurement programs, product efficiencies, improved cycle time, employee involvement in quality improvements programs, involvement of functional employees in strategy formulation, development of contact between manufacturing and customers and coordination of quality improvement; new measure
Chenhall & Langfield-Smith (1998)	Survey of manufacturing companies to examine how combinations of management techniques and management	Adoption and benefits of various management accounting practices	New measure, 33 items that reduced to 6 factors, developed from the management accounting literature	Emphasis on cost leadership and various forms of differentiation in one organization	New measure, 11 items, based on Miller et al. (1992)

Table 1. (Continued)

Research study	Method/Focus	Management control systems		Strategy	
		Conceptualization	Measurement	Conceptualization	Measurement
Abernethy & Brownell (1999)	accounting practices enhance organizational performance under strategic priorities Mailed questionnaire to managers in hospitals to explain role of budgets and strategic change	Style of budget use	Developed four items based on Simons's (1990) interactive controls framework	Strategic change, in terms of prospector and defender	Adapted from Shortell et al. (1990) and validated through interviews
Bouwens & Abernethy (2000)	Postal survey of manufacturing companies to study the consequences of customization on MAS design	Importance of information	Adoption of Chenhall & Morris (1986) broad-scope information measure	Customization strategy	Categorization of four categorizations of customization, adopted from Pugh et al. (1969)
Hoque & James (2000)	Survey of manufacturing companies to analyze the relationship between BSC usage, organizational size, product life cycle, and strength of market position	Use of each measure in a BSC	20-item scale listing performance measures that span the 4 dimensions of the BSC. The focus is on managers' use of each measure to assess organizational performance	Business strategy is implicit in the choice of performance measures in the BSC	
Davila (2000)	4 case studies and a postal survey of product design projects in 11 companies in the medical devices industry, to study the relevance of project uncertainty and product strategy to the design of MCS	MCS information: product cost, product design, time-related, customer-related, resource input, and profitability	Each of the six types of information is measured by level of detail, frequency of updating of information, and usage pattern; new measure developed from preliminary interviews	Importance to the company and customers of product strategies based on cost, time-to-market, and customer focus	Nine items to measure three product strategies; new measure
Van der Stede (2000)	Postal survey of SBU managers to study the impact of strategy and	Budgetary slack	Five statements relating to ease of achieving budget targets	Cost leadership and differentiation strategies	Govindarajan & Fisher (1990) measure

Baines & Langfield-Smith (2003)	budgetary slack and short-term orientation Postal survey of manufacturing companies to examine relationships between changing environment, organizational variables, and management accounting change	Changes in reliance on non-financial performance measures	19 items based on Abernethy & Lillis (1995) and Stivers et al. (1998)	Change in emphasis on differentiation strategy	Derived from Chenhall & Langfield-Smith (1998), Parthasarthy & Sethi (1993), and Perera et al. (1997)
Ittner et al. (2003a)	Analysis of propriety data and surveys, internal company documents, interviews, and observation to examine how different types of performance measures were weighted in a subjective BSC bonus plan of a major financial services firm	BSC of performance measures focused on financial, strategy implementation, customers, control, people, and standards		Implicitly, the BSC was focused on encouraging managers to work toward the achievement of strategies; one category of measures was focused on evaluating strategy implementation	Strategy implementation measures: number of customers in different segments, customer attrition, level of assets under management for each customer or customer segment; these archival measures were developed by the company
Bisbe & Otley (2004)	Survey of Spanish manufacturing firms that followed a product innovation strategy to study the moderating effect of the interactive use of controls on performance	Interactive use of MCS, namely budgeting systems, BSC, and project management	For each of the three controls a four-item scale, adapted from Abernethy & Brownell (1999) and Davila (2000)	Product innovation strategy	Four-item scale adapted from Capon et al. (1992), Scott & Tiessen (1999), Thomson & Abernethy (1998)
Auzair & Langfield-Smith (2005)	Survey of service companies to study effect of service process type, business strategy, and life cycle stage on MCS	Bureaucratic versus non-bureaucratic management control systems five dimensions: action/results controls, formal/informal controls, tight/loose controls, restricted/flexible controls, and impersonal/interpersonal controls	Five 7-point scales, semantic differential scales developed from Robbins & Barnwell (1989), Simons (1987a), Govindarajan & Fisher (1990), and Ouchi (1977)	Emphasis on cost leadership and differentiation strategies	Based on Chenhall & Langfield-Smith (1998) and Kumar & Subramaniam (1997)

new markets; sophisticated control systems may play an integrative role. While the nature of strategy was not explicitly considered, organizations that face intense product competition are likely to be those that follow the strategies of a prospector or differentiator (Miles & Snow, 1978; Porter, 1980). However, the specific controls measured by Khandwalla—formal accounting controls, such as standard costing, flexible budgeting, internal auditing, use of return-on-investment (ROI), and inventory control—are not those that might be expected to act as integrative devices in an innovative, product-focused organization, with an emphasis on flexibility, quick responses, and after-the-event control (Miles & Snow, 1978; Porter, 1980). Burns & Stalker (1961) suggested that innovation was more suited to unstructured and organic organizations, where there was less reliance on formal controls. Similarly, Thompson (1967) argued that innovation and administrative controls were not compatible.

Khandwalla (1972) is notable in providing the first empirical evidence of a relationship between MCS and the level of competition. However, this paper contributes little to our knowledge of the relationships between MCS and strategy, and the findings of this study are ambiguous, particularly when compared with subsequent research studies. A further limitation is the study's focus on the use of controls, without considering whether those controls were effective in supporting a particular strategy or level of competitiveness.

#### 4.3. Controls and Discretionary Decision Making

Merchant (1985b) studied control systems, strategy, and discretionary decision making in the divisions of a single company. Strategy was defined by managers within the company as rapid growth, selective growth, maintain or generate cash flow, and harvest. The controls studied extended beyond financial controls to include procedural and personnel controls. Merchant found that the controls used in businesses that followed a growth strategy were not noticeably different from the controls used under a maintain or selective growth strategies.

When a rapid growth strategy was followed, discretionary decisions were more highly affected by controls such as net income targets, headcount controls (especially hiring freezes), and the use of meetings where senior management gave directives. The findings of the study in relating MCS and business strategy are limited, which is an artifact of the then level of maturity of the research area; Merchant acknowledges that his research was exploratory. No arguments were presented to support a conceptual relationship between growth strategies, control

systems, and discretionary decision making. While the link to other empirical research on strategy and control systems is not strong, it should be recognized that at the time this study was written there was limited prior empirical research to draw on.

#### 4.4. Cost and Accounting Controls

There is some agreement among researchers that cost control is more important in firms following a defender-like strategy compared with the “opposite” prospector-like strategy. Porter (1980) suggested that tight cost controls were appropriate when following a cost leadership positioning. Miles & Snow (1978) argued that for defenders, control systems will focus on cost objectives that are translated into specific operating goals and budgets. Efficiency and ongoing cost monitoring are more important to defenders, while prospectors are more results oriented.

The findings of Miller & Friesen (1982) are more difficult to integrate with the prior research as strategy was defined in terms of product innovation. However, their argument for the lack of sophisticated cost controls in entrepreneurs is consistent with Miles & Snow's (1978) view of prospectors (but inconsistent with Khandwalla, 1972).

Simons's (1987a) study is a postal survey of the relationship between MCS and strategy. However, many of the findings conflict with other research. First, Simons (1987a) found high-performing prospectors placed importance on controls, such as forecasting data, tight budget goals, and the careful monitoring of outputs, but gave little attention to cost control. Also, large high-performing prospectors emphasized frequent reporting and the use of uniform control systems, which are modified when necessary. Simons (1987a) also found that control systems were used less intensively by defenders, particularly large defenders, compared with prospectors. In large defenders, high financial performance was negatively correlated with tight budget goals and the use of output monitoring. It was only in small defenders that tight budget goals were positively correlated with high performance. These findings are not consistent with Miles & Snow (1978) and Porter (1980). While Simons expressed “surprise” at his findings, particularly regarding defenders, he offered little explanation or speculation about the possible reasons.

There are two aspects about Simons's results that are puzzling. First, why were certain aspects of formal control systems considered important to prospectors, but used less intensively by defenders, particularly large defenders? Second, why should organizational size make a difference to the importance

of controls? Small defenders found tight budget goals important, but large defenders did not. While we can cite the usual reasons for conflicting findings—different samples, different industries, empirical versus normative studies, and national cultural differences—other interpretations are possible.

Dent (1990) proposed several explanations for Simons's findings. First, for prospectors, control systems may restrict risk taking, particularly where authority for product development and market innovation is delegated. Thus, control systems may balance the innovative excess encouraged by prospectors' organizational arrangements (Miller & Freisen, 1982). Second, prospectors may rely on performance monitoring to encourage organizational learning in the face of high task or environmental uncertainty. Finally, financial controls may be the only way that the wide scope of a prospector's activities can be captured. Also, defenders, being more stable organizations, may not require intense cost control, but may more effectively achieve efficiency using non-financial measures (Dent, 1990). A major limitation of Simons's study (which may reflect the era in which it was undertaken) was the focus on financial controls. However, as non-financial controls were not considered by Simons (1987a), the above explanations remain speculative.

Gosselin (1997) provides some additional insights into Simons' study, by studying the effect of strategy and structure on the adoption and implementation of various stages of activity-based costing (ABC). He argued that competitive strategy influences the need for cost management information, and organizations that compete through innovation and product and market development (prospectors) are more open to new innovative techniques that help them improve processes and information. Thus, prospectors more than defenders are associated with the adoption of simple forms of activity-based management (activity analysis and cost analysis), which are less constraining than a formal ABC system. It may be the level of innovativeness and lack of formality of a costing system that may encourage adoption by a prospector.

Van der Stede (2000) undertook a survey of diversified companies in Belgium and examined how budgetary control may be used by prospectors to enhance their competitive position. Prospectors may build budgetary slack into budgetary control systems to provide the flexibility that they need and allow them to respond to their changing environment. Slack is not seen as waste, but as essential for innovation. This, however, does not support the findings of Simons (1987a), which associated prospectors with tight budgetary control.

In a later section of this chapter, Simons's more recent framework for viewing strategy and control systems is considered, and that casts a different light on these issues.

#### 4.5. Performance Evaluation and Reward Systems

Several quantitative studies have focused on the relationship between strategy and performance evaluation and reward systems. In most studies, the choice of subjective or objective approaches to measuring and rewarding performance has been researched.

We will first consider the findings for organizations following defender, cost leadership, and harvest strategies. Simons (1987a) found that high-performing defenders awarded bonuses for the achievement of budget targets (an objective measure). Govindarajan (1988) found similar results for high-performing firms following a low-cost strategy, as did Gupta (1987) for harvest and low-cost strategies and Porter (1980) for cost leaders. Further, the reliance on long-run criteria and subjective bonuses hampered effectiveness in firms following a harvest mission (Govindarajan & Gupta, 1985). Thus, the research findings are consistent: objective performance evaluation and reward systems have been found to support defender-like strategies.

In organizations that follow prospector, differentiator, and build strategies the evidence is also fairly consistent. Porter (1980) argued that subjective performance evaluation was appropriate for differentiators. This was supported by Govindarajan & Gupta (1985) for organizations following a build mission and Gupta (1987) for firms following a build and differentiation strategy. Govindarajan & Gupta (1985) also argued that as build strategies demand a long-term orientation, incentive bonuses should also be based on long-run criteria. (Interestingly, they did not find a strong relationship between the use of short-run criteria for bonuses and effectiveness for build or harvest firms.) The reliance on behavior controls by differentiators in the Govindarajan & Fisher (1990) study implies that subjective bases are used for performance evaluation, as may the low emphasis on meeting budget targets in Govindarajan (1988). In contrast, Gupta & Govindarajan (1986) found that while subjective, rather than objective approaches, to determining bonuses were more beneficial when there is a high degree of resource sharing between business units, resource sharing itself makes a greater contribution to effectiveness in cost leaders than in differentiators. Simons (1987a) and Miles & Snow (1978) did not specify the subjective or objective nature of performance evaluation systems for particular strategies.



The apparent consistent findings regarding performance evaluation and reward systems for prospector-like strategies are not surprising, especially as high environmental uncertainty is usually associated with these strategies. In these situations, it may be difficult to develop performance measures that accurately predict or capture managers' performance. Also, critical success factors associated with these strategies, such as new product development, innovation, and research and development, are of a long-run nature and difficult to quantify objectively, particularly in the short term. Similarly, defender-like strategies usually operate within a low level of environmental uncertainty. Their limited and stable product range and their focus on internal efficiency may enable performance targets, actual performance, and bonuses to be specified with greater objectivity and precision.

The relationship between environmental uncertainty and performance evaluation is well researched (see Briers & Hirst (1990) for a review). For example, Gupta & Govindarajan (1984) confirmed that high-performing firms facing high environmental uncertainty place greater reliance on subjective performance evaluation. While environmental uncertainty may partially explain the choice of a subjective or objective performance evaluation system, it should not be assumed that strategy is a surrogate for the environment (although it is probably highly correlated). Also, to date we have only limited knowledge of the nature of performance evaluation systems under different strategies. Recently new studies have emerged that address the use of a mix of financial and non-financial performance measures for managerial rewards. Often this research is framed within a balance scorecard.

The BSC (Kaplan & Norton, 1992, 1993) and strategic performance measurement systems (SPMS) frameworks (Lynch & Cross, 1992) have stimulated a new research agenda for studying strategy and performance evaluation and reward systems. Some studies have focused on the mix of financial and non-financial reward systems in bonus contracts. For example, Ittner et al. (1997) conducted an archival study to examine factors that influenced the relative weights placed on financial versus non-financial measures in CEO compensation contracts. They found that the use of non-financial measures increased in line with increases in the level of regulation, the extent to which a firm follows a prospector strategy, and the adoption of strategic quality initiatives and noise in financial measures. In a study of total quality management (TQM) and performance and reward systems, Ittner & Larcker (1995) found

that TQM was associated with the adoption of a range of non-traditional information and reward systems. These findings are consistent with earlier studies (Govindarajan & Fisher, 1990; Govindarajan & Gupta, 1985) and confirm the link between non-financial performance measures and differentiation strategies. Baines & Langfield-Smith (2003) took a different slant in studying the relationship between strategy and non-financial performance measures in their study of the antecedents of management accounting change. Overall, they found that a differentiation strategy was a driver of change for a range of technologies and organizational systems. In particular, a change toward a differentiation strategy led to an increased use of advanced management accounting practices (such as ABC, customer profitability analysis, and quality improvement programs) and in turn, a greater reliance on non-financial performance measures.

Ittner et al. (2003a) studied the level of subjectivity in a managerial bonus scheme, which was based on a BSC. The plan was not successful, not because of its design, but due to the inappropriate use of the system by senior managers. (Studies that address the BSC are outlined in more detail later in this chapter.)

While several studies have addressed strategy and performance evaluation and reward systems, there are many questions that remain unanswered, which may be influenced by the strategic orientation of the firm. These include the appropriate mix of salary and non-salary components within rewards, the potential for linking rewards to both business unit performance and corporate performance, and the frequency and timing of performance measurement and bonus payments. While most of the research reviewed in this chapter has considered the performance evaluation and rewards of senior managers, future research may focus on non-managerial employees.

#### 4.6. Resource Sharing and Control Systems

Govindarajan & Fisher (1990) studied cost leadership and differentiation strategies, the extent of resource sharing between SBUs and the use of controls. Resource sharing refers to the sharing of functional resources by two or more SBUs within a single firm, and may include using common sales forces and common R&D facilities. They argued that the potential for synergistic benefits from resource sharing varies across strategic contexts, and the realization of these potential benefits depends on how effectively the linkages between SBUs are managed.

In high-performing cost leaders, Govindarajan & Fisher (1990) found that output controls (and not

behavior controls) were combined with high resource sharing. However, this is not consistent with Miles & Snow (1978), who described the use of standard operating procedures by defenders, and Porter (1980) who argued that cost leaders may rely on frequent cost reports. To some extent, the interaction effect of resource sharing and controls could explain this apparent conflict. Also, Govindarajan & Fisher (1990) found that differentiators with high resource sharing relied on behavior controls (the continual monitoring of decisions and actions), which seems at odds with the entrepreneurial mode of prospectors and their reliance on subjective performance assessment (discussed in the previous section). However, it was found that where there was low resource sharing, output controls were used by effective differentiators, but the level of effectiveness was not as great as for SBUs with high resource sharing.

Control systems theorists, such as Ouchi (1977) and Eisenhardt (1985), concluded that behavior controls are more suitable where there is high task programmability and where outcomes can be readily measured. This would seem to describe the situation facing defenders and cost leaders. As task programmability decreases and outcomes can still be clearly specified, greater reliance may be placed on output controls. This is not the situation usually faced by prospectors, as the innovative and spontaneous nature of their operations could preclude high task programmability, but the situation could still apply to defenders. Thus, the findings of Govindarajan & Fisher (1990) for differentiators conflict with Ouchi (1977). However, Ouchi (1977) also described a third situation that does seem to match the environment of prospectors—where there are neither programmable tasks nor measurable outcomes. In this situation, socialization or clan controls might be appropriate. While Govindarajan & Fisher (1990) did not explicitly consider social controls, curiously they did equate behavior controls with social controls when interpreting their findings. This is despite there being sufficient discussion in the literature to support the different nature of these two forms of control (Eisenhardt, 1985; Merchant, 1985a).

#### 4.7. A Focus on Operational Strategies

The research outlined above focuses on broad business strategies of prospector/defender and differentiation/cost leadership. Studies that focused on quality, operational strategy, and control systems began to emerge in the early 1990s. In the late 1990s, other operational strategies including product innovation and manufacturing flexibility became the focus of MCS research.

##### 4.7.1. Quality Strategies

The first operational strategy to be the focus of MCS research was quality strategy and this is an area where there has developed a critical mass of work. Early papers were in the professional literature, often including descriptive case studies, and several normative papers were published in the academic literature that promoted the benefits of tailoring the control system to suit the needs of a quality strategy (see, for example, Johnson, 1992; Nanni et al., 1992).

The earliest quantitative studies were Daniel & Reitsperger (1991, 1992), and the related studies, Daniel & Reitsperger (1994) and Daniel et al. (1995) that focused on the relationship between MCS and quality strategies in US and Japanese firms. They distinguished between two forms of quality strategies: zero-defect strategy and economic conformance level (ECL) strategies.<sup>5</sup> While much of the literature had suggested that Japanese managers follow a zero-defect quality strategy and US managers an ECL strategy (see, for example, Hayes et al., 1988), Daniel & Reitsperger (1994) found that most of the Japanese and US managers in their sample adhered to a zero-defect quality strategy, with significantly more followers in the US compared to Japan. The management control studied in Daniel & Reitsperger (1994) and Daniel et al. (1995) was the provision of goal setting and feedback information about quality performance.

Daniel & Reitsperger (1994) found that while US manufacturing managers adhered to zero-defect strategies more than Japanese managers, fewer US managers received MCS information to support their zero-defect strategies. Japanese managers were found to receive MCS regardless of which of the two quality strategies they followed. Interestingly, Daniel et al. (1995) found that in US companies, as managers moved up the corporate hierarchy they viewed quality as a high strategic priority and were provided with more quality goals and more feedback on quality performance. Quality strategies and feedback in US companies were linked, but a quality goal setting was not associated with a quality strategy. In the Japanese

<sup>5</sup>The ECL model of quality control assumes that “quality is costly” and proposes that a cost-minimizing quality level can be achieved by balancing prevention and appraisal costs against internal and external failure costs. The optimal ECL is the point at which costs are minimized—where the marginal prevention and appraisal costs equal marginal failure costs. Under this model, the ECL would never occur at the zero-defect level. A zero-defect strategy focuses on continuous improvement to achieve perfect quality performance.

companies, no association was found between quality strategies and the quality goal setting or feedback.

Carr et al. (1997) provide another slant on the study of strategy and quality management by focusing on whether there were significant differences between the quality management practices of ISO and non-ISO accredited companies. While companies pursuing a quality strategy were more likely to have ISO accreditation, there were few differences in the quality management practices and the performance reporting systems of ISO and non-ISO accredited companies.

Ittner & Larcker (1997) surveyed automotive and computer companies and some of their suppliers, across Canada, Japan, Germany, and the United States. Using survey data collected by a consulting firm, the analysis indicated that organizations following a quality-oriented strategy made greater use of strategic control practices, consistent with the quality orientation. The strategic control practices focused on strategic implementation practices (action plans, project controls, and management rewards), internal monitoring practices (feedback mechanisms, meetings, and board reviews), and external monitoring practices (benchmarking, market research and strategic audits of products, and processes). In contrast to earlier MCS/strategy research, the control systems investigated included externally focused controls to monitor comparative performance with competitors and to assess customer and market perspectives. The relationship between strategy and control practices varied across country. In the US and German organizations there was a very strong relation; while in Japan extensive use was made of quality-related control systems, regardless of the strategic orientation. Interestingly, the alignment of quality strategies and strategic control practices was not always associated with high organizational performance, and this varied by industry. Thus, in some situations it seemed that formal control systems might sometimes reduce performance. Despite expectations, there was no evidence that Japanese companies more closely aligned their control practices with their competitive strategy of quality, compared to the other countries.

TQM is a broad framework that includes practices that relate to JIT, flexible manufacturing, and business process engineering. Ittner & Larcker (1995) utilized the survey data collected by a consulting firm and found TQM practices were associated with a greater use of non-traditional information and reward systems. These non-traditional systems included placing a greater reliance on team and non-financial performance, more frequent provision of quality information to all organizational levels, and a greater

use of bottom-up data-gathering techniques. In companies that had more advanced quality programs, the TQM program was more tightly integrated into the organization's overall business strategy. This was reflected in a greater use of external benchmarking of products, processes, and services, the communication of strategic information throughout the organization, and the frequent review of reports on quality plans and achievements by the board of directors. However, TQM and the use of non-traditional information and reward systems were not associated with higher organizational performance. Chenhall (1997) studied TQM and reliance on manufacturing performance measures (MPM) and found that evaluating managers using direct manufacturing measures (which would be one aspect of a non-traditional information and reward system) enhanced company profitability.

The above studies indicate that evidence of a close association between quality strategy, quality-related control practices, and performance is mixed. In these studies, several explanations are provided to explain the lack of support for associations or inconsistencies with prior studies. However, another source of inconsistency may relate to the one organization following a mix of quality, cost-based strategy, and other differentiation-type strategies, such as a customer-focused or flexibility strategies. Evidence from other studies (see Abernethy & Lillis, 2001; Chenhall & Langfield-Smith, 1998) indicates that organizations may follow several types of business strategies to varying degrees and this may influence the focus placed on individual controls such as quality. Bryant et al. (2004) in a study of BSC approaches to multiple performance measures found that firms tend to use generic performance measures rather than measures tailored to a specific strategy. This casts some doubt on the degree to which performance measures should be tightly coupled to strategy. Other aspects that may explain conflicting results are associated with the research design and these issues are discussed later in the chapter.

#### 4.7.2. Product-Focused Strategies

Product-related strategies are not only aspects of business strategy, but are also operational strategies, as their success may be affected directly by activities at the manufacturing, marketing, or product design levels.

Davila (2000) viewed MCS as reducing uncertainty in new product development projects by providing a source of information to close the gap between information required to perform a task and

information on hand (Tushman & Nadler, 1978). Davila (2000) argued that along with strategy and structure influencing the design of MCS in the new product development area, three forms of information gap (uncertainty) shape the design of the MCS. These are market-related uncertainty, technology-related uncertainty, and project scope. Using a combination of qualitative case studies and a postal survey, Davila (2000) included both financial and non-financial information in his characterization of MCS. He found that cost and design information had a positive effect on performance, but time information hinders performance. He also found that cost information was related to a low cost strategy, and time-related information is related to a time-to-market strategy. However, there was no significant relationship between customer information and customer strategy. MCS was not the only source of information used to reduce uncertainty and when technology is the main source of uncertainty, prototyping may substitute for MCS. However, when uncertainty comes from project scope or from the market, MCS are more suited to reducing that uncertainty.

#### 4.7.3. *Manufacturing Flexibility and Other Customer-Focused Strategies*

Manufacturing flexibility is another form of operational strategy. It focuses on the ability to respond to customer demand, by switching from the manufacturing of one product to another in a timely manner.

Abernethy & Lillis (1995) interviewed managers of 42 manufacturing businesses to study the impact of a manufacturing flexibility strategy (seen as a form of customer-responsive strategy) on the design of MCS. They extracted a series of constructs from their interviews. Flexibility was defined as consisting of three dimensions: technological difficulty in making product changes, strategic commitment to flexibility, and turn-around time to meet customer demands. MCS were defined in terms of integrative liaison devices—teams, task forces, meetings, and spontaneous contacts—and efficiency-based performance measures. As predicted, they found a positive relation between a flexibility strategy and the use of integrative liaison devices, supporting the role of such devices to manage functional interdependencies that are needed in the pursuit of flexibility. However, for both flexible and non-flexible firms there was a positive relation between the use of integrative liaison devices and firm performance. There was a negative relation between the use of efficiency-based performance measures for the evaluation of manufacturing performance and the commitment to flexibility, and only in firms that

were “not flexible” did the use of efficiency-based performance measures correlate with higher firm performance.

Perera et al. (1997) examined customer-focused manufacturing strategies that included cost, quality, flexibility, and dependability. They focused on an unanswered question from Abernethy & Lillis (1995), whether firms that follow a customer-focused strategy emphasize non-financial manufacturing measures and whether that is associated with enhanced performance. Support was found for the association between a customer-focused strategy and an emphasis on non-financial measures. However, there was no link to organizational performance. One explanation provided for this result was that the role of the operational measurement system is to direct attention and to motivate managers to focus attention toward those aspects of operations that are of strategic importance, so that relevant outcomes may be increased job satisfaction and motivation rather than firm-level performance outcomes. As with many studies of this nature that seek to relate the use of various practices and systems with improved firm performance, there are questions about the lag between behavioral outcomes and firm-level performance, or more broadly how or if this linkage works in the light of so many other factors that may mitigate such relationships.

Customization is a concept that is similar to flexibility. Bouwens & Abernethy (2000) studied tailored customization, which is the ability or willingness of a company to make non-standard customer-requested changes to products. They found that the relationship between a customization strategy and MCS was not direct, but was via the interdependencies created when the strategy is pursued. The interdependencies are between the sales and production functions, which are necessary for the customization to take place.

#### 4.8. *Balanced Scorecard and SPMS*

In the early 1990s, Kaplan and Norton presented their BSC. This has become a popular framework for combining financial and non-financial performance measures, with explicit links to strategy and organizational objectives (Kaplan & Norton, 1992, 1996). The BSC provides a way for communicating strategic intent and motivating performance toward achieving strategic goals (Ittner & Larcker, 1998). Recent papers that have studied the BSC include Hoque & James (2000), Malina & Selto (2001), and Ittner et al. (2003a). However, the BSC is only one of several frameworks that integrate financial and non-financial performance measures. The performance pyramid of Lynch & Cross (1992) is a performance measurement

hierarchy that articulates an integrated performance measurement system, from senior management level to the operational level, addressing both market and cost considerations to support aspects of strategic importance. More recently, the term “strategic performance measurement systems” has been used as a generic term to study frameworks that integrate financial and non-financial measures (Chenhall, 2005; Ittner et al., 2003b; Webb, 2004).

The paper by Hoque & James (2000) was one of the first empirical papers to address the BSC and strategy linkage. Taking a contingency approach, they hypothesized that organizational performance is dependent on the usage of the BSC, which was influenced by three contextual variables: organizational size, stage of product life cycle, and strength of market position. BSC usage was measured by asking managers the extent to which they used 20 performance measures to assess the organization’s performance. These measures covered the four dimensions of the Kaplan & Norton (1992) BSC. This study found that larger organizations were more likely to make use of a mix of measures, possibly because larger firms can more easily afford to support a more sophisticated system of performance measures. It was also suggested that firms that had a higher proportion of new products also made greater use of the BSC. However, there was no relationship found between market position and the use of the BSC measures. While it is assumed that business strategy influences the design of a BSC, this study did not explicitly measure whether there was alignment between the BSC measures and the competitive strategy of the firm. This is critical, as the BSC is not just a collection of financial and non-financial measures; it is an integrated set of measures based on the firm’s business model (Kaplan & Norton, 1996). Even so, it has been argued that even when measures are selected to reflect a business model, major shifts in the environment can cast doubt on whether “balance” has or will continue to be achieved (Ittner & Larcker, 1998).

A BSC consists of performance measures that address a range of perspectives: financial/non-financial, external (financial and customer) and internal (business processes, innovation, learning and growth), drivers and outcomes, objectives and subjective measures (Kaplan & Norton, 1996, p. 10). However, Kaplan and Norton do not specify how these measures are weighted or aggregated in evaluating managerial performance. Ittner et al. (2003a) studied how different types of performance measures were weighted and used in a BSC bonus plan of a financial services firm. Senior managers introduced subjectivity into the plan by placing greater weight on

financial measures, including factors outside of the BSC in their performance evaluation, changing the evaluation criteria each quarter, ignoring BSC measures that were drivers of future financial performance, and placing reliance on measures that were not predictive of desired results. The BSC was designed to address the company’s five corporate imperatives: achieving good financial results, delivering for customers, managing costs strategically, managing risk, and having the right people in the right jobs. The measures included related to the number of customers in different segments, customer attrition, and level of assets under management for each customer or customer segment. By analyzing company proprietary data and conducting interviews, Ittner et al. (2003a) found that the high level of subjectivity in the bonus plan led managers to complain about favoritism in bonus awards and uncertainty in the criteria that were being used to determine rewards. This paper casts an interesting perspective on the use of BSC to award performance bonuses. While the design of the BSC seemed to be in line with strategic considerations, senior managers did not use the BSC in the way it was intended; the system was abandoned.

An interesting aspect of this paper is how a BSC of measures was used in a way that was inconsistent with the original “good intentions”; the focus of the measures used to award bonuses focused more on achieving financial outcomes. It seems that in some organizations the technical design of a reward system or BSC may be emphasized more than the implementation, even though the implementation can lead to systems failure. Further support for the importance of implementation of the BSC is provided by Banker et al. (2004) in their experimental study of the judgment effects of performance measures and strategy. They found that the evaluations of business unit managers were influenced more by measures linked to strategy than those not linked to strategy, but only when managers are informed in details of the business unit strategies. Also, Malina & Selto (2001) provided a qualitative case study of the effectiveness of the BSC as a strategy communication and management control device and found that difficulties in the design and implementation of the BSC affected its credibility among managers, resulting in conflict and tension and an inability of the BSC to meet its stated outcomes. Problems included the development of inaccurate or subjective measures, top-down rather than participatory communication processes, and the use of inappropriate benchmarks for performance evaluation. Ittner et al.’s (2003a) study is interesting as it relies on a mix of evidence and utilizes quantitative and qualitative data. It also provides support for

various experimental studies that have examined the use of common and unique performance measures in BSC (Lipe & Salterio, 2000).

Another study that utilizes the BSC is by Bisbe & Otley (2004), which tested whether the interactive use of controls (including the BSC) leads companies to develop and launch new products, and whether it contributes to the impact of the new innovative products on organizational performance. The study found that the interactive use of the BSC did not moderate the relationship of the product innovation strategy on performance.

The terminology “balanced scorecard” is often associated with the well-known Kaplan and Norton prescription. However, it is clear that many forms of scorecard exist, whether or not they are formally labeled a BSC. Bisbe & Otley (2004, p. 717) defined BSC in their survey as “summarized, multi-perspective sets of both financial and non-financial indicators that aim to capture the extent to which strategic objectives are being achieved.” It is perhaps for this reason that more recent studies have used the general term, SPMS, to capture these frameworks (see, for example, Webb, 2004).

Chenhall (2005) studied how the underlying information dimensions of SPMS assist managers to deliver positive strategic outcomes. The characteristic of *integrativeness* affects organizational outcomes by providing information on the linkages between operations and strategic outcomes, and between different factors in the value chain. The study found that an SPMS can enhance strategic competitiveness of firms emphasizing both product differentiation and low cost-price strategies.

Unlike earlier quantitative studies that focused on identifying the design of MCS, recent studies of the BSC have highlighted the importance of the implementation of controls as a factor influencing MCS effectiveness and strategic outcomes.

#### 4.9. The Levers of Control Framework

Simons (1987b, 1990, 1991, 1994, 1995) developed his *Levers of Control* framework in a series of linked cases studies. Simons argued that it is not the *identification* of controls associated with particular strategies that is important, but the *distribution of management attention* among controls. MCS are not viewed as devices that constrain and monitor activities to ensure that organizational goals are achieved, but play a role in maintaining or altering patterns of organizational activity. Interactive controls are those that senior management choose to monitor personally. This directs attention toward strategic uncertainties and allows managers to monitor emerging

threats and opportunities. The choice of interactive controls provides the signal to subordinates about which aspects need to be attended to, and when new ideas should be proposed and tested. This activates organizational learning, and new strategies emerge over time through the debate and dialogue that surrounds the interactive management controls. Diagnostic controls are used to implement intended strategies (Simons, 1995, p. 63) by measuring critical performance variables and delegating their management to staff specialists. While firms competing within the same industry may face the same set of strategic uncertainties, managers’ identification of relevant environmental uncertainties, and hence, choice of interactive and diagnostic controls may differ. Notably, Simons does not consider how managers’ perceptions and other information processing characteristics affect these choices (Gray, 1990).

Simons (1990) compared the competitive characteristics and MCS of two companies operating in one industry. Company A was a defender, a cost leader, and adaptive; while Company B was a prospector and entrepreneurial and followed a differentiation strategy (based on product innovation and quality). Company A operated in a relatively stable environment and many aspects that were important for sustainable competitive advantage were highly controllable, and therefore, were treated as diagnostic. Interactive control focused on the strategic uncertainties of product or technological change that could undermine the company’s low-cost position. Company B used budgeting systems and planning systems interactively to set agendas to debate strategy and action plans in the face of rapidly changing environmental conditions. Simons found that subjective reward systems motivate organizational learning in rapidly changing environments where rewarding team effort is important. This is consistent with research described in an earlier section (such as Govindarajan & Gupta, 1985), which supported the use of subjective bonus systems in firms following a differentiation strategy.

In a subsequent study, Simons (1991) refined his theory and identified five different types of control systems that managers may choose to use interactively: programmed management systems, profit planning systems, brand revenue budgets, intelligence systems, and human development systems. Three propositions were presented. First, senior managers with a clear sense of strategic vision choose one type of control system to use interactively, and this choice is influenced by technological dependence within product markets, complexity of the product chain, and the ability of competitors to respond to product

market initiatives. Second, senior managers use multiple control systems interactively only during short periods of crisis, and when the organization is in transition. Third, senior managers without a strategic vision, or without the urgency to create a strategic vision, do not use control systems interactively. Interactive controls force personal involvement, intimacy with issues, and commitment that guides the formal strategy-making process.

Simons (1994) extended his earlier work to examine how 10 newly appointed senior managers used formal control systems as levers of strategic change and renewal. While there were differences between managers implementing revolutionary and evolutionary change, the following features were common. The managers used control systems to overcome organizational inertia, communicate the substance of their strategic agenda, organize implementation timetables and targets, ensure continued attention through incentives, and focus organizational learning on the strategic uncertainties associated with their new strategy.

These studies illustrate how senior managers may select and use MCS in strategy formation and implementation and to stimulate strategic change. Unlike the quantitative studies reviewed in earlier sections of this chapter, the orientation of the strategy or design of MCS is not critical to understanding the nature of the relationship between controls and strategy. Simons (1995) hypothesized that senior managers may use different aspects of the control system to focus on four key constructs that are critical to the successful implementation of strategy. Core values (which influence belief systems) and interactive control systems (which control strategic uncertainties) are described as creating positive and inspirational forces. Boundary systems (which control risks) and diagnostic control systems (which control critical performance variables) create constraints and ensure compliance with rules. Simons argued that the dynamic tension between these opposing forces allows the effective control of strategy.

One of the first quantitative studies to utilize this framework was Abernethy & Brownell (1999) who focused on how budgets were used interactively in a hospital setting, to moderate the relationship between business strategy and organizational performance. They found that organizational performance was enhanced if budgeting was used interactively to reduce the disruptive effect associated with strategic change. The interactive mode was characterized as an ongoing dialog between organizational members as to why budget variances occur, how systems and behaviors could be adapted to minimize variances, and the actions that should be taken. This facilitated

organizational learning. The aspect of strategic change that was studied was the move to a more market orientation (prospector strategy), which was common across the hospital sector.

Bisbe & Otley (2004) provide a comprehensive study of the effect of the interactive use of control systems on product innovation. They conducted a survey of 120 medium-sized mature Spanish manufacturing firms, and tested whether the interactive use of controls leads companies to develop and launch new products, and whether it contributes to the impact of the new innovative products on organizational performance. The control systems studied were the budgeting system, BSC, and project management systems. The results indicated that in low innovating firms, the use of an interactive control system may lead to greater innovation, by providing guidance for the search, triggering, and stimulus of initiatives and through providing legitimacy for autonomous initiatives. However, in high innovating firms, the interactive use of controls seemed to reduce innovation. This was thought to be caused by the filtering out of initiatives that result from the sharing and exposure of ideas. This interpretation is similar to that of Simons (1987a). Another finding was that the interactive use of controls moderated the impact of innovation on organizational performance, possibly as a result of the direction, integration, and fine-tuning that is provided by those interactive control systems. Overall, support was found for the positive impact of formal MCS on innovation and long-term performance.

Simons's levers of control framework is significant as it may contribute to our interpretation of contradictory evidence on the identification of formal MCS in organizations that follow defender or prospector strategies. (See Langfield-Smith (1997) and the discussion of Simons (1987a) in an earlier section of this chapter.)

#### *4.10. The Changing Focus of Strategy in MCS Research*

From the beginning in the early 1980s, quantitative MCS/strategy studies have typically focused on MCS design and business strategy, from a senior management perspective. Business strategies were identified in generic terms of differentiation versus cost leadership, prospector versus defender, or build versus harvest. This was followed by studies that focused on operational strategies and MCS, including quality, manufacturing flexibility, and new product development. With the development of Simons's (1995) levers of control framework, which explains how managers use controls interactively for strategy formation, implementation, and change, more complex studies

have emerged. In addition, the BSC and SPMS frameworks have provided different perspectives for viewing the design of strategically oriented performance measurement systems, and their link with strategy.

Despite there being a critical mass of work in some areas, such as performance evaluation and reward systems and quality strategies, there remain inconsistencies in research findings that make it difficult to build a coherent body of knowledge. Some of these are a result of methodological limitations and are examined in the following section.

### 5. Methodological Limitations of MCS/Strategy Studies

The studies reviewed above focus on a broad range of controls and perspectives, which makes it challenging to define the current state of knowledge. However, the integration of the available evidence is further hampered by specific aspects of the research designs. These issues are discussed in this section.

While the general limitations and contributions of contingency research have been covered in detail elsewhere (Chenhall, 2003; Gerdin & Greve, 2004; Hartmann & Moers, 1999; Moores & Chenhall, 1994; Otley & Berry, 1980; Van der Stede et al., 2005) many research studies continue to exhibit methodological weaknesses. In this section, methodological limitations relating specifically to quantitative research that addresses the relationship between MCS and strategy are addressed. These need to be considered if valuable quantitative research is to be undertaken in the future.

#### 5.1. Operationalizing Management Control Systems

There are several methodological issues that relate to MCS. These are the breadth of controls, the orientation of the control variable, and specific identification versus generic specification of controls.

A key difference across reviewed studies is the *breadth* of controls that is researched (see Table 1). For example, Simons (1987a) focused on 10 financial controls, whereas Govindarajan & Gupta (1985) and Govindarajan (1988) each focused on one control— incentive bonus schemes and budget evaluative style, respectively. Perera et al. (1997) studied 10 non-financial performance measures and Chenhall & Langfield-Smith (1998) and Baines & Langfield-Smith (2003) focused on broad categories of controls. The variation in the number and type of controls that have been researched makes it difficult to integrate findings and develop a coherent body of knowledge.

The omission of clan or social controls and a wider range of formal and informal controls from most of

the studies can also be criticized. It has been claimed that focusing on a few financial or non-financial formal controls is an under-specification of an organization's control system (Otley, 1980). However, designing instruments to measure accurately the incidence or use of informal and clan controls is difficult. Auzair & Langfield-Smith (2005) attempted to do this by measuring non-bureaucratic controls, which focused implicitly on informal controls. While there are practical limitations to the numbers of controls that can be included in a single study, the failure to recognize broader control definitions may assist in the interpretation of some research findings. For example, while Miller & Friesen (1982) found that "controls" were negatively correlated with innovation in entrepreneurs, this could have been due to successful entrepreneurs relying on strong clan or social controls, derived from a strong culture that promotes aggressive product innovation (consistent with Ouchi, 1977). If the study had considered these controls, then a different picture of the relationship between controls and strategy may have emerged.

Another variation in the operationalization of controls is the *orientation* of the control variable. While some researchers focus on whether controls *exist*, others consider if controls are *in use* or their *importance*, while yet others assess the *benefits* of controls, the *reliance on controls*, or *how controls are used*. In some studies, these distinctions are not always acknowledged and hypotheses are supported by evidence from prior studies that adopt a mix of inconsistent control orientations. It can be argued that the mere existence or provision of control information is not sufficient to indicate its use or importance to key decision makers. Simons' (1995) theory of diagnostic and interactive controls is useful in clarifying this distinction.

Another difference in the way in which controls have been conceptualized is whether controls are *specified individually* or whether the focus is on *generic descriptions of controls*. This choice has implications for the completeness of the specification of the control measure and the interpretation of results. For example, a list of specific performance measures or controls is unlikely to capture a picture of all organizational situations, so low levels of use or of reliance may be partially a function of some specific measures that are used by respondents missing from the list. Hoque & James (2000), Abernethy & Lillis (1995), Baines & Langfield-Smith (2003), and Perera et al. (1997) use defined lists of performance measures in their surveys. A generic description of the performance measures may better capture the features or orientation of a performance measurement system.



Auzair & Langfield-Smith (2005) developed a generic framework of controls for service firms that focused on the degree of emphasis on action/results, formal/informal, tight/loose, restricted/flexible, and impersonal/interpersonal controls. A disadvantage of this method is that the specific controls in use are not uncovered. Chenhall & Morris (1986) developed a measure that focused on the characteristics of useful information: scope, timeliness, aggregation, and integration. This was used by Bouwens & Abernethy (2000).

### 5.2. Weaknesses in Conceptualizing and Operationalizing Strategy

There are several weaknesses in the way that researchers have conceptualized and operationalized strategy. These are the validity of assuming equivalence of strategic combinations, whether firms follow a single or multiple forms of strategy at the same time, the potential for circularity in the choice of strategy variable, the lack of distinction between intended and realized strategy, a lack of recognition of the relative nature of business strategy, the correspondence between research definitions and managers' perceptions of strategies, and the lack of recognition of the different stages of development of strategy across a sample.

Early in this chapter, it was assumed that certain configurations of typology, competitive position, and strategic mission may coexist in the same business unit and these combinations are influenced by similar levels of environmental uncertainty. While none of the studies reviewed included more than one dimension of strategy, research outside of the MCS literature has done so (see, for example, Segev (1989) who integrated competitive position and strategic typology). However, this assumption may not be valid; there is an alternative viewpoint. In a theoretical paper, Fisher & Govindarajan (1993) argued that the uncertainties underlying strategic mission and competitive strategy may differ and this may have conflicting implications for the design of MCS.<sup>6</sup>

The papers reviewed above have focused primarily on firms adopting either a prospector-like or a defender-like strategy. The original prescription of Porter (1980) was that effective organizations should follow one or the other, but not both. However,

organizations may not just pursue one form of competitive position, but may follow aspects of differentiation and cost leadership to varying degrees. However, only a few studies have recognized this. For example, Chenhall & Langfield-Smith (1998) examined how combinations of management techniques and management accounting practices enhance performance under different combinations of strategic priorities. Using factor analysis they classified firms as following combinations of low price, customer service, and flexibility strategies. Other studies have structured their survey instruments to force respondents to choose between cost leadership/defender and differentiation/prospector. However, to regard firms as following either differentiation or cost leadership may lead to flawed results in terms of the fit between controls and strategy, as some controls may be used to support both or either strategic orientation.

Using certain strategic typologies can potentially result in a circular research design. This is because strategic typologies are defined by recognizing patterns between many interrelated environmental and organizational variables. Hambrick (1980) warned that researchers should only test for associations between strategic types and other variables that do not constitute the basis for the strategic types. For example, the Miller & Friesen (1982) typology focuses on product innovation, but the different types are categorized using variables such as environmental hostility, organizational differentiation, and technocratization. Studying the strategic type (conservative and entrepreneurial) and the degree of environmental hostility would be invalid. However, there would be no difficulty in studying the relationship between strategy and performance measurement systems.

Another weakness is the lack of recognition of the distinction between intended and realized strategy in some studies, or in the wording of the measurement instruments. Thus, in responding to surveys, managers could report their intended strategies and not emergent or realized strategies; or realized strategies may be presented by managers as the strategy that was always intended.

Some survey instruments do not recognize the relative nature of strategy, which may have led to inaccurate classifications of strategic types. While Govindarajan & Fisher (1990) focused on measuring cost leadership and uniqueness of products (differentiation) relative to competitors, other researchers assessed strategy in isolation from competitors. For example, the questions on risk taking and product innovation used by Miller & Friesen (1982) to classify firms as entrepreneur or conservative did not relate

<sup>6</sup>Fisher & Govindarajan (1993) concluded that uncertainty related to strategic mission focused more on external uncertainty, while competitive position related more to internal or process uncertainty. Not all researchers may agree with this interpretation.

these characteristics to those of the competitors. A company with only a few new product introductions in a fast moving, highly innovative industry might be considered highly innovative in a more conservative industry. Later studies do recognize the relative nature of strategy (see Baines & Langfield-Smith, 2003; Chenhall, 2005).

A further criticism of methods used to operationalize strategy is an underlying assumption that managers view their organization's strategy using the same orientation or focus adopted by the particular strategic variable or typology. The conceptualization of strategy as, say prospector versus defender, may be useful from a researcher's viewpoint, but may have little relevance to managers who formulate and implement strategy (Archer & Otley, 1991; Snow & Hambrick, 1980).<sup>7</sup> This conflict could affect the validity and reliability of responses. We may also question the relevance of the archetypes, which were developed some decades ago and their continued relevance in the new century. Closely related to the issue of validity is the assumption that managers who are surveyed are fully aware of the strategy of their organization, especially of the intended strategy. Quinn (1977) suggests that it may be a deliberate policy of some senior managers to avoid communicating intended strategies to all managers. Also, it has been shown that perceptions of intended strategy can vary among managers within the one organization (Dess and Davis, 1984; Snow & Hrebiniak, 1980). If we take the view that the "true strategy" of an organization is not always that which is formally espoused, even more complex questions arise.

Finally, in many quantitative studies there is a failure to recognize that strategy can be an ongoing developmental process. In cross-sectional survey studies, strategy is measured across a number of organizations, which may be at different stages in their strategic change process. In addition, the MCS needed to support a particular strategy may only be partially developed at the time of the study as the change process may be continuous or span many years. This would clearly affect the validity of aggregating data across a sample and the quality of research findings.

<sup>7</sup>This has also been the writer's experience when experimenting with instruments of Snow & Hrebiniak (1980) and Porter (1980). Some managers had difficulty relating to the particular orientations of those instruments that differed from the way that strategy was thought about in their companies.

### 5.3. Modeling and Measuring Effectiveness

It has been argued that effectiveness is a necessary dependent variable in contingency research as it provides the means for determining the appropriate fit between MCS and organizational variables (Merchant & Simons, 1986; Otley, 1980). However, Simons (1987a) defined firm performance as the dependent variable, whereas in Merchant (1985b) it was an independent variable and in Chenhall & Langfield-Smith (1998) effectiveness was used to validate the clustering of firms.

Effectiveness can be considered an independent variable (Otley & Wilkinson, 1988). For example, the adoption of certain controls or of a particular strategy might be in response to low (or high) effectiveness. However, in this situation what is the appropriate dependent variable? And how can "the proper fit" between organizational aspects and strategy be assessed if there is reverse causation?

Simons (1987a) and Merchant (1985b) defined effectiveness in terms of financial performance. However, for firms that focus on a differentiation strategy, say product innovation, high (short-term) profits may not be considered a good measure of the effectiveness of the strategy. Criticisms have also been voiced concerning whether ROI is even adequate for measuring the performance of financially oriented firms (Dearden, 1987; Merchant, 1989). However, if the measure of effectiveness is not appropriate for the firms studied, then result of analyses must be interpreted carefully. For example, in Simons (1987a) high-performing prospectors (defined as high ROI) placed limited emphasis on cost control, and prospectors with low ROI relied on a high level of cost control. However, this provides little evidence about the nature of controls associated with prospectors who exhibited high performance in their area of differentiation, that is, product innovation. Miller & Friesen (1982) used innovation to measure effectiveness, and considering the nature of the entrepreneurs and conservative classification, this seems a reasonable measure of strategic performance.

A weighted multidimensional performance measure has been used in many studies to take into account the different perspectives on performance (see, for example, Baines & Langfield-Smith, 2003; Bisbe & Otley, 2004; Chenhall & Langfield-Smith, 1998; Govindarajan & Fisher, 1990; Govindarajan & Gupta, 1985). This measure consists of 10 or 12 financial and non-financial dimensions, such as ROI, development of new products, market share, personnel development, and political-public affairs, which respondents assess and weigh to reflect the relative importance of each dimension to their business.

However, the assumption that the aggregation of such disparate performance measures provides a meaningful effectiveness measure can be questioned.<sup>8</sup>

## 6. Conclusion and Directions for Future Research

The purpose of this paper was to review and critique quantitative research that examines the relationship between MCS and strategy, to consider the state of our knowledge in this area, outline limitations, and suggest improvements and directions for future research.

Most of the quantitative MCS/strategy studies up to the mid-1990s related MCS design to business strategies. A contingency perspective was adopted to study the fit between MCS design and strategy. Business strategies were identified in generic terms of differentiation versus cost leadership, prospector versus defender, or build versus harvest. This was followed by studies that focused on operational strategies and MCS, including quality (Carr et al., 1997; Daniel & Reitsberger, 1994; Ittner & Larcker, 1997), manufacturing flexibility (Abernethy & Lillis, 1995), and new product development (Davila, 2000).

Studies in the early 1990s adopted a dichotomous view of strategy as either cost leadership or differentiation, or prospector or defender. More recently, studies have acknowledged that organizations may pursue business strategies characterized by several aspects of differentiation or cost leadership (Chenhall, 2005; Chenhall & Langfield-Smith, 1998). The BSC and SPMS frameworks provide a different perspective for viewing the design of strategically oriented performance measurement systems, and their link with strategy.

More complex characterizations of the MSC/strategy relation emerged with the levers of control framework, which focused on how managers use controls interactively for strategy formation, implementation, and change. The focus has moved from a simple matching of MCS design and strategy to the use of MCS to manage behavior and effect strategic change. If organizations pursue a range of strategies, and if strategy is in continual change, the matching of strategy and MCS design may no longer be the driver of competitiveness and organizational performance. Several studies point toward the importance of the use of the MCS in influencing strategic outcomes and performance.

It is difficult to integrate the outcomes of the studies reviewed to assess the state of knowledge. In many

cases, the research evidence is fragmentary and sometimes conflicting. These conflicts are partially a result of the differences in research designs (as occurs in all contingency research), and also arise from the way that control, strategy, and effectiveness have been operationalized and measured. However, there are some areas where there is fairly consistent evidence, namely in the areas of performance evaluation and reward systems and the orientation of control systems. Recent studies have tended to turn away from a focus on identifying the specific design characteristics of MCS, toward examining how controls are used and implemented to reinforce strategic thinking and strategic change. This is an area where there is much scope for future research. More in-depth studies that integrate quantitative and qualitative evidence may accommodate complex perspectives and provide a needed context and dynamism to complement statistical relationships. Recent papers by Ittner et al. (2003a, 2003b) and Malina & Selto (2001) point the way to such studies.

Future research in this area could also be to build on and develop consistent classifications for controls and strategy. The focus of most of the studies reviewed was on senior management—divisional heads, profit center managers, and business unit managers. This may be an appropriate focus, as it is these managers who usually formulate and often implement business strategy. However, the continued focus on senior management's use of controls could be misplaced. The success of a strategy may be directly influenced by activities that take place in other areas of the business, for example, at the operational, and research and development areas of the organization. The types of controls and the way that they are used by shop-floor workers and their managers may be critical to the success of the strategy. Determining the nature of the controls that are suitable at the operational level for different types of manufacturing strategies is an important research question, which has been only partially addressed in studies that focus on operational strategies.

This review does not capture the state of knowledge in the area, as there are many qualitative case studies that address strategy and control system, and an increasing number have appeared since the mid-1990s. The case studies often adopt different research paradigms and address different questions. There is clearly a place for both case studies and survey research, and both forms of research should continue to play a role in the future. However, future survey research may reflect a greater maturity in the structure of the research design and could draw on the insights and perspectives provided by innovative case studies.

<sup>8</sup>In Bisbe & Otley (2004) the product innovation dimension was excluded from the performance measure as this was modeled as an antecedent to performance.

However, in studying MCS and strategy, the interactions are complex and perhaps only in-depth research can help us understand the complex nature of these relationships. This is particularly so if we recognize that strategy is an evolving and multifaceted concept. It is difficult to envisage how Simons's theory of the dynamic interactions between MCS and the strategy formation process could have emerged from survey-based research!

Many research opportunities and unresolved questions remain. For example, it is not clear what role MCS can play to bring intended strategies to realization, or whether MCS can minimize the disruption caused by strategic change (especially when those changes are spread over a considerable period of time). Research could be undertaken to explore whether the role and composition of MCS change as a company matures. Analysis of research that examined the use of subjective and objective performance measures under different strategies revealed consistencies, but also raises questions about the forms of performance measures suitable for other employee groups. Empirical research to explore how performance measures and reward systems may be used under particular operational strategies, and to support changing manufacturing approaches is a broad topic for future research.

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# A Review of the Literature on Control and Accountability

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**Abstract:** This chapter provides a review of the broad field of the literature on control and accountability, which is generally seen as being encompassed within the domain of management control systems (MCS) research. It describes researchers' definitions of the MCS domain, the frameworks and conceptualizations they have used to provide structure to the field, and the research methods that have been used to advance knowledge. It then describes some of the findings in key issue areas. The main focus of the review is on "financial accountability" types of controls, those that involve holding individuals (or sometimes groups of individuals) accountable for generating results measured in accounting terms. By its nature, the subject matter overlaps with other chapters in the book. The main distinguishing feature of the literature reviewed here is that it takes a holistic view of the overall process of accountability and control in organizations, rather than focusing on any single aspect or control technique.

## 1. The Domain of Management Control Systems

The word control appears frequently in the management literature. When control is described as a function of management, rather than as a synonym of "power," authors are referring to the things managers do to ensure that their organizations perform well. In broad terms, a management control system is designed to help an organization adapt to the environment in which it is set and to deliver the key results desired by stakeholder groups, most frequently concentrating upon shareholders in commercial enterprises. Managers implement controls, or sets of controls, to help attain these results and to protect against the threats to the achievement of good performance. An organization that is "in control" is likely to achieve good performance against its objectives, regardless of whether these objectives are to maximize shareholder returns, heal the sick, or educate the young.

Beyond this general understanding, definitions of the domain of management control systems (MCS) vary widely. Most authors' writing about control refer in some way to the generic management process, which involves (1) setting objectives, (2) deciding on preferred strategies for achieving those objectives, and then (3) implementing those strategies while (4) making sure

that nothing, or as little as possible, goes wrong. But then control authors' decisions about which of these processes they choose to include as part of the "control system" vary significantly. Some (e.g., Merchant & Van der Stede, 2007) exclude strategy formulation processes from their control discussions. They identify the control function of management solely as the third element of the management process described above. Thus a major part of this process can be termed effective *strategy implementation*. Others (e.g., Gould & Quinn, 1993) define control systems to include *strategic control* processes, those designed to evaluate the continuing viability of the strategies that have been set. Still others (e.g., Mintzberg, 1987) argue that it is dangerous to focus only on a strategy that is clearly defined and well articulated, particularly in uncertain environments, and that the encouragement of learning, innovation, and adaptation are important functions of control systems (e.g., Simons, 1995). These latter, broader conceptualizations of control can encompass almost everything managers do to acquire, deploy, and manage resources in pursuit of the organization's objectives. In other words, almost everything in the organization is included as part of the overall control system.

While these differences in definitions of the boundaries of the field create integration and communication difficulties, some commonalities do exist. Regardless of their focus, all of the control writings recognize that managers take several types of steps to keep their organizations reliably on track. In other words, they implement what are called *controls*. Controls come in many forms, from simple operating procedures to elaborate processes, such as performance evaluation reviews that involve the efforts of many managers over significant periods of time. Authors have enumerated and categorized these controls in many different ways, such as action, results, and personnel/cultural controls (Merchant & Van der Stede, 2007); diagnostic controls, interactive controls, and boundary and beliefs systems (Simons, 1995); feedback and feedforward controls (Preble, 1992); and administrative and interpersonal controls (Bruno & Waterhouse, 1975). Some of these frameworks are described below in more detail, and a good overview of the range of frameworks and approaches used can be found in Berry et al. (2005b). Control authors have also applied their frameworks in a variety of settings for overall organizational control and for control in specific operational areas, such as inventory controls, cost controls, and process controls.

We take a broad view of the nature of MCS while reviewing the literature on control and accountability, so as to be able to encompass the wide variety of approaches taken by different authors. However, it is necessary to warn the reader that some of the authors mentioned have taken a narrower and more specific definition of control in designing their studies.

## 2. Overlaps with Other Fields

Given that control is generally recognized as a major function of management, it is not surprising that the management control literature overlaps significantly with some other bodies of literature. One is the field of *cybernetics*, the discipline that studies communication and control processes in machines, living things, and social systems.<sup>1</sup> Cybernetics has been applied in many settings, including engineering, animal and human behavior, and social systems. Thermostats are commonly cited as an example of a simple cybernetic model in a machine setting. If the actual measured temperature is below that desired, the thermostat activates a switch to turn a heater on. Some more complex cybernetic models include feedforward loops that involve predictions of outcomes before fi-

nal measurements are taken and/or multiple correcting feedback loops. Thus, planning can be seen as a form of control, in that it attempts to produce a more desirable future state than would have occurred in its absence. In Wildavsky's (1975) pithy words, "Planning is future control."

Many cybernetic models include one or more correcting feedback loops that are dependent on comparisons of actual and expected (or desired) performance. Performance variance analyses and systems of "management-by-exception" are two practical *management* examples of cybernetic principles. Another is illustrated in the ability of people to control their own behavior, so-called "intrinsic control." A key issue in designing MCS is that the people being controlled are themselves self-controlling systems and may thus react in less than perfectly predictable ways (Otley & Berry, 1980). Beer (1960, 1972) was a pioneer in applying cybernetic principles to management issues and in studying, for example, the responsiveness, stability, amplification, and unintended effects of various regulatory devices.

These insights have been extended with the holistic approach taken by the literature on general systems theory and the "soft systems" approach (Checkland, 1981). Its central contribution has been the *systemic* approach it adopts, focusing on the overall control of organizational activities, in contrast to the *systematic* approach dominant in accounting-based control approaches. This latter approach has often assumed that the multiplication of "controls" will inexorably lead to improved "control," a view roundly routed early on by Drucker (1964). Cybernetics and general systems theory are developed in such an interlinked manner that it is difficult to draw a meaningful dividing line between them (Otley, 1983), although a simple distinction would be to suggest that cybernetics deals with closed systems, whereas systems theory has a more explicitly open perspective and stresses the importance of emergent properties in such systems. However, the conditions for guaranteed control are rarely met in real organizational settings, so this literature can provide only general insights rather than precise design guidelines.

One popular subset of control principles has however been derived from an equally abstract body of theory, namely agency theory. *Agency theory* is the application of microeconomic theory to some of the problems of management control, particularly those related to the design of optimal incentive contracts. Agency theorists view organizations as nexuses of contracts between principals, those who delegate services, and agents, those who perform them (Jensen & Meckling, 1976). Its chief concern is to develop control arrangements, particularly monitoring of work

<sup>1</sup>The name "cybernetics" was coined by Wiener (1948), who adapted it from the Greek word for "steersman" or "rudder."

performed and incentive contracts, that will enable principals to ensure that agents are devoting proper efforts to activities that are in the principal's interests. (See surveys by Baiman, 1982, 1990; Bergen et al., 2001; Eisenhardt, 1989; Laffont & Martimort, 2002.)

Agency models make assumptions about the characteristics of the contracting situation, such as the extent to which the agents' behaviors can be monitored, the degree of information asymmetry that exists, and the attitudes of the principal and agent toward risk, and explore the characteristics of the contracts or other conditions that can be changed to better serve the principal's objective function. This literature has given some important insights into control systems design, particularly relating to the design of reward systems that will lead to desired behaviors in different circumstances. But much of the agency literature still remains relatively abstracted from real situations and yields results of limited practical relevance.

A more practice-based focus is given by the literature on internal control. *Internal control* is a term that auditors have long applied to the sets of controls that are designed to prevent or to detect errors and irregularities, particularly in the recording of transactions that could cause financial statements to be materially misstated. Over time auditors' conceptions of internal control have broadened to include more areas of management control and corporate governance. In the United States, there is now general agreement among auditors and regulators and, hence, managers as to how to define the internal control domain. Internal control has been defined as (Committee of Sponsoring Organizations, 1992, p. 1):

a process ... designed to provide reasonable assurance regarding the achievement of objectives in the following categories:

- effectiveness and efficiency of operations
- reliability of financial reporting
- compliance with applicable laws and regulations.

This definition is indistinguishable from the narrower scope definition of management control described above, that which is concerned with strategy implementation. In the United States, reports on the adequacy of internal control are mandated by the Sarbanes-Oxley Act of 2002 for all publicly traded corporations. Still the focus tends to be more on the interests of those trading shares in financial markets, rather than on the interests of shareholders acting as owners of the company (Bush, 2005).

Another MCS-related body of literature is that focused on *risk management*. While most controls can be

seen as reducing risk, the goal of risk management is not necessarily just to reduce risk but rather to manage it better (e.g., Committee of Sponsoring Organizations, 2004; Crouhy et al., 2001). The risk management literature helps managers better assess organizational risks of various types, to align the risk levels with the organization's risk appetite, and to improve the organization's abilities to make risk-related decisions, such as in avoiding, reducing, or sharing risk or in making sure that the organization is earning returns commensurate with the levels of risk being faced. Like the control literature, the risk management literature focuses both on overall enterprise risk and risk management in specific areas, such as market risk, credit risk, operational risk, reporting risk, and compliance risk.

From this perspective, the field of risk management can be seen to incorporate the entire MCS field. Since risk management often involves a concern about companies' strategies and strategy formulation activities, it can be said to include the strategic control and risk management concerns in the broader MCS definitions. But in addition, the risk management field discusses other more specialist topics, such as insurance, currency hedging, and debt ratings, which are generally not discussed in the MCS literature. Perhaps it is more appropriate to see risk management as just one (important) aspect of overall control systems design.

A final body of literature has taken a *contingency theory* approach to the design of management accounting and control systems. Contingency research was motivated by the generally correct belief that no single control or MCS is optimal in all situations and that the control choices depend on any of a number of situational (or "contingent") factors. (See reviews by Chapman, 1997; Chenhall, 2003; Donaldson, 2001; Fisher, 1995, 1998; Gerdin & Greve, 2004; Itzkowitz, 1996.) Drawing upon earlier developments in organization theory, contingency theory has made some progress in determining the most important contingent variables. Besides organizational size, these include strategy, technology, competition, and organizational structure. But most significant have been various aspects of environmental uncertainty facing the organization (Brownell & Dunk, 1991; Otley, 1980). However, although the main categories of contingency have been reasonably well established, there has been relatively little progress either in specifying what the appropriate responses to uncertainty should be or in outlining the appropriate design for MCS operating in different conditions.

In many ways, contingency theory is not so much a theory as an approach which claims that "it all

depends.” Whereas this claim may be self-evident, it is not clear whether positivistic prescriptions that are stable across time and national and organizational culture are likely to be found, even with a much greater volume of contingency research. Researchers must also be aware of the possibility of “equifinality”: different approaches can often lead to the same outcomes (Doty & Glick, 1993; Drazin & Gresov, 1997).

A major challenge in integrating the MCS-related findings is caused by the fact that the literatures described above have developed largely independently. Identical, or quite similar, concepts are referred to by quite different technical terms. For example, what is referred to as decentralization in many of these literatures is called allocation of decision rights in the agency literature. And beyond the communication difficulties caused by the use of different technical terms, researchers working with one paradigm tend not to cite works from other literatures, which further hinders progress (Merchant et al., 2003).

### 3. Control Concepts and Frameworks

Control was identified as a core function of management in writings dating back to the early 1900s (Giglioli & Bedeian, 1974). For example, Fayol (1916) identified four functions of management: planning, organizing, coordinating, and control. But then much of the development of the control literature in the early 1900s was due to thoughtful business people, such as Chester Barnard (1938), president of New Jersey Bell Telephone Company, or F. Donaldson Brown, the DuPont financial executive who developed the so-called DuPont model of financial analysis in 1919 and who was also later credited for developing General Motors’ innovative decentralized planning and control system (see Blumenthal, 1998).

Academics started developing control frameworks in the 1950s and 1960s. Some, like Burns & Stalker’s (1961) discussion of mechanistic vs. organic organizations, did not have a control focus, although the control system implications are obvious. The work of Scott (1981), who analyzed the development of the literature on organization theory, has also been used to characterize the development of MCS research (see Otley et al., 1995). Scott saw a movement in the approaches taken from a rational (imposed) to a natural (evolving) perspective, first within a closed systems context and later within an open systems context.

Anthony’s (1965) seminal work provided the first discussion of *management control* as a separate topic of academic study. He disaggregated control into three distinct processes: strategic planning, management control, and operational control. Strategic

planning is future oriented, and sets the overall strategies and plans that then require to be implemented. Management control processes, which are focused on ensuring that resources are obtained and used effectively and efficiently to achieve the organization’s objectives, relied heavily on accounting measures of performance and financial accountability. Operational control processes are highly dependent on the situation and tend to rely heavily on nonfinancial measures of performance. Indeed, a much overlooked area of control can be found in the literature on the design and physical layout of manufacturing operations (e.g., Blackmon et al., 2001) which act as facilitators for good operational practice without the need for other measurement systems. One small example involves the use of kanban controls, where the need for stock replenishment is signaled by a bin of parts becoming empty.

Anthony’s terminology and framework, which have guided management control research and teaching for decades, have tended to encourage a strong emphasis on financial, accounting-based controls. Part of the reason for Anthony’s separation of management control from the other two areas was that he hoped to avoid the issues involved in formulating strategy (although this work has been now largely undertaken by the corporate strategy literature), and also the complexity of the many different forms of operational control in different technological environments. He sought to uncover universal patterns of control at the middle management level that could be generalized across many types of organization (and thus anticipated the importance of two major contingent variables, strategy and technology). However, given this approach, it was perhaps not surprising that his answers turned out to be dominated by financial accountability and management accounting controls.

Given the breadth and complexity of the control field, it is natural that over the years authors have taken many approaches to its study. Some researchers focused attention on specific control devices, such as budgeting, measurement, or incentives. Others developed more-inclusive control frameworks or identified contrasting control archetypes. For example, Ouchi (1979) developed a control framework that identified three forms of control: behavior control, outcome control, and clan control. The use of these forms of control depends on two contextual factors—knowledge of what behaviors are desirable and the ability to measure outcomes.

Merchant (1985) and Merchant & Van der Stede (2007) further developed this object-of-control framework. Among other things, they chose more precise

terminology for each of the types of controls, re-labeling them as action, results, and personnel/cultural controls (having noted that *all* controls are behavioral controls). They developed a better understanding of what it means to be able to measure outcomes/results well and how that quality should be judged. They examined the relative advantages and disadvantages of each of the forms of control, in terms of the degree of control provided and both direct and indirect costs. They discussed what managers should do if the use of both action and results is feasible and whether it is desirable to have “tight” or “loose” control. And they used findings in the existing academic research to relate the framework to specific settings, such as organizations operating in uncertain environments, foreign and multinational corporations, and not-for-profit organizations.

Another framework was developed by Simons (1995). In his “levers of control” framework, Simons argues that senior managers have to take explicit decisions about how much they desire of each of the four distinct types of control he identifies: beliefs systems, boundary systems, interactive controls, and diagnostic controls. *Belief systems* set the core values (and contribute to the overall culture and ethos) of the organization. They are very general and may operate through devices such as mission statements and overall corporate policies. But it is also seen as essential that senior managers “walk the talk” to help ensure that such statements reflect an actual reality. *Boundary systems* are in many ways the opposite of belief systems, and indicate the areas of activity and types of behavior that are considered inappropriate. A large number of compliance systems and quality control systems typify this type of control. Whereas *diagnostic control* represents the normal type of variance accounting or management-by-exception reporting, *interactive control* is used to distinguish strategic failure from inadequate strategic implementation. That is, interactive controls are intended to provide early warning that a given strategy is no longer appropriate and needs revision. However, the term ‘interactive’ also covers other types of behavior (the term comes from intensive and interactive discussions between senior and junior managers); indeed Bisbe et al. (2005) have identified five dimensions of interactive use of controls, and argue that all five are necessary components of Simons concept. A contrasting point of view might argue that Simons’ concept has evolved over time, and that it is an empirical question as to whether the five dimensions are independent or need to be used in conjunction. Nevertheless, Simons’ framework provides a high-level overview of the control context of top managers

and the major areas in which strategic control decisions need to be taken.

Otley (1999) proposed still another framework that seeks to ensure that a holistic view of control systems is preserved, rather than more microfoci on just one or a few aspects of control. He argues that it is likely that there are many alternative control system configurations that may produce good results; thus, studying just one aspect of control systems design at a time is likely to introduce noise into results. For example, a weak use of one control system (e.g., budgetary control) may be compensated by a heavy use of an alternative control device (e.g., a balanced scorecard) and vice versa. Only when the overall system is considered will meaningful connections between the use of control systems and overall results emerge.

He suggests a descriptive framework based around five questions:

1. What are the key objectives that are central to the organization’s overall future success, and how does it go about evaluating its achievement for each of these objectives?
2. What strategies and plans has the organization adopted and what are the processes and activities that it has decided will be required for it to successfully implement these? How does it assess and measure the performance of these activities?
3. What level of performance does the organization need to achieve in each of the areas defined in the above two questions, and how does it go about setting appropriate performance targets for them?
4. What rewards will managers (and other employees) gain by achieving these performance targets (or, conversely, what penalties will they suffer by failing to achieve them)?
5. What are the information flows (feedback and feed-forward loops) that are necessary to enable the organization to learn from its experience, and to adapt its current behavior in the light of that experience?

Otley applied this framework in discussing three major control systems—budgetary control, balanced scorecards, and economic value added—to demonstrate how each system takes different approaches in each main area.

The Otley framework is intended to be used as a guide for case-based research. More recent work by Otley & Ferreira (2005) uses it to develop case descriptions of four companies, and extends the framework to 12 questions (some of which are additional and others add precision to the original 5). At the very least, the extended framework provides a useful checklist of the major aspects of control systems design that

may need to be included in a comprehensive analysis of such systems.

Recent work (see Berry (2005) and Berry et al. (2005a) for two overviews) has extended the compass of management control outside the single organization to include the control of value chains that cross organizational boundaries in producing and delivering goods and services to final consumers. Such studies of control in organizational networks and interorganizational control are the subject of a separate chapter in this handbook (Hakansson & Lind, 2006).

#### 4. Key Research Questions and Research Method Alternatives

Broadly speaking, the goal of management control research is to develop a better understanding of how and why control systems work in various situations and what can be done to improve them from the perspective of organizational goal attainment. Typically researchers try to understand how and why specific sets of controls, such as those identified in the frameworks described above, or control characteristics (e.g., formal, rigid, adaptable, and tight) are or are not effective in specific settings. Most MCS researchers (e.g., Merchant, 1985) have viewed control systems as economic goods. Making a control system better means making it more effective and/or less costly. In addition, the use that managers make of controls rather than their mere existence has been identified as a key aspect of their effectiveness (Simons, 1995).

Research findings relevant to the management control field have been developed using four basic research methods, each with its own set of advantages and disadvantages. Some research, most particularly that applying economics-based principal-agent theory, uses an *analytical modeling* approach. These models use mathematics to search for an optimal solution given a particular set of conditions. The agency research explores how to minimize total agency costs—the value loss to shareholders arising from divergences of interests between principals (typically shareholders) and agents (those who are employed to act on behalf of the principals)—under various assumed scenarios. Agency costs are the sum of the monitoring costs, incentive costs, and the costs of agents' actions taken that diverge from the principal's preferences.

The advantage of the analytic modeling approach is in the rigor of the argument. If the world were as assumed in the model, then the findings would hold. Unfortunately, however, it is difficult to model the huge variety and complexity of the agency conflicts and the settings in which they occur. The now vast analytical agency theory-based literature (see reviews by Baiman 1982, 1990; Indejikian 1999) has made

contributions in identifying some variables that should be considered by managers who are designing control systems (e.g., risk aversion, information asymmetry, and information informativeness). But generally this research has failed to capture enough of the complexity of the settings to provide reliable guidance to managers concerned about control problems (Himmelberg et al., 1999; Otley, 1999).

*Empirical* researchers have used many methods, including field (case), experimental, survey, and large sample archival methods, to study control-related topics. *Field research* involves the study of business practices, such as the design and implementation of control systems, in their natural setting (for reviews see Ahrens & Dent, 1998; Keating, 1995; Merchant & Van der Stede, 2006). It is intended to provide a “rich” understanding of relevant phenomena in, typically, a limited number of settings. This rich understanding often allows the research to go beyond the questions of *what* (identification) and *how* (explanation) and into the question as to *why* certain phenomena exist as they do.

Field research can be and has been used for a variety of purposes, including the building, refinement, and testing of theory. Field research can be used for testing and modifying existing theory and for building early, exploratory theory where phenomena are not well understood. For example, Merchant & Manzoni's (1989) study of why firms set budget targets to be so apparently highly achievable served both theory testing and theory building purposes. And field research is often used to introduce “critical cases” to the literature, to explain why a particular theory does or does not work. For example, the Svenska Handelsbanken case provided considerable insight into a control style that has since been labeled “beyond budgeting” (Hope & Fraser, 2003). Ittner et al.'s (2003) study illustrated why a balanced scorecard approach ultimately did not work when implemented in a large financial institution. Field research tends to be a central component of holistic studies of control systems operation, as more “arm's length” methods cannot access the wide range of factors influencing overall control systems success.

Field researchers sometimes study a broad variety of situations to try to find commonalities among them, a type of research that Lillis & Mundy (2005) called “cross-sectional field studies.” Many of the control frameworks described above resulted from this kind of research. But because of the limited number of settings typically studied, generalizations to populations beyond the settings studied are generally not advisable (or even theoretically sound).

When researchers use *experiments*, they manipulate one or more (independent) variables and observe

the effects on other (dependent) variables. Experiments can be used for multiple purposes, including testing of theory, exploring the reasons why a theory does or does not hold, and sometimes to establish empirical regularities that can be used to build new theory. Because of the tight controls on the setting, experiments allow researchers to draw causal inferences regarding the variables of interest. And experiments can be used to study phenomena even when real world data do not exist, such as in the study of “truth-inducing incentive schemes” (e.g., Chow et al., 1994; Waller, 1988). However, since experiments are abstractions from the real world, the external validity of the findings is often called into question.

Many experiments have been conducted in MCS-related areas. For example, experimental studies have focused on measures (DeJong et al., 1989), performance targets and target-setting processes (Fisher et al., 2000, 2002), performance evaluations (Banker et al., 2004; Dilla & Steinbart, 2005; Frederickson et al., 1999; Lipe & Salterio, 2002), and incentives (Waller & Bishop, 1990). (For reviews of MCS-related experimental findings see Bonner et al., 2000; Bonner & Sprinkle, 2001; Sprinkle, 2003.)

*Surveys*, which come in multiple forms (e.g., mail, Internet, and telephone), allow the collection of information from relatively large samples of respondents. Surveys are generally used to test, refine, and explain existing theories, not to explore new topic areas. Most surveys are done cross-sectionally, which makes drawing causal inferences difficult, but this design is appropriate for testing differences in sample subsets. Surveys can be used for studies at multiple levels of analysis, from that of the entire organization down to the lowest level employees.

Survey research methods have been used extensively in control systems research. (for reviews see Van der Stede et al., 2006; Young, 1996). Much of the so-called “contingency theory” literature has used survey methods applied to, for example, the design and use of budgeting systems and the appropriateness of the reliance on accounting performance measures (RAPM). However, this work has tended not to be cumulative in its outcomes, as different measurement instruments have been used in a wide variety of different contexts without adequate contextual information being given to enable these differences to be recognized and classified. Clearly, survey work has its place, but it is hazardous to conduct it without a clear understanding of the assumptions concerning control practices that are embodied in questionnaire instruments.

Sometimes researchers can use *archival* data to conduct relatively large-scale empirical studies. Some of these archival data are secured from public sources,

such as from regulatory filings. Others are obtained from within the firm. Archival studies have two main advantages. One is that the data are seen as “objective,” not tainted by, for example, response, surveyor, interviewer, or cooperating-firm biases. Another is that researchers working with archival data are often able to work with large sample sizes, which allow the use of more sophisticated statistical methods and more reliable generalization to specific populations of interest.

Because of the availability of public disclosures, particularly in the United States, the control-related topic area that has received the most attention from archival researchers is regarding top management incentive compensation (see a review by Murphy, 1999). Only a few researchers (e.g., Banker et al., 2000; Ittner & Larcker, 1998) have been successful in gaining access to significant within-company databases that are suitable for studying MCS-related topics. With virtually all archival studies, researchers often have to work with indirect (“proxy”) indicators of the variables of interest. This is a disadvantage of this type of research as compared to the other research methods.

Finally, there is the issue of the type of theory that research on control systems design and use is able to produce. At one level, many empirical researchers appear to believe that their work (if properly conducted and subject to replication) will eventually produce universal findings that will continue to hold over time. At the very least, contingent models of how control systems will work in different circumstances are believed to be an adequate representation of reality. Such a natural scientific model of human and organizational behavior is disputed by some (see, for example, the discussion of organizational culture by Scheytt & Sojin (2005); a fuller review of critical theory approaches to management control is provided in Puxty (1989)). Perhaps a more realistic approach is put forward by Laughlin (1995) in developing his ideas of “middle-range” theory. Here he tries to distinguish between those aspects of theory that are indeed universal and invariant over time (the skeleton) and those aspects that are contingent on specific, local circumstance (the flesh). In any specific setting, both elements will be required in order to explain (or perhaps predict) the behaviors that a specific control system design and use might engender.

### 5. What have We Learned about Accountability-Oriented Control Systems?

Some control systems are intended first and foremost to hold individuals (or sometimes groups of individuals) *accountable* either for their actions or for the results they or their organizations produce. Being held accountable means that the individuals are rewarded



when good things happen and punished when bad things happen. Accountability-oriented control systems predominate at managerial levels of most organizations, but in some organizations they are in use even at the lowest organization levels, as in a piece rate system used with production line employees.

In an accountability-oriented control system, the individuals whose behaviors are being controlled are generally, but not always, told prior to the performance period what is expected of them. These expectations can be quite explicit and fixed, as is apparent in such targets as “make your budget” or “open the new sales office on schedule.” They can be explicit yet flexible, as in “grow faster than the inflation rate” or “perform above the median level in our industry.” Or they can be implicit, not really apparent to anyone until the performance period has ended, and perhaps not even then. After the period has ended, evaluators monitor reports of what the individuals were being held accountable for—records of what was done or what was accomplished during the period. They reward good performance, such as with bonuses, promotions, and praise. They punish poor performance, such as with criticisms, the absence of assignments of rewards being given to others, and, at the extreme, demotions and dismissals.

The management control-related literature, which in its modern form can be said to be nearly 50-years-old, and even the portion of it that is related to accountability, is now voluminous. It is impossible to summarize all that has been learned in a short review paper. Thus, we have chosen to provide an overview of what we believe to be seven of the most important accountability-related themes in the literature. These are:

1. What makes a good performance measure (or set of measures)?
2. Why are managers generally held accountable for much more than they can control?
3. Are performance targets necessary, and if so, what makes a good one?
4. What do we know about choices of styles of accountability?
5. What are the key incentive system design issues, and what do we know about them?
6. How and why do control systems differ in different settings?
7. How can we recognize progress, that is, positive innovations as distinct from fads?

### 5.1. What Makes a Good Performance Measure (or Set of Measures)?

The performance measures for which people in organizations are held accountable exist in many forms.

One way to classify them is to distinguish market measures, financial summary measures (e.g., profit), disaggregated financial measures (e.g., revenues and costs), and nonfinancial measures (e.g., quantity, quality, market share, and customer satisfaction). Authors have proposed a number of evaluation criteria, such as congruence, informativeness, objectivity, and timeliness, that can be used to distinguish good from bad performance measures or sets of measures (Merchant, 2006). There is still work to be done to compare and contrast these characteristics, as some of the terms used are highly related and others conflict in certain settings.

One area where general agreement seems to exist is that good measures must reflect progress toward achievement of the organization's objectives. This quality has long been referred to in management accounting textbooks as *congruence*, but it is also closely related to what has been called more recently “informativeness” (Feltham & Xie, 1994) and “signal-to-noise ratio” (Banker & Datar, 1989). Congruence is important because holding employees accountable for an incongruent measure will actually motivate them to act in ways that are not in the organization's best interest.

A contrast can be drawn between goal congruence and behavior congruence, which recognizes that it may not be necessary for all employees of an organization to espouse its goals provided they behave appropriately in delivering required behaviors. Nevertheless, it may be unlikely that a complete range of appropriate behaviors can be motivated without some degree of normative involvement of employees. A contingent approach might reconcile these points of view, although ideas of normative involvement are clearly moving into areas of control systems use and organizational culture.

If one could measure an organization's “true” performance over time, one could judge the congruence of a measure by calculating the correlation between the measure being used for control purposes and that for true performance. Most economists believe that the overriding objective of profit-seeking organizations is to maximize shareholder returns, so they believe that “the simple correlation between [any measure] and stock returns is a reasonably reliable guide to its value as an incentive contracting tool” (Garvey & Milbourn, 2000, p. 210). Even if this is accepted, those taking a stakeholder perspective would argue (along the lines put forward by proponents of the balanced scorecard) that intermediate performance measures are necessary to reflect the different subcomponents of performance that are required.

When researchers conduct congruence tests of financial measures such as accounting earnings or returns, they invariably find low correlations between the accounting-based measures and stock returns. For periods of a year, the most common period used in management incentive contracts, most of the correlations are only around 0.2 (Biddle et al., 1997; Easton et al., 1992; Garvey & Milbourn, 2000). This realization has led to the development of “new, improved” bottom-line measures of performance, such as economic value added (EVA), economic profit, and cash flow ROI. Although not all of these measures have been tested rigorously, the existing research, which has focused mostly on the EVA measure, does not show any congruence improvement over traditional accounting performance measures, despite the marketing claims to the contrary (Biddle et al., 1997; Garvey & Milbourn, 2000).

The search for more congruent measures has also led consultants to suggest the use of combinations of measures that supplement the largely backward-looking financial measures with one or more leading indicators of forthcoming performance, such as market share, customer satisfaction, or employee turnover (e.g., Banker et al., 2000; Epstein & Manzoni, 1997; European Foundation for Quality Management, 2003; Kaplan & Norton, 1996; Lynch & Cross, 1990). Some of the more elaborate of these systems, such as the balanced scorecard (Kaplan & Norton, 1996), encompass dozens of measures organized into “strategy maps” that show multiples series of (mostly assumed) causal links. While the idea of combinations of measures has intuitive appeal, testing of the congruence of these combinations-of-measures systems in various settings is in its early stages. Testing will be complex because the range of possibilities is huge. The possibilities require choices of which concepts to measure (e.g., customer satisfaction), choices about how to measure each selected concept (e.g., customer survey, mystery shopper ratings, and customer retention indicators), and choices of both the lags and importance weightings for each of the measures selected. It is likely that different choices are optimal in different settings.

What if the organization’s overriding goal is not maximization of shareholder returns, as is true of all not-for-profit organizations? In these organizations, financial performance is a constraint; the objective is to fulfill a worthwhile mission, such as feeding the poor, educating youth, or generating research breakthroughs. Measuring the inputs to the process is generally easy. But, even if all constituencies agree on the organization’s objectives, and often they do not, performance measurement is usually more difficult than

in profit-seeking organizations. The lags before results are sometimes quite long (e.g., finding a cure for cancer), and the quality of the services provided (e.g., educating) is difficult to measure. Little generalizable research has focused on measurement in not-for-profit organizations, and the solutions tend to be highly idiosyncratic. There has been a body of research on public sector organizations, some of which is reviewed in Abernethy et al. (2006) and Eldenburg & Krishnan (2006).

Another aspect of performance measurement that has not been well studied is the question as to whether it is better to hold managers accountable for a single, bottom line performance measure or for a combination of measures, assuming no major difference in congruence (Merchant, 2006). Holding managers accountable for a single measure provides maximum autonomy. The organization can promise managers rewards for improvements in, say, return on assets (ROA), and the management team can figure out how best to accomplish that result. Maybe they will have an innovative idea that will improve ROA. But even failing that, they can adapt their tactics to their management style. In addition, bottom-line summary measures are usually cheap to provide. A combination-of-measures system is more complex and will generally be more expensive.

On the other hand, a well-designed combination of measures can help some managers understand how to accomplish the desired bottom-line result. For example, if ROA is the objective, some managers might benefit from reminders that ROA improvements are best accomplished in the long run in this setting by focusing on specific elements of performance, such as new product development, operating margins, and inventory control. These reminders about the key elements of the business model or strategy could be useful in some settings.

### 5.2. Why Do We Generally Hold Managers Accountable for Much More than They Can Control?

The controllability principle—hold people accountable only for what they can control—is one of the oldest control principles. If individuals can have no effect on an outcome, it serves no useful purpose to hold them accountable for that outcome.

Organizations take many steps to implement the controllability principle, at least in part. They eliminate some of the disparities between authority and responsibility and some of the uncontrollable “noise” in the performance measures (Merchant & Van der Stede, 2007). Before the measurement period, they design responsibility structures to match performance measures with managers’ levels of authority. When

responsibility accounting is used, sales managers are only held accountable for the revenues they generate (and controlling their costs) and production managers are only held accountable for controlling costs (and their department's output). And they buy insurance to transfer risk to third parties. After the measurement period, they use management accounting-related tools, such as variance analyses, flexible budgets, relative performance evaluations, and subjective performance evaluations, to separate out some uncontrollable effects.

In practice, however, it has been observed that many, perhaps even most, managers are held accountable for many things that they cannot control (e.g., Merchant, 1987, 1989). This disparity in practice has two basic causes. One is that it is often difficult to separate the uncontrollable and the controllable effects on the performance measures. Was the fire in the production plant caused by negligence, or was it truly bad luck?

The other basic cause is that while some factors are uncontrollable, organizations want managers to respond to changes in those factors. Those responses mean that managers can influence the performance measures, even if the factor is uncontrollable. For example, if oil prices rise, managers can take steps to reduce their organization's consumption of oil. Thus, the controllability principle should probably be called the "influenceability principle." If managers can materially influence the effects of a factor on performance, they should be held accountable for the effects of that factor, whether or not the factor itself is controllable. If they are buffered totally from the effects of the factor, such as oil prices, they will not make the desired adjustments (Antle & Demski, 1988).

### 5.3. Are Performance Targets Necessary, and If So, What Makes a Good One?

There is a substantial literature on goal setting and the use of targets (see Murphy, 2000). However, it seems to have not advanced much beyond the findings of the early 1970s (see Hofstede (1968) and Otley (1982) for two reviews) that generally supported the case for motivational targets that were challenging, but not impossible to achieve, and to have only a small number of such targets. Most of these findings were based on psychological theory and were generally based on experimental results with nonmanager subjects.

The practical problem, though, was how to combine motivational targets (which were not likely to be achieved on every occasion) with realistic planning numbers (which could form the basis of sound budgets) (Barrett & Fraser, 1977). Although there is some

evidence that this issue could be resolved by extracting the optimism using contingency allowances at different hierarchical levels (see Otley & Berry, 1975), the issue tended to be left as a dilemma for managers to resolve. In most organizations, budgets tend to be set at levels that are frequently achieved (Merchant & Manzoni, 1989); and it is argued that this can still encompass "stretch" targets that are achievable only with considerable skill and effort on the part of effective, motivated managers. That is, an *ex post* assessment of target difficulty, based on the frequency with which such targets are achieved, may miss the point. A target may be seen as challenging and, hence, have a high motivational impact, despite the fact that it is usually achieved. Indeed, many budgetary systems seem to incorporate devices to allow motivational targets to become more conservative estimates as they move up the organizational hierarchy (Otley, 1985).

Nevertheless, there is still an issue regarding managers not being motivated to overachieve, even where the target proves easier than expected. This issue has been well documented by the "Beyond Budgeting" (BB) movement (see Fraser & Hope, 2003). Many of the (increasing) problems experienced by organizations attempting to manage their budgetary control procedures have been laid at the door of the budget representing a "fixed" (preset and unchanging) target in a world of constant change and uncertainty. Thus, budgets can become out-dated during the budget year, or even before it begins.

The weaknesses identified by the BB group are very similar to a list, also of 12 items, subsequently outlined in a report by Neely et al. (2001). Drawn primarily from the practitioner literature, they maintained that the 12 most cited weaknesses of budgetary control (which can also be applied more generally to management control) are

- Budgets constrain responsiveness and are often a barrier to change
- Budgets are rarely strategically focused and often contradictory
- Budgets add little value, especially given the time required to prepare them
- Budgets concentrate on cost reduction and not value creation
- Budgets strengthen vertical command and control
- Budgets do not reflect the emerging network structures that organizations are adopting
- Budgets encourage "gaming" and perverse behaviors
- Budgets are developed and updated too infrequently, usually annually

- Budgets are based on unsupported assumptions and guess-work
- Budgets reinforce departmental barriers rather than encourage knowledge sharing
- Budgets make people feel undervalued

The conclusions of the BB group (Fraser & Hope, 2003) are that many of these problems can be mitigated by adopting some new control principles. The first of these principles is designed to remove the emphasis on preset and fixed (budget) targets, and to replace them with benchmarked (flexible) performance standards. Thus, a common form of performance target would be a league table, either internally (e.g., different branches in the same company) or externally (e.g., performance in comparison with leading competitors) referenced.

This forms the basis for implementing the second, and arguably the most important, principle. Here the objective is to remove reliance on an arbitrary performance target that is set for a fixed period (typically a year) many months in advance. It is to be replaced by a relative performance target that is continually updated in light of changing conditions. More radically, performance against such targets will be evaluated with hindsight. That is, performance evaluations may well be adjusted to reflect the actual operating experience and economic circumstances faced during the period. Rewards may be connected to performance, but typically by relying more on subjective performance evaluations with an emphasis on workgroup rather than individual rewards. The aim appears to be to attempt to engender a philosophy of doing what is best for the firm in light of current circumstances and to encourage teamwork.

How successful this approach will prove to be is largely untested (see Hansen et al. (2003) for a review). But it represents a significant change in approach to target setting in moving away from a preset fixed target to a moving, flexible target benchmarked on other factors. The previous literature on target setting has never considered this possibility, so a new and significant research topic has opened up.

#### 5.4. What Do We Know about Choices of Styles of Accountability?

A common conclusion in many studies of MCS design and use is that it is the way in which such systems are used, rather than their mere existence, that determines their effects and effectiveness. But we have few conceptualizations about what “style of budget use” actually entails. One aspect of this concept is hinted at in Simons’ (1995) distinction between interactive and diagnostic use. Bisbe et al. (2005) identify five separate

subdimensions of the interactive use construct. These are (1) intensive use by top managers; (2) intensive use by operating managers; (3) face-to-face challenge and debate; (4) focus on strategic uncertainties; and (5) noninvasive, facilitating and inspirational involvement. They argue that all five components are a necessary condition for true interactive use of a control system. However, as these dimensions are not necessarily theoretically connected, it is an open empirical question as to what the effects of such an “interactive” use are in practice.

The only other major conceptualization of control systems use dates back to Hopwood’s (1972) distinction between the “budget-constrained” style of budgetary control systems, which he contrasted with a “profit conscious” style, and demonstrated the different consequences of each style in his subject company. This categorization was subsequently used by Otley (1978) and his different conclusions, in the context of a different type of organization, formed one of the bases of the development of the contingency theory of management accounting systems (Otley, 1980). The theme was taken up by other researchers, and became known by the title of “Reliance on Accounting Performance measures” (RAPM). By 1991, it had been characterized, rather generously, by Alan Dunk and the late Peter Brownell as “the only organized critical mass of empirical work in management accounting at present.” Excellent reviews of this body of work can be found in Briers & Hirst (1990) and Hartmann (2000). But it has two major shortcomings. First, the concept of RAPM (and its measurement) has deviated from the original concept put forward by Hopwood, with the term now being used to cover a wide variety of different concepts and measures, causing a great deal of confusion (see Otley & Fakiolis (2000) for a review). Second, virtually none of the work has ever been replicated (see Otley & Pollanen, 2000). Thus, we can have little confidence that any of the results are robust, even in the settings in which they were conducted, let alone in different settings in a more modern context.

Nevertheless, the key feature that Hopwood had uncovered does seem to have a persistent relevance in current organizational setting, and with reference to a wide range of performance measures (not just budgetary control systems). He essentially distinguished between a short-term approach characterized by a rigid insistence by senior managers that targets should be attained in the current period and a long-term approach that might condone short-term failure to attain a target if it could be demonstrated that performance might be better over the longer-term by so doing.

There is also the open question as to whether a senior manager’s style of control systems use is a trait

or a behavior. If it is seen as a trait, it is part of the manager's personality, and cannot be varied across subordinates. If, as seems the case for some managers, it is a behavior, then it might be selectively used in different circumstances. We have some evidence to suggest that the longer-term, "profit-conscious" style is more likely to be used with subordinates with whom the senior manager has worked for a lengthy period, and where a trust relationship is more likely to have developed. Hopwood's (1973) idea of the "contagion effect" also suggests that the "budget-constrained" style can be a behavior, in this case, a hierarchically adopted behavior.

In conclusion, we still seem to be feeling our way into what different styles of evaluation involve, although there is mounting evidence that such style of use can have important consequences. It thus appears to be a key area for further investigation.

#### 5.5. *What are the Key Incentive System Design Issues, and What Do We Know about Them?*

Extrinsic rewards and punishments, those provided by the organization, are an important part of every accountability-oriented control system.<sup>2</sup> Rewards—things that employees value—come in many forms, including salary increases, bonuses, promotions, praise, and public recognition. Punishments are the opposites of rewards in that they are things that employees want to avoid. Punishments also come in multiple forms, including criticism, loss of autonomy, the absence of rewards that others are getting (e.g., salary increase) and, at the extreme, loss of job. All companies, even those that have no formal measurement and bonus systems, use incentives of some type.

There are many incentive system issues to consider. Some of these issues, such as when does compensation become "excessive," are largely beyond the scope of the MCS field, although the relationship between rewards and performance is clearly an important area for control systems design. But many other incentive issues are critical to the design of an effective MCS system.

The most basic question is: Do incentives work? Kohn (1999) argues that rewards and punishments produce only temporary compliance, and that intrinsic rewards are more powerful and enduring. His arguments do support the arguments in favor of using

personnel/cultural/clan controls. However, the vast majority of organizations have implemented some form of incentive system, certainly in the United States and increasingly in the rest of the world, which suggests that the intrinsic rewards, by themselves, do not provide adequate motivation to everyone.

Another issue is: What incentives should be provided? There is no easy answer to this question. Positive motivational effects can be obtained by linking anything employees value (or want to avoid) to measured outcomes. Thus, we see organizations using a wide variety of rewards in their incentive plans (Nelson, 1994). Clearly different employees place different values on different forms of reward; in general, promotions are more important to younger employees and pensions are more important to older ones. But organizations generally cannot optimize their incentive plans for individual employees. Since all employees value cash (and cash equivalents), money is a common form of incentive, even though it is not a tax-advantaged form of reward and its effects might not be durable.

Several major incentive system issues relate to timing, both of the performance period over which accomplishments are to be judged and the time period over which the payments are to be made (Pavlik et al., 1993). The performance period issue relates most importantly to the qualities of the performance measures being used. While motivation is enhanced if rewards are provided frequently, it is often difficult to measure performance effectively in short time periods. For example, while the correlation between annual accounting profits and annual market returns averages only about 0.2, as has been discussed above, the correlation between these two performance measures rises to almost 0.8 when the measurement horizon is extended to 10 years (Easton et al., 1992). Obviously managers do not want to wait 10 years for their bonus award, but perhaps providing them over a 3-year period is a reasonable compromise, certainly at more senior levels.

Should 100% of the bonus awards earned be paid immediately, or should they be paid over time? This raises the question as to the purposes for which the incentive system is being used. If employee retention is an important purpose of the system, then it can be desirable to defer some of the payments, to encourage employees to stay to get what they have already earned. This is true even if motivation is reduced (because the value of the incentive being given is reduced).

Figure 1 shows a generic form of the pay/performance relationship most companies use for their short-term bonus plans. But how should this relationship

<sup>2</sup>Intrinsic rewards, those that stem from an individual's inner feelings, such as satisfaction and accomplishment, can also be powerful motivators, but they are not part of what we call accountability-oriented control systems. They are a key element in what have been referred to as personnel or clan control systems.

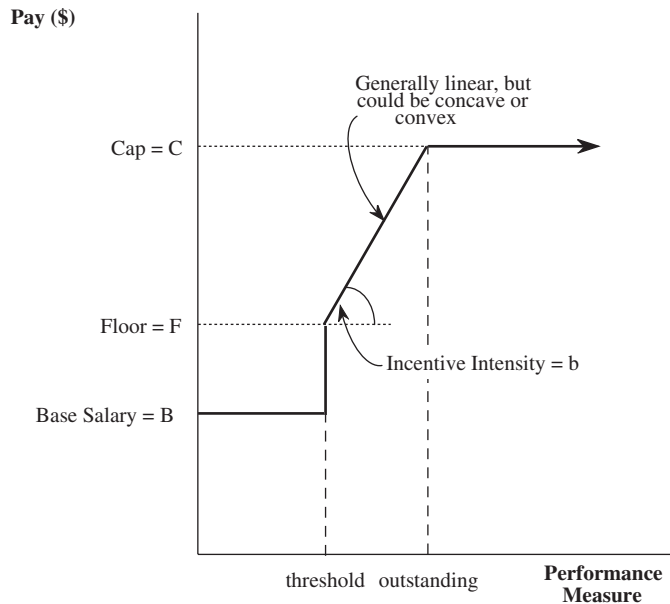


Figure 1. Common form of the short-term pay-performance relationship.

be made operational? Some of these parameters are interdependent. For example, if “threshold performance” (often a function of the annual budget) is set to be quite easy, does that mean that the Floor should be set low, quite possibly even so that the bonus paid is zero (point B in Fig. 1)? If the organization is highly dependent on the development of new products, should convexity be built into the bonus function to motivate breakthrough developments? Why do so many companies use caps when economists (e.g., Jensen & Murphy, 2004) consistently argue against them?

Another set of interdependencies that has received little research attention is among the multiple incentives that organizations typically provide to their employees. For example, if employees have no promotion possibilities and know it, what does that imply for the design of the bonus plan and the provision of salary increases? What are the interdependencies between the designs and implementations of organizations’ stock option plans, their long-term performance plans, and their short-term bonus plans? Most incentive system research has focused on a single incentive device, such as a stock option plan or an annual bonus plan, and has not considered these interdependencies.

And underlying all these issues are questions about how to make these choices in different settings? Should the answers depend on factors such as the organization’s strategy, its resources, the uncertainty

in its operating environment, and the country (or countries) in which it operates? Almost assuredly, the answer to this latter question is yes. Much more research is needed to sort out all these contingencies.

#### 5.6. How and Why Do Control Systems Differ in Different Settings?

Following on from the previous theme, it seems highly likely that appropriate control arrangements will differ depending upon the context within which the system is operated. For example, the balanced scorecard approach is predicated on the view that a good set of performance measures is dependent on their linkage to organizational or departmental strategy; incentive pay systems may have different consequences in the relatively open and transparent environment of the United States, compared to the more secretive approach adopted in most other countries; and the “tightness” or “looseness” of controls may well depend upon the economic environment within which the organization is operating. But we have little practical guidance available beyond these basic contingency ideas.

One approach to these issues has taken the view that control systems are built on a foundation of shared values and assumptions (e.g., O’Clock & Devine, 2003). This is essentially a definition of culture, and the role of culture in the operation of MCS has received some attention over the past two decades. This began from studies focused on the level of national

culture, but even here there has been a tendency to assume a cultural difference between different cultures, rather than attempting to measure “culture” more explicitly. A notable exception to this approach has been the ground-breaking work of Hofstede (1980) who identified four (later five) different cultural dimensions along which societies differ, although it should be noted that his work has been extensively criticized (e.g., Baskerville, 2003). But very little work has been undertaken to assess the impact of different cultural assumptions on the working of MCS (a good review can be found in Langfield-Smith, 1997). It is exactly because culture provides the world taken-for-granted by organizational participants that it forms the foundation for control systems design and use. Similar systems operating in different cultural environments may well have markedly different outcomes.

It can be difficult to disentangle the impact of local institutional arrangements from aspects of national culture. Further, individuals are affected by a range of cultural differences beyond those of the nation in which they were brought up, or in which they currently work. There are distinct aspects of organizational culture, workgroup culture, and professional cultures. There are also differences in “individual culture” which might better be referred to as personality. Add to this the fact that we live in ever more multicultural settings, makes the impact of culture both more important and more difficult to conceptualize. All of these aspects remain underexplored, although it needs to be recognized that it is difficult for natives to study their own culture. To some extent, the researcher needs to be an outsider to be able to fully appreciate the “world taken-for-granted” by organizational participants. Finally, a caveat needs to be made concerning the degree to which organizational culture can be affected by senior managers as a “lever of control.” It has been argued (Scheytt & Soin, 2005) that there is a recursive relationship between culture and control which makes it difficult to predict what the consequences of control systems changes are likely to be. Both this and the difficulty of practically changing aspects of organizational culture indicate the need for using intensive research methods to come to a better understanding of these complex phenomena.

### 5.7. *What is Progress? How can We Recognize Positive Innovations as Distinct from Fads?*

Ittner & Larcker (2001) argue that the management accounting literature has a “faddish nature” to it. By this they mean that much research is motivated just by the fact that the topic has received attention in the business press, and researchers make little or no

attempt to situate the topic in a broader theoretical context. Then when the next new, “hot” topic appears, the old topic disappears, even though it has not yet been well explored. As examples of fads, Ittner & Larcker mention the cost-driver studies that followed the initial developments of activity-based costing and research on the interface between accounting and operations and management, which has declined as many researchers have moved their research to the study of hotter topics, such as economic value added and balanced scorecards.

We do not think that quickly following new ideas that arise in practice is a problem. Indeed, most of the advances in MCS have originated in practice (Kasanen et al., 1993). At some point academic researchers discover the developments and spread their application by writing about them and possibly also contribute by further developing the ideas and the limits to their application (Merchant & Van der Stede, 2006). Having academics respond quickly to developments in the field is an advantage, not something to be avoided. We also do not see it as a problem if research resources shift away from older topics that are not fully explored and towards the newer topics. Research resources are limited, and they should be directed toward the areas that researchers judge to be the ones with the highest potential payoffs.

Are some of the developments currently being studied fads, in the sense that the writing about them will disappear after the initial burst of activity? Surely the answer to this question is yes. We can look back at some formerly popular topics—human resource accounting comes to mind—that have totally disappeared from the research landscape. Other “new” techniques appear to have the characteristics of old wine in new bottles, representing only a re-packaging of familiar ideas in new language. Will current topics, such as economic value added, balanced scorecards, and beyond budgeting, survive to be included in the textbooks published in the year 2020? Only time will tell.

## 6. Conclusion

In a recent thought piece, Zimmerman (2001) argued that the empirical management accounting literature, which includes the MCS literature, has failed to produce a substantive body of knowledge. He believes that it has not matured beyond mere descriptions of practice to the development and testing of theory that explains observed practice, as have other accounting areas.

Regarding the MCS literature specifically, we strongly disagree with that conclusion. While clearly many researchers can do better at articulating their

theoretical preconceptions and contributions, in the past 50 years, the MCS field has advanced considerably. In 1955, the control literature consisted primarily of some simple management principles and descriptions of techniques and practices by some thoughtful business people. Today the MCS literature is rich and varied. It consists of multiple frameworks and paradigms that are useful in organizing the field. It consists of considerable evidence about what firms are doing and what works and does not work in various settings. And it has identified a long list of questions about which more research is needed.

If the MCS field suffers in its development of unifying theories in comparison with other fields, it is primarily because of the complexity of the field. The variety of issues addressed in the control literature is vast, and MCS researchers study the issues in many different settings and at many levels of analysis. The MCS field draws from a broad range of theoretical disciplines, including economics, psychology, sociology, and anthropology, which is quite unlike most research in other areas of accounting, most notably financial accounting and taxation, which are almost exclusively economics-based. Despite many calls for interdisciplinary research, integrating theories developed in different academic disciplines continues to be quite difficult (Merchant et al., 2003). Indeed, the nature and type of theories that are relevant is as much of an issue in MCS research as it is in the social sciences more generally. Many of the relationships are highly contextually dependent, meaning that much investigation is necessary to find their limits. And, last but certainly not least, the difficulties in securing “good” data are significant.

Maybe the MCS field is in a relatively incomplete state of development as compared to other fields of accounting, but we see that as not so much a problem as an opportunity. Considerable progress has been and is being made, but there is much room for others to join the quest for further knowledge!

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# **Management Accounting Practice Contexts**

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# Accounting and Control in Health Care: Behavioural, Organisational, Sociological and Critical Perspectives

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**Abstract:** This chapter synthesises literature exploring complex technical, social, political and institutional influences on the inception and operation of accounting in health care contexts and its diverse effects. The review is organised according to two key methodological positions adopted by researchers—behavioural/organisational and critical/sociological. The review demonstrates that although behavioural/organisational studies focus on technical economic imperatives associated with the design and use of accounting and control systems in health care organisations these cannot be disentangled or decoupled from the historical, institutional and socio-political contexts of health care accounting. To this end the chapter calls for increased methodological pluralism to further improve our understanding of accounting in health care contexts. A number of other suggestions for future research are offered and projected trends in the structure and delivery of health care services are discussed.

## 1. Introduction

A number of features of health care organisations pose challenges for the design and implementation of accounting and control systems. These include: the complexity of the core operating processes; the control by dominant professionals of these core operating processes; the multiple and often conflicting goal sets imposed on the organisation by both internal and external stakeholders; the highly politicised environment in which these organisations function (the majority of hospitals are either publicly funded or not-for-profit religious or other philanthropic alliances); and organisational charters that typically preclude the use of monetary incentives as a mechanism for achieving goal congruence. While other industries experience the effects of some of these factors there are few, if any, that face the confluence of all five factors discussed above. Attempting to understand how this complexity influences accounting and control system design and use is important given the prevalence of under-developed management control systems in this sector and the size and significance of the health care sector in the economy.

This chapter reviews literature that explores the introduction, operation and implications of accounting

in the context of such health care organisations. For the purpose of this review accounting is defined broadly as encompassing 'traditional' techniques such as budgeting and costing systems as well as a range of contemporary performance measurement and management approaches. The review incorporates literature from diverse social science and paradigmatic research foundations<sup>1</sup> and covers the period 1980–2004. Papers included in the review are drawn from an extensive search of a range of internationally referred journals including, but not limited to: *Accounting, Organizations and Society*; *Management Accounting Research*; *The Journal of Management Accounting Research*; *Contemporary Accounting Research*; *Financial Accountability and Management*; *The Academy of Management Journal*; and *The Accounting, Auditing and Accountability Journal*.

The review and evaluation of this extant research is organised according to two broadly defined methodological positions—positivist research premised on

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<sup>1</sup>While the literature review was not constrained by research method or methodology employed very little, if any, experimental research was found that met the broader parameters of interest and as such is not discussed in this chapter.

behavioural and organisational theories and studies that can be defined as adopting a sociological or critical perspective. Behavioural and organisational studies discuss the inception, design and operation of accounting and control systems within health care organisations in response to technical attributes in the health care environment.<sup>2</sup> Here accounting is conceptualised as a source of decision relevant information for the improvement of the efficiency and effectiveness of health care delivery. Sociological and critical studies examine more diverse explanations for the enactment, development and operation of accounting and control systems within health care organisations. Rather than assuming that accounting purely serves a technically 'rational' function, research here explores how accounting technologies also influence and in turn are influenced by social, political, historical and institutional characteristics.

The chapter is organised in four key sections. The first two sections review insights into accounting and control systems in health care organisations gleaned from behavioural/organisational and sociological/critical perspectives, respectively. The following section integrates these literatures in order to identify and consider contributions to our existing and potential understanding of the antecedents and effects of accounting technologies in the context of health care organisations when a cross-paradigmatic stance is adopted. In the final section directions for future research, which are evident from the reviews undertaken, are presented.

## **2. A Review of Behavioural and Organisational Perspectives of Accounting and Control in Health Care**

This section reviews existing behavioural and organisational research that examines accounting and control in the health care sector from a range of diverse perspectives. The review encompasses studies drawn from the management accounting, strategic management, psychology and organisational behaviour literatures. These studies adopt a primarily positivist stance, reflected in the assumption that there exists a physical and social reality, external to the researcher, that can be examined through the development of testable hypotheses (Chua, 1986). This section considers how these studies inform our

understanding of the antecedents and effects of accounting and control systems for the governance of health care organisations. First, transformations in the funding and delivery of health care services, which are considered within this literature to have driven the demand for the increased use of accounting and control technologies, are reviewed. Then empirical studies examining the implications of these reforms for accounting and control system design and use within health care organisations are analysed. These studies are assessed in the context of a decision making framework that permits recognition of the complexities of non-profit health care organisations and the multitude of factors influencing organisational behaviour in such settings.

### *2.1. Health Sector Reforms—Antecedents and Implications for Behavioural and Organisational Research*

Over the past two decades health care expenditure has increased in all OECD (Organisation for Economic Cooperation and Development) nations. Consequently the health care sector is now the largest service industry, accounting for more than 8% of GDP, in most OECD countries (Organisation for Economic Cooperation and Development, 2003). While the average annual growth rate in health care expenditure slowed considerably from 6.2% in the 1970s, to around 3.3% in 2001, it continues to grow at rates exceeding overall economic growth in many OECD countries (Organisation for Economic Cooperation and Development, 2003). Comparatively, the average annual growth in the manufacturing sector between 1990 and 2002 was 2.3% in high-income countries (World Bank, 2005). Demand for health care is driven by a number of factors (see Abernethy & Stoelwinder, 1990a; Klumpes, 2001; Lapsley, 1991, 1996; Llewellyn, 1993; Preston, 1992). Continued advances in medical technologies and treatment philosophies, which extend the array of health care treatments available, promote popular expectations of, and demand for health services. These advances lead to higher life expectancy and concomitantly higher demands on health care resource use. Further, demographic patterns common to the majority of developed nations, primarily the post world war 'baby booms', and slowing birth rates since the 1960s, are responsible for an aging population and a reduced population base to fund the increased services demanded. Going forward these factors are predicted to continue influencing the demand for health services (Organisation for Economic Cooperation and Development, 2003).

<sup>2</sup>The review does not assess literature examining issues such as the technical/calculative features of costing systems, problems associated with cost shifting or joint cost allocation problems nor literatures that examine accounting and control from an economic, principal-agent perspective. Some of these issues are covered in Chapter 16 (Eldenbergh & Krishnan, 2006) of this handbook.

Pressure to reign in public health care expenditures began in earnest in the early 1980s.

Health financing and delivery systems that were initially conceived to provide access to services appeared to be less successful at achieving efficiency. Governments and private purchasers began to question the cost and health effectiveness of the additional services they were purchasing. With the achievement of almost universal access in most countries, efficiency and effectiveness have moved to the forefront of the debate.

(OECD, 1987, in Craig et al., 1990)

These perceived 'inefficiencies' in the sector were the genesis of a wide range of reforms. These reforms sought means to both better allocate and manage resources within the sector and to increase the accountability of health care organisations entrusted with the spending of public monies. Accounting and control technologies were central to these initiatives (Lapsley, 1996).<sup>3</sup> Key initiatives, common to the majority of Western health jurisdictions, are each explored in turn.

### 2.1.1. Prospective Payment Systems

Among the most notable of the reforms introduced in major health care systems at this time was the development and diffusion of prospective payment systems. Prospective payment systems denoted a fundamental shift to an output-based mechanism for the financing of public health expenditures. Also frequently referred to as casemix funding, this method of funding hospitals<sup>4</sup> employs a sophisticated accounting algorithm based on cost and volume data to allocate resources. Casemix funding requires patients to be classified into disease categories<sup>5</sup>

<sup>3</sup>It should be noted at this point that sociological and critical theorists were also sanguine about these calls for the increased penetration of accounting in health care organisations. This perspective is considered in the ensuing section. The consequent health sector reforms that are discussed here are also reconsidered from this alternative perspective.

<sup>4</sup>Please note that the majority of research examining prospective payment schemes has been conducted in hospitals. This is also true of research relating to other reforms discussed in ensuing sections and studies examining accounting and control system design in the health care sector. The term health care organisation is used more broadly throughout this chapter to denote a wider range of institutions in the health care sector.

<sup>5</sup>The majority of major health systems around the world use diagnostic-related groups (DRGs) to classify patients under prospective payment systems. Also used for this purpose are patient management groups and disease staging.

(DRGs) and for a cost weight to be assigned to each disease category. These cost weights assume that groups of patients (DRGs) have similar patterns of resource consumption (Fetter, 1991). Cost weights represent 'prices' for the different 'product lines' produced by the hospital (Fetter & Freeman, 1986; Samuel et al., 2005). Central funding authorities use the cost weights assigned to each DRG, and the volume of inpatients treated in each DRG (as well as a number of other variables) to determine hospital funding. In most health jurisdictions prospective payment schemes replaced traditional allocation processes in which funding was determined through reference to historical levels of expenditure and a process of negotiation between health organisations and central funding authorities (see for example Bourn & Ezzamel, 1986; Nahapiet, 1988). Casemix funding was said to address the growing perception that the traditional funding approach preserved an inequitable distribution of resources and inefficient clinical and other work practices (Duckett, 1994).

Casemix 'accounting' was argued to introduce incentives for efficiency and effectiveness (Bourn & Ezzamel, 1986; Craig et al., 1990). Hospitals in which costs were higher than the prices paid for services needed to improve performance or would face closure. In short, prospective payment schemes were seen as a means of bringing under control the rapid growth in health expenditures experienced in the 1980s. There is some evidence that many of the intended incentives inherent in casemix funding schemes did induce desired efficiency improvements in the sector. For example, studies document increases in the number and average case complexity of patients treated and shorter hospital waiting lists (Duckett, 1995). The increased level of sophistication in financing mechanisms is also suggested to make more visible hospital actions and their consequences improving their accountability and the ability of central funding authorities to directly influence the agenda of individual hospitals (Fetter & Freeman, 1986). The visibility of activities created by casemix accounting now provides the basis for organisational rewards and sanctions.

Evaluations of the introduction of casemix accounting also raise a number of general concerns. For example, Horn & Horn (1986) suggest that the DRG classification system, which forms the basis of the casemix accounting system, is based on an algorithm which at best only explains about 50% of the variation in the resources consumed by different types of patients. Similarly, it is contended that the cost weights used are not necessarily based on sound costing principles and thus, do not reflect the actual



cost experience associated with treating patients in these DRGs (Abernethy et al., 1991). Extant the casemix formula is complex, it does not capture the requisite variety associated with the patient care transformation process (Jencks & Dobson, 1987). Further unfavourable outcomes of prospective payment schemes documented include reduced length of patient stay, growth in hospital admissions and the de-emphasis of outcomes other than efficiency such as quality of care (Coombs, 1987). A number of instances in which DRGs are not applicable for costing purposes in particular contexts have also been identified (see for example Llewellyn, 1993).

On balance, research evaluating the introduction of prospective payment schemes presents equivocal findings (see for example Coulam & Gaumer, 1991; Fetter, 1991; Guterman, 1991). Certainly many of the concerns documented raise interesting challenges for management accounting with respect to continued refinements to patient classification systems and cost weights and a better understanding of the link between expenditure and quality of care (Bourn & Ezzamel, 1986; Llewellyn, 1993).

### 2.1.2. Market-Based Control Mechanisms

Prospective payment systems paved the way for the introduction of market-based approaches to the allocation and management of resources in major health care systems including the United Kingdom (UK), the United States (US), Australia and Canada. Central funding authorities assumed responsibility for the purchase of health services to meet the needs of the population, and separated out responsibility for the management of supply to service providers (see Ezzamel & Willmott, 1993; Levaggi, 1995; Rea, 1994). This purchaser–provider split was designed to foster price competition among service providers *via* cost efficiency and intended to achieve the level and mix of health services in each country that made the most productive and effective use of the resources available (Ellwood, 1996; Fischbacher & Francis, 1998; Llewellyn, 1993; Rea, 1994).

Fischbacher & Francis (1998) note that evidence regarding the use of purchaser–provider arrangements in the health sector is fragmented and limited in its conclusions. Several authors have questioned the applicability of the assumptions underlying the efficient functioning of purchaser–provider markets in the context of health service provision. They note that internal competition in the health care sector can at best only reflect ‘quasi-market’ conditions for a number of reasons: providers of health services do not necessarily aim to maximise profits; consumers of

health services do not exercise choice concerning purchasing decisions but rather these choices are made by a third party (central funding authority) acting on their behalf; and funding authorities have limited bargaining power in purchasing required health services. Market conditions are more likely to be approximated in densely populated urban areas but in regional areas local monopolies are likely to exist given the infeasibility of patients travelling significant distances for health services (Ellwood, 1996; Fischbacher & Francis, 1998; Levaggi, 1995; Smith et al., 1992).

Ellwood (1996) reviews the use of market-based mechanisms for the governance of health service provision in the National Health Service (NHS) and the results of her study question whether production efficiencies resulted. Her analysis of survey data and more qualitative case information suggests that market prices were not reliable indicators of the comparative efficiency of organisations. There is, however, some evidence of favourable outcomes resulting from the implementation of purchaser–provider arrangements. Fischbacher & Francis (1998) examine the creation of a purchaser–provider split in the UK National Health Service in which General Practice fundholders (responsible for the health care of particular practice populations) purchase hospital services for their constituents. While their findings are equivocal with respect to the extent to which this arrangement has resulted in improved efficiencies they do demonstrate several other qualitative outcomes of purchaser–provider arrangements including improved scope for innovation and learning between the primary and secondary care organisations involved in their study. They stress the importance of future policy developments that build on these achievements.

### 2.1.3. Business Models of Performance Management

In response to the acknowledged limitations of market mechanisms more recent reforms to health care financing in major economies have included the implementation of ‘business models’ of performance management. These business models draw on a variety of management techniques to communicate national priorities to service providers and offer the information incentives and capacity required to respond appropriately (Landrum & Baker, 2004; Smith, 2002; Smith et al., 1992; Van Peurse et al., 1995). The earlier work of Sherman (1986) and Chilingirian & Sherman (1987) that compared for-profit and not-for-profit hospitals to determine if a more business-oriented approach to health service provision led to better performance suggested some

scope to introduce performance management and control techniques in the not-for-profit sector. [Chilingerian & Sherman \(1987\)](#) analysed survey data to establish the prevalence of management techniques, aimed at improving operations, across for-profit and not-for-profit hospitals. They conclude that for-profit hospitals adopt more techniques to increase efficiency and control and thus are better managed. While they note the difficulties in determining whether the introduction of such management techniques result in lower operating costs at comparable quality (see also [Sherman, 1986](#)) they explore the opportunities for not-for-profit hospitals to adopt business-oriented practices that they hypothesise will lead to such outcomes. Recent implementations of contemporary accounting and control practices in several major health economies, including but not limited to benchmarking, the balanced scorecard and new network-based forms of organisation and control, offer the opportunity to further explore the link between the use of business practices and desirable health outcomes.

The trend to the introduction of benchmarking across health service providers in a number of major economies is premised on the rationale that the exchange of information about the best medical practices and associated costs will lead to greater efficiency and improved quality of health care ([Jones, 2002](#)). To date little empirical research has been undertaken to support these assertions. [Northcott & Llewellyn \(2003\)](#) elaborate on attempts to implement such management techniques in a not-for-profit sector and note the difficulties in doing so. These difficulties include gaining clinician acceptance and determining appropriate benchmarks, or standards of acceptable cost efficiency, across diverse health organisations. In a later study, [Llewellyn & Northcott \(2005\)](#) assess the outcomes resulting from the benchmarking of hospital costs in the UK National Health Service. They contend that the exercise has resulted in the promotion of 'averageness' across health service providers. Average hospitals arise from the need to categorise doctors, patients and clinical practices for the purposes of comparison. By focusing on the 'average' costs of an 'average' hospital [Llewellyn & Northcott \(2005\)](#) suggest operating costs are reduced and easier to control. While [Llewellyn & Northcott \(2005\)](#) do not explicitly set out to examine the impact of benchmarking on quality they do note the potential for unfavourable tradeoffs between productivity and innovation to arise as well as other potential dysfunctional consequences associated with incentives to reduce patients' length of stay and manipulate patient-mix.

Another business model of performance management increasingly being implemented in the context of health care organisations is the balanced scorecard (see for example [Aidemark, 2001](#); [Chow et al., 1998](#); [Modell, 2004](#); [Voelker et al., 2001](#); [Zelman et al., 2003](#)). [Chow et al. \(1998\)](#) contend that the balanced scorecard is a powerful means by which health care organisations can manage performance in the context of the unprecedented levels of change they currently face in their operating and institutional environments. Empirical evidence provided by [Aidemark \(2001\)](#) suggests balanced scorecards to date have been received favourably within health care organisations given the renewed visibility they provide to non-financial, patient-related and process outcomes. [Aidemark \(2001\)](#) cautions, however, that the appropriateness of the balanced scorecard for promoting accountability in health care organisations is still to be fully explored.

Finally, research has also examined innovative organisational forms introduced to meet the challenges of the emerging health care environment. [Jones \(1999\)](#) for example, contends that promoting the development of networks, rather than persisting with a focus on individual hospital units, has the potential to engage clinicians and administrators in dialogue and debate across hospital units, resulting in the identification and adoption of the most effective and cost-efficient medical practices. [Shortell et al. \(1996\)](#) and [Devers et al. \(1994\)](#) have paid considerable attention to factors that affect the development and success of horizontally and vertically integrated systems of health care organisations. These researchers identify mechanisms and implementation activities to encourage overall system performance and consider how such systems can and should be held accountable. To this end [Grafton & Lillis \(2005\)](#) provide rich contextual evidence of the type and use of accounting and other control systems observed in a number of health care networks.

#### *2.1.4. Implications for Behavioural and Organisational Research*

The implications of reforms introducing prospective payment systems, market-based controls and 'business practices' within the health care sector are reviewed at an organisational level in the next section. That is, organisational-level responses to the external environment faced by health care institutions over the last two decades are examined. In their study of the Australian health care sector [Grafton & Lillis \(2005\)](#) demonstrate the importance of understanding organisational responses to public sector reform initiatives.

They illustrate how organisational-level responses to reforms influence the nature and extent of achievable reform outcomes. Thus, the next section synthesises studies that consider the design and implementation of management accounting and other elements of health organisation control systems.

### 2.2. Accounting and Control Systems for Health Care Organisations

The behavioural and organisational literatures primarily view accounting and control systems within health care organisations as purposive, that is, designed and implemented in order to facilitate decision making and/or to control behaviour (Demski & Feltham, 1976; Horngren et al., 1995; Sprinkle, 2003; Zimmerman, 1995). Accounting serves the decision-facilitating function by providing information to reduce *ex ante* uncertainty. This in turn enables decision makers to improve their action choices with better-informed effort (Kren & Liao, 1988).<sup>6</sup> The importance of the control function stems from the assumption that individuals will not act in the organisation's best interests but rather in their own. Control systems are thus implemented by top management to influence the probability that individuals will behave in a manner, which will enable organisation goals to be achieved efficiently and effectively. They do this by providing information *ex post* about the action choices taken by managers of health care organisations. This information can then be used to measure and reward performance.

As discussed previously the decision contexts of health care organisations are particularly complex. Research examining the design of accounting and control systems within hospitals has been motivated by the potential for 'dysfunctional behaviour' to occur when these systems are implemented in such environments. While the potential for accounting to result in dysfunctional behaviour has also motivated research in other industries, the particular features of the health care sector make it an ideal laboratory in which to study how the implementation of accounting systems can result in unintended consequences and to predict when these systems will and will not work. The following section introduces a framework that allows the multitude of factors influencing the decision-making context of hospitals to be usefully

circumscribed such that the implications of these factors for the design and implementation of management control systems can be readily assessed. This framework is then used as the lens through which extant empirical research studying control systems in hospitals is viewed.

### 2.3. Circumscribing the Decision-Making Context of Hospitals

The decision context of hospitals can be depicted using the framework developed originally by Thompson & Tuden (1959). This is a particularly useful framework as it enables the multitude of factors influencing behaviour in hospitals to be studied. Thompson and Tuden characterise decision making within organisations as varying with respect to two key conditions: (1) uncertainty of cause effect relations; and (2) ambiguity of objectives. Uncertainty in cause effect relations occurs for a number of reasons. For example, it may not be possible to predict with certainty the outcomes that will occur as a result of actions taken. This could be due to incomplete knowledge concerning the input/output relation or due to the highly interdependent nature of work processes with multiple inputs that make it difficult to program work flows. Ambiguity of objectives generally occurs when there are multiple and often conflicting objectives and/or where stakeholders cannot agree on the priorities to be placed on these objectives. Thompson and Tuden's framework, illustrated in Fig. 1, uses combinations of these two conditions to identify four decision contexts and the types and uses of accounting and control mechanism that best support decision making in each context.

In Cell 1 of Fig. 1, decision making is by computation. There is agreement over objectives and relatively complete knowledge of cause and effect relations. There are many non-clinical service departments (e.g. food services, cleaning, payroll) and clinical support services (e.g. medical imaging, diagnostic laboratories) that satisfy these conditions. A diagnostic laboratory has clearly specified objectives as outputs and quality of output can be pre-specified, work processes are routine, and technology well known. It is possible to compute 'whether the consequence of the action or set of actions being considered will or will not satisfy the objectives that have been laid down and agreed beforehand' (Burchell et al., 1980, p. 14). Decision making is supported by 'answer machines' or management accounting and control systems that provide accurate, timely and reasonably unequivocal answers. Not only does this information facilitate decision making, it also reliably monitors the actions taken by managers and so can

<sup>6</sup>For example, the decision maker may be the manager of a diagnostic imaging department in a hospital wishing to select the optimal inputs to use in the imaging process. This decision will be facilitated by the provision of cost accounting information generated from the management accounting system.

*Ambiguity of Objectives*

		Low	High
<i>Uncertainty of Cause and Effect</i>	Low	1. Decision by Computation “Answer Machine”	3. Decision by Compromise “Dialogue Machine”
	High	2. Decision by Judgement “Learning Machine”	4. Decision by Imagination “Idea Creation Machine”

Figure 1. Thompson & Tuden's (1959) decision making framework.

be used *ex post* to measure and reward desired behaviour and thus *ex ante* influences behaviour. The use of accounting and control systems as ‘answer machines’ can be instrumental for both decision facilitation and control in the context of Cell 1.

The Cell 2 decision context occurs frequently in a hospital setting, particularly in clinical units, where the transformation process is not fully understood due to incomplete information or due to the multiple and interdependent activities associated with the process. While there is likely to be an agreement over desired patient care outcomes, there is uncertainty as to how to achieve these outcomes. In this situation, decision making is by judgment. Decision makers must subjectively appraise the array of possible alternatives available to achieve desired outcomes. Formal information systems can be designed to provide information to assist managers to learn more about the possible alternative means of achieving a particular outcome. Decision support systems (Keen & Scott-Morton, 1978) or inquiry systems (Churchman, 1971) are good illustrations of how information systems can be designed to serve as ‘learning machines’ in this context. Cost–volume–profit and capital budgeting models can be used as ‘what-if’ models and sensitivity analysis can be performed to assess the likely outcomes of certain actions or used to compare the outcomes of different solutions. In this way management develops a better understanding of cause and effect relations.

The second condition considered in Thompson & Tuden's (1959) framework is the ambiguity associated with objectives. Ambiguity arises due to disagreement regarding the priorities to be placed on objectives, which objectives should be pursued or even the nature of the objectives. Some argue that this factor, more than any other, is the major driver

of decision-making behaviour in hospitals. The ambiguity of objectives that occurs within hospitals is partly due to its public, or not-for-profit, status. This creates a politicised environment where preferences for health care are challenged and debated—‘Do we want more preventative care, more palliative care, more tertiary-level care?’ This translates into micro-level ambiguity at the hospital level as senior hospital administrators attempt to respond to the political agenda through resource allocations to different types of patient services (e.g. surgery vs. general medicine). In this type of environment it is highly probable that professional conflict will arise. This conflict occurs within professional groups (i.e. within groups of surgeons or oncologists or gastroenterologists), across professional groupings (e.g. between nurses and physiotherapists and/or physicians etc.), and between hospital administrators and dominant professional groups such as physicians. Conflicting and/or ambiguous objectives create a decision-making context governed by bargaining and compromise. Effective decision making requires communication channels to be opened up to encourage debate and consideration of alternative perspectives with a view to reaching some level of agreement over the priorities to be pursued. The role of accounting information and control systems in this context should be to assist in generating and furthering dialogue among organisational members. ‘Dialogue machines’ need to be designed that serve as databases that can be interrogated and used to facilitate debate.

The decision context faced in Cell 4 is one where there is uncertainty over cause and effect relations and also ambiguity of objectives. There is little *ex ante* information about the objectives to be achieved and the means of achieving them. Rationales for action must emerge in the course of the decision-making

process itself. Decision making in this context is very much by inspiration. Information systems need to be able to trigger the creation of ideas which assist in achieving a consensus as to the importance of objectives and how best to achieve them. This decision-making context needs a combination of those accounting and control systems found in Cells 2 and 3, that is, systems that encourage learning as well as generate dialogue to resolve ambiguity over objectives. These systems can trigger creative ways of articulating the priorities to be placed on objectives, facilitate the development of consensus among conflicting objectives and encourage the development of innovative ways of achieving these objectives.

#### 2.4. Behavioural and Organisational Empirical Research Findings in Specific Decision Contexts

Empirical research on management control systems in the health care sector is relatively scarce (Lapsley, 1991). Extant research can be classified into the following categories that examine: the design characteristics of management accounting systems (Eldenburg, 1994; Kim, 1988; Mia & Goyal, 1991); the role of budgeting systems (Abernethy & Stoelwinder, 1990b, 1991; Covalleski & Dirsmith, 1983; Nyland & Pettersen, 2004; Purdy, 1993); the applicability of the balanced scorecard, new forms of costing systems, performance measurement systems and benchmarking (Abernethy, 1996; Abernethy et al., 2005; Aidemark, 2001; Ballantine et al., 1998; Jones, 2002; King et al. 1994); accounting versus non-accounting forms of control (Abernethy & Stoelwinder, 1995; Bourn & Ezzamel, 1986); and effect of controllability and accountability on the use of management control systems (Abernethy & Lillis, 2001; Abernethy & Vagnoni, 2004; Modell & Lee, 2001). Largely this body of empirical research uses survey or archival data to test hypotheses premised on organisational and behavioural theories. There are an increasing number of studies using case-based or field evidence, many of which are exploratory and attempt to inform or develop theory. In the ensuing sections the findings of these rather diverse empirical studies are synthesised using the Thompson & Tuden (1959) framework.

##### 2.4.1. Uncertainty and Decision Making

Many of the early empirical studies in health care organisations conceptualise accounting systems as 'answer machines' and use survey data to test the effect of uncertainty on the design and implementation of these systems. This research is based on frameworks developed and tested in more traditional manufacturing contexts and does not question whether there is ambiguity with respect to the goals

and objectives of the health care organisations examined. These studies enable us to compare differences in the use and effectiveness of management accounting and control systems in Cells 1 and 2 of Fig. 1. There is, however, very little empirical research that allows for the possibility that accounting and control systems could serve an effective role as a 'learning machine' in Cell 2. Abernethy & Brownell's (1999) study of large public hospitals attempted to assess the learning role of accounting and control systems when decision makers faced uncertainty using Simons' (1995) notion of interactive control system use. Their results indicate that decision makers should move away from the 'answer machine' role for accounting and control systems in light of uncertainty and instead use such systems to support greater interaction and dialogue to encourage learning.

While other studies do not explicitly inform the learning role of accounting and control systems in Cell 2 they do shed light on differences in the design and use of these systems dependent on the extent of uncertainty faced by hospital decision makers. Kim (1988), using data collected from hospital accounting information system groups, found some support that in health care organisations confronting the decision conditions of Cell 1, formal administrative controls, such as accounting, rules, plans and policies, are appropriate. Where tasks were unpredictable, however, more impersonal forms of control and co-ordination were found to work best. Kim (1988) also reports that matching the design of accounting and control mechanisms to the decision context faced is significantly associated with good performance, as measured by user information satisfaction.

Abernethy & Stoelwinder (1990b) select a broader sample of hospital managers in their study, including managers of departments providing clinical services directly to patients (e.g. medical, surgical, pediatrics), clinical support services (e.g. laboratory services, medical imaging, food services) and non-clinical support activities (e.g. finance, personnel). They demonstrate that budgeting systems are used to a significantly lesser extent in the direct clinical departments than in the support departments. The judgement required for decision making in clinical departments limits the relevance of budgeting information as these systems are based on the assumption that input-output relations can be pre-specified in financial terms. Abernethy & Stoelwinder (1990b) also demonstrate that 'learning machines' support this decision context requiring judgement. These mechanisms include what Van de Ven et al. (1976) refer to as 'mutual adjustment' but also include formal information systems that include statistical patient-related

data. Thus, formal information systems are capable of supporting a decision context requiring judgement dependent on the characteristics of the information the systems contain.

Mia & Goyal's (1991) study of public hospitals in New Zealand and the earlier work of Macintosh & Daft (1987), who included hospitals in their sample set, demonstrate the importance of information characteristics when employing formal information systems in a decision context that calls for judgement to be exercised. These studies recognise that an uncertain decision context requires an information set that is much broader than the narrow financially oriented data provided by traditional management accounting systems. This richer data set can be used by decision makers in this context for learning. Provided the information is relevant, and is not limited to internal financial data, decision makers can use the data set to assess the consequences of alternative means of achieving particular outcomes.

What is important, however, is that formal, quantitative data, be limited to the decision-facilitating role in Cell 2. Quantitative measures, particularly accounting-based numbers, are often not completely controllable by the focal manager and/or are incomplete measures of performance. Modell & Lee's (2001) study of a large Norwegian hospital demonstrates the consequences when the performance measurement system does not adequately reflect the controllability of decision makers in this context. These include the creation of an 'excuse culture' in which managers are unwilling to accept responsibility for the performance of their operating units.

Nyland & Pettersen (2004) in a comparable setting confirm the importance of controllability for accounting systems to play a role beyond decision facilitation in clinical units. Further, they observe that the presence of complementary control mechanisms such as internal structural arrangements, particularly the appointment of clinical managers, and other less formal mechanisms such as 'coffee-room talks', or mutual feedback mechanisms, can influence the effectiveness of accounting systems in the context of medical units confronted with the uncertainties inherent in medical diagnoses and treatment. Similarly, Abernethy & Lillis' (2001) study of public hospitals in Australia suggests that accountability structures and performance measurement systems within hospitals should be aligned, and both of these mechanisms should be used to direct decision makers attention to effectiveness-based criteria, rather than efficiency-based criteria. Where this is found to occur, performance management in an uncertain decision context is improved.

#### 2.4.2. Goal Ambiguity and Decision Making

An increasing amount of attention is devoted to understanding the consequences when management control systems are implemented in hospitals where the major stakeholders face conflicting goal sets. This context (Cells 3 and 4 of Fig. 1) makes it difficult to state unambiguously what the priorities and/or objectives of the hospital or individual units within the hospital should be. Researchers have tended to use case studies to understand the complexities associated with this decision context. The imposition of financial and other formal administrative systems by governments in countries with centrally funded health care systems has heightened the potential for a clash between the goal sets of administrators and those of the medical professionals who have traditionally dominated all aspects of decision making within hospitals. Jones & Dewing (1997) use data collected from a longitudinal study of a large acute hospital in the UK and demonstrate the effect of implementing formal systems into an organisation with a deeply embedded clinical culture that is at odds with the administrative objectives associated with the implementation of these systems. Their findings support an earlier work of Coombs (1987) in Swedish hospitals. Admittedly part of the problem of implementing 'new' budgeting or performance management systems is the quality and relevance of these systems but the major obstacle ignored by politicians and administrators implementing these systems is the difficulty of effecting change to an entrenched professional culture where priorities are not dominated by efficiency-related concerns. This issue is explored by Jones (2002) in his assessment of the UK National Health Service's move to implement a new performance assessment framework. This framework focuses on quality and efficiency, that is, it is argued to include the concerns of patients (and presumably clinicians) and the public. It has been introduced to encourage benchmarking across the National Health Service. It would appear from Jones' (2002) assessment that the attitudes of clinicians and administrators to the implementation of this framework differ significantly. This framework is an example of the imposition of a bureaucratic control and its associated priorities into a control environment dominated by clinicians with quite different goals and priorities. Jones (2002) advocates that to be successful the introduction of such mechanisms must create an environment that fosters receptivity to change rather than being effected in a centrally imposed manner. Abernethy & Stoelwinder (1990b, 1991, 1995) have devoted considerable attention to empirically assessing the consequences of introducing formal bureaucratic control systems in

contexts where the pursuit of efficiency is often in conflict with the professional objectives of health care professionals. The empirical evidence provided by Abernethy & Stoelwinder (1995) identifies that formal administrative systems will simply not work in a context calling for decision making by compromise. These systems assume efficiency is the major priority and that individuals accept, or can be trained and socialised to accept, the goal set associated with this objective. The adverse consequences for physicians or other dominant professionals working in this type of control environment have been well documented (see Abernethy, 1996; Abernethy & Stoelwinder, 1991, 1995). This leaves open the question as to whether accounting systems can be designed as 'dialogue' let alone 'idea creation' machines. Can multiple goal sets be supported by an accounting system? Aidemark (2001) is somewhat optimistic that the balanced scorecard can be effectively used to support a decision by compromise context. Theoretically such a scorecard should include the clinical indicators relevant to health care professionals as well as the efficiency concerns of administrators (Aidemark, 2001). Aidemark (2001) observed in a Swedish county council hospital that goal uncertainty could be reduced provided professionals defined the measures and controlled what was important. He argues that the system supported the use of 'clan control' and created a new construction of reality. Abernethy et al. (2005) also describe the means of designing a performance management system that actively involved physicians and nurses in the construction of this reality.

### 2.5. Summary

This section of the chapter identifies the macroeconomic conditions that influenced the demand for changes in the design and implementation of management accounting and control systems in hospitals. It focuses on a selection of empirical papers studying these systems within hospitals that are based on theories drawn primarily from the organisational behaviour, sociology and psychology literatures and those studies which adopted a 'positivist' approach to the design and use of these systems. These studies conceive accounting and control systems as serving a decision-facilitating or decision-control role. Synthesizing this research within the Thompson & Tuden (1959) framework enables the consideration of the multitude of factors that dominate hospital decision making and their consequences for the design and implementation of management accounting and control systems. With few exceptions, the vast majority of prior empirical research implicitly or explicitly assumes that these systems will provide accurate, timely

and unequivocal answers for decision facilitation and control, despite the fact that when objectives are ambiguous or the nature of the work performed is uncertain these systems are limited for either purpose. The empirical evidence reviewed demonstrates that these systems can result in dysfunctional consequences when implemented in inappropriate contexts. A number of researchers provide recommendations as to how accounting and control systems can be improved to support the unique decision context of hospitals. This positivist approach to examining the characteristics of accounting and control systems that best suit particular decision contexts is challenged by Burchell et al.'s (1980) use of the Thompson and Tuden framework. Burchell et al. (1980) consider alternative explanations for observed accounting and control system design and use in light of the prevailing decision conditions. For example, they explore the use of 'answer machines' to rationalise decisions made in light of ambiguity with respect to objectives. Pursuing this theme the next section of this chapter draws on sociological and critical theories to suggest alternative interpretations of recent health care sector reforms and the resultant introduction and diffusion of accounting and control technologies in health care organisations.

### 3. A Review of Sociological and Critical Perspectives of Accounting and Control in Health Care

The studies reviewed in this section, classified broadly as sociological and critical research, conceive accounting as a technology fabricated to serve multiple, fragile and shifting interests as opposed to a response to a clear, objective and technical organisational reality as assumed in positivist behavioural research. Extant sociological and critical studies are discussed in this section according to two key research questions that have received considerable attention. First, how did specific forms of health care accounting come about and rise to prominence and penetrate particular institutions and societies? In contrast to the behavioural perspective presented previously, which assumes the genesis of health care accounting to be a technically rational response to control increasing health care expenditures, sociological and critical research suggests diverse and often disparate explanations for the origins of health care accounting including political changes, institutional shifts and the emergence of disciplinary power (see Laughlin et al., 1994; Miller & O'Leary, 1987). These studies permit a more critical, less sanguine evaluation of the rise of contemporary health care accounting at particular socio-political junctures. Second, sociological and critical studies that discuss the effects of the

operations and penetration of health care accounting are reviewed. While positivist behavioural research conceptualises accounting as a means of generating decision-relevant information that has the potential to improve efficiency and effectiveness, sociological and critical studies challenge many of the general supposition of this research and offer alternative interpretations of the operations and effects of contemporary health care accounting.

### 3.1. *The Birth and Rise of Health Care Accounting*

In tracing the birth of contemporary health care accounting, extant research is influenced in varying degrees by the work of key French social theorists such as Foucault and Latour. Research that is inspired by Foucault essentially argues that health care accounting is a form of discourse/power-knowledge and a technology of government whose emergence needs to be located within a wide-ranging analysis of social and historical contexts.

Preston (1992) offers a good example of work that associates the birth of 'clinical' accounting in the US to fundamental and 'large' social and political changes—in medical discourses and practice, in the creation of hospitals as institutionalised sites for the practice of medicine, government regulation and intervention in health provision, social and political attitudes towards the cost and provision of health care and the emergence of a private insurance health industry. Preston's genealogy focuses on the period from the late nineteenth century onwards and he draws illustrative data from two hospitals in Boston—the Massachusetts General Hospital and the Boston City Hospital. Reflecting its underlying Foucaultian roots, considerable emphasis is placed on tracing discursive and institutional shifts particularly those in medicine and accounting. In medicine, for example, Preston points out that politicians and policy makers became concerned about the health of societies and this came to be associated with increased numbers of doctors, hospitals, and increased standardisation of procedures. This increase in the consumption of health services as well as the increased marketisation of health care in turn gave rise to concerns about rising health care costs and a discourse about how this burden is to be shared among the patient, the government and the insurer. Preston concludes by arguing that the emergence of clinical accounting cannot be seen as a result of increasing technical elaboration or as a response to some vague notion of 'society's needs' for information for decision and control. Instead, its conditions of possibility are diverse and lie 'outside' of accounting in larger discursive shifts. Indeed, the emergence of health care

accounting could be seen as a result of a more wide-ranging change in the exercise of power or government in modern societies.

Like Preston (1992), Miller & O'Leary (1987) do not see the emergence of standard costing and budgeting in the early part of the twentieth century as an example of an accounting innovation that evolved in response to changing needs. Instead, using Foucault's notion of disciplinary power, Miller & O'Leary (1987) write that the emergence of standard costing in the early decades of the twentieth century can be seen as part of the rising ascendancy of disciplinary power as opposed to sovereign power. The latter is exercised by 'kings in headquarters'; the former is enacted indirectly through a diverse, dispersed range of tactics and human sciences that result in disciplined, practised, docile individuals and societies. Foucault (1977) argues that this shift in power and its associated 'project of docility' occurred during the course of the seventeenth and eighteenth centuries. When compared with sovereign power, disciplinary power is much more penetrative as it regulates the minutiae of individual and collective behaviour. Importantly, it operates through the application of bodies of knowledge (disciplines) that enable the classification, supervision, administration and ultimately the disciplining of large populations. The disciplines in effect enable non-subjective government of populations. Or to use Latour's (1987) more physical metaphorical phrase, they enable 'action from a distance'.

Interestingly, Preston (1992) does not actually explicitly locate the birth of health care accounting within this 'modern' project of docility through discipline and government. Although he cites Miller & O'Leary (1987) and explicitly grounds his work in the Foucaultian notions of genealogy and archaeology, his analysis is largely discursive and somewhat less emphasis is given to analysing how the sick (and their bodily ailments) is constituted as an object of accounting knowledge and hence disciplined. That is, a genealogy of the accounting subject does not quite occur. But in a later paper, Preston et al. (1997) do refer explicitly to the Foucaultian notions of government (as the 'conduct of conduct') and disciplinary power. In that paper, the authors argue that the DRG Prospective Payment System (DRG-PPS) used to reimburse US hospital for the treatment of medicare patients was a calculative technology that enabled distributive government from a distance. It influenced the allocation of health care resources and regulated the lives of citizens in a highly indirect and decentralised manner. This study is discussed later in the chapter.



The origins of health care accounting, as depicted above, are disparate, dispersed and diverse; being associated with the rise of the human sciences and an articulation of ‘the’ need to govern and discipline the health of the social body in a cost-effective and affordable manner. Importantly, these origins had little to do with the internal, technical/rational elaboration/evolution of the accounting craft (compare Chandler & Daems, 1979). Instead, they lay elsewhere—‘outside’ of accounting and particular firms.

Reflecting a similar scepticism of ‘technicist’ accounts and sharing a focus on ‘external’ origins, the 1990s also saw the emergence of institutional studies that explained the presence and increased penetration of health care accounting by reference to the increased ‘rationalisation’ of modern societies (see especially Covaleski & Dirmsmith, 1988a, 1988b; Covaleski et al., 1993; Meyer, 1994). Institutional theorists such as Meyer & Rowan (1977) argue that formal organisations reflect patterns or templates established in a wider social system and are driven to incorporate practices and procedures defined by prevailing norms of ‘rationality’ and ‘efficiency’. Organisational identities, structures and routines may then not be ‘freely chosen’ but rather culturally imprinted through the dominance of particular cognitive models. Indeed, isomorphic tendencies (coercive, mimetic and normative) (Dimaggio & Powell, 1983, 1991) have led to widespread diffusion of technologies deemed to be socially legitimate (as opposed to technically productive); thus leading to a loss of structural and processual diversity within organisational fields. Accordingly, casemix accounting systems in health care organisations are said to have been adopted largely because they affirm conformance to supposedly orderly, objective and rational organisational processes. Indeed, they may be ‘no more’ than a part of the institutionalised and ‘rational’ myth structure of modern societies—being decoupled from operational processes and performing ‘merely’ a rhetorical and ceremonial function.

Institutional sociologists clearly question the roles that strategic imperatives and deliberate agency play in the origins of organisational forms and accounting systems. This is in contrast with, for example, transaction cost economists, such as Williamson (1985), who argue that actors in exchange systems subject to competitive efficiency pressures will develop—either by adaptation or environmental selection—governance structures that economise on transaction costs. Chandler & Daems (1979) run a similar argument in their historical account of the evolution of management accounting systems in the US and Europe during the nineteenth century. They argue that argues

that institutional arguments have gained support because of their ability to account for two empirical features of many organisational forms: first, why, given the great variety in specific settings, participants and tasks, one observes considerable uniformity in the structural arrangements made by firms. Second, the thesis helps explain the common observation of the very loose coupling between formal structures/rules and actual behaviour. If governance choices were in response to particular problems, one would expect to see more diversity and a closer correspondence between official structures and behaviour. Further, evolutionary arguments for either governance structures or accounting systems lead to the implicit conclusion that only the ‘fittest survives’—that is, extant forms are efficient, cost-minimizing solutions to optimisation problems. Institutionalists are critical of this and point out that ‘history is not efficient’ as existing arrangements cannot be assumed to be optimal for a variety of reasons—imperfect information, unexpected events, overly rapid change, etc.

In focusing on the force of external, normative rule structures, early institutional work downplays the role of agency in the choice of organisational form and/or accounting system. Indeed, Meyer (1994) wishes to dispense with the idea that organisations are ‘actors’ as actorhood tends to be associated with unified and unambiguous self-interest/purpose and the knowledgeable use of rational means–ends technologies. In this respect, some institutional research echoes Foucaultian-influenced accounts of the birth of health care accounting. The Foucaultian concepts of genealogy, archaeology and government result in historical analyses that do not give analytical priority to the material agency of particular individuals or groups of individuals in the emergence of power-knowledges. This is because Foucault’s central concern is with the ‘how of power’ at the point of its effects and application. He writes

...it seemed important to accept that the analysis in question should not concern itself with the regulated and legitimate forms of power in their central locations, with the general mechanisms through which they operate, and the continual effects of these. On the contrary, it should be concerned with power at its extremities, in its ultimate destinations, with those points where it becomes capillary, that is, in its more regional and local forms and institutions.

(Foucault 1976, in Gordon, 1980, p. 96)

As a result, one of his methodological aims has been historical analysis that does not concern itself with power at the level of conscious intention or decision. Instead of asking ‘who has power’ and seeking to

discover the intentions of the ‘powerful’, Foucaultian analyses of power-knowledges have focused on how subjects (e.g. the mad, the sick or the delinquent) are constituted as an object of knowledge.

This similarity with Foucaultian notions of non-subjective government has weakened as more recent institutional writing begins to reintroduce notions of agency and power. As Scott (1994) points out, institutionalists have recognised that environmental determinism cannot be assumed as there are multiple and complex external models and rule systems and hence some element of strategic choice remains viable. Oliver (1991) correctly argues that conformance to social norms is not the only choice available to organisational actors—firms, for example, might choose to resist, subvert and even extend existing templates. Much depends on the power of particular actors. At the same time, economists have broadened their concept of rationality to include satisficing behaviour as well as certain forms of normative rule-following behaviour (it is ‘efficient to be legitimate’). An example of work that seeks to integrate a concept of strategic agency in the face of isomorphic pressures is that of Abernethy & Chua (1996). They studied the introduction of clinical budgeting systems within a public hospital in Australia, and found that actors did not merely conform to governmental pressure but deliberately chose particular courses of action in order to gain additional resources for the hospital in question. In addition, they criticised the ‘decoupling’ thesis and argued that the complex set of management control and accounting changes did fundamentally transform the decision structure, flow of resources and interpretive frameworks within that hospital.

This renewed emphasis on agency is now associated with ethnographic research grounded in Latour’s actor network ideas. Actor network theory, as this body of work has come to be named began with studies in the sociology of science. Latour’s (1987) *Science in Action* is now often the required starting point for discussing this still evolving ontological framework. For our purposes here, it is perhaps sufficient to sketch two particular characteristics of this framework that is grounded in semiotics—first, relational materiality; and second, performativity (see Law, 1999). The first emphasises that the entities (actors, actants, etc.) take their form and acquire their identities as a result of their relations with other entities. These identities are not given in the order of things. In addition, entities are performed in, by, and through those relations. A consequence is that everything is uncertain and reversible, at least in principle. Durability is also not given in the order of

things and how it may be achieved becomes a subject of investigation. How is it that things get performed (and perform themselves) into relations that are relatively stable and stay in place? What devices or processes of *interessement*<sup>7</sup> are put in place? Who are the actors? What do they seek? How are obligatory passage points such that convergence of purpose and action occurs? What technologies and forms of inscribing are persuasive?

These types of questions are explored by Chua (1995) in her discussion of efforts by Australian federal agencies to introduce DRG casemix accounting and accountability systems to Australia hospitals. Her actors consisted of government agencies at both federal and state levels, university researchers and hospital personnel who experimented with a particular technology called the Yale Cost Model. In particular, she focuses on how the computerised model (expressed through flow charts and data matrices) came to be the obligatory passage point for a fragile, uncertain and changing mix of interests. Financial resources, too, were crucial to the durability of this fact-building network as was the strength of stronger ties, such as between university experts and particular government agencies.

Actor network theory seeks to bridge traditional macro–micro dichotomies by focusing on circulating entities. Because of its insistence on treating both human and non-human actors in a symmetrical way, it has focused accounting research on the performativity of machines, inscriptions and computerised accounting technologies. Its rejection of meta-narratives, however, is particularly troublesome for researchers who seek a political economy of accounting and whose theoretical roots are in Marxism. There has been relatively little work in this tradition within health care accounting. However, numerous papers do point to how the emergence of health care accounting is associated with the rise of a neo-liberal philosophy for smaller government and a public sector that operates more like a competitive private sector (see Chua, 1995; Chua & Degeling, 1993; Llewellyn, 1997; Preston, 1992; Preston et al., 1997).

<sup>7</sup>Interessement (Callon, 1986, pp. 207–208) is the group of actions by which an entity attempts to impose and stabilise the identity of others. To be interested is to be in between (inter-esse), to be interposed. Thus, for example, A interests B by cutting or weakening all the other links that B might have with other entities (C, D, E etc.). The properties and identity of B is a ‘result’ of the association with A (only) who is now ‘between’ B and other parties. The link with A dissociates B from all the C, D and Es (if they exist) that attempt to give it another definition.

This has occurred in a range of countries—the US, UK, Australia, New Zealand (Lawrence et al., 1994) and Finland (Kurumaki, 1999). Researchers have pointed to enduring government concerns with rising health costs and attempts to redefine the role and responsibility of government in the production and financing of health care. But none of these studies has explicitly sought to explain the rise and penetration of health care costing in the context of, for example, structural transformation of the state apparatus and its relationship to the political economy of health care.

In Summary, there is some consensus that the origins of health care accounting are many, and associated with larger social movements—the growth of the human sciences (medicine as well as management disciplines), the reorganisation of medicine and health delivery, the role of government in health provision and funding, the presence of particular external, rationalised templates for corporate action and finally, the durability and transportability of technologies of inscription. Increasingly, there is focus on how the diffusion and translation of legitimated accounting technologies is achieved through circulating, connected entities that are both human and non-human.

### 3.2. *The Operation and Effects of Health Care Accounting*

Numerous papers within the domain of social and critical research have sought to understand the operation and outcomes of the penetration of accounting into health care organisations. Drawing mainly on Habermas (and to some extent Foucault), Chua & Degeling (1993) conceptualise the effects of accounting-based interventions in health care in terms of three spheres: instrumental–technical (what ends have been achieved), moral–practical (what is being morally legitimised) and aesthetic (what concept of subjectivity is created). The discussion below is organised on these lines.

#### 3.2.1. *Techné<sup>8</sup>—Achieving Lower Cost and Maintaining Quality of Care?*

Chua & Degeling (1993) argue that accounting struggles and indeed fails to deliver ‘technical’ answers

unambiguously. What does a new accounting-based technology achieve—does it cut costs and/or increase productivity nationally? Focusing on the DRG-PPS implementation in the US, they note that the existing empirical evidence on the financial and quality effects of that intervention provides few conclusive answers but rather raises questions as to whose costs and how cost and quality are to be measured and defined. For example, although the real per capita cost of health care was lower post the implementation, confounding variables made it difficult to conclude that overall spending on health was decreasing as a result of the change in payment system. These variables included: (a) changes in the composition of health care cost (in particular, the substitution of capital expenditure for operating expenditure); (b) the rise in outpatient as opposed to inpatient care costs; (c) increased administrative and contract staff costs; and (d) increased out-of-pocket costs (both financial and labour costs) for patients and their carers. This view is consistent with that of other health care accounting researchers. Covalesski et al. (1993), for example, also argued that despite various attempts at cost containment over decades, health care delivery costs in the US have continued to escalate instead of reduce. More recently, Samuel et al. (2005) concur, pointing out that there has been an ‘utter failure’ to contain costs. The increase in the medical portion of the US federal budget and of medical insurance rates to corporations and individuals are still dramatically above inflation rates (Blumenthal, 2001). If health care accounting was intended to rein in costs, at least in the US, it appears not to have achieved this aim.

More recently, however, there has been some evidence that cost benchmarking in the UK has resulted in a standardisation of cost behaviour. Llewellyn & Northcott (2005) report that 5 yr after the introduction of the National Reference Costing Exercise by the UK government in 1998, hospital costs are tending towards the average. This is also due to the fact that since 2002, UK hospitals are funded on the basis of the average cost. But Llewellyn and Northcott point out that they did not investigate whether achievement of average cost would raise care standards in hospitals. Neither did they study whether costs had been shifted to non-hospital facilities.

Cost considerations aside, the situation is said to be just as murky with respect to quality effects. With respect to the DRG-PPS, Chua & Degeling (1993)

<sup>8</sup>In English, the Aristotelian term ‘techné’ has come to mean a form of technical knowledge or skill. Further, in the writing of Gadamer and Habermas, techné has come to be identified with the empirical analytical sciences that seek predictive knowledge of the physical and social world by the employment of particular ‘scientific’ research methods. Chua & Degeling (1993) adapt Habermas’s (1971) theory of knowledge-constitutive interests to argue that a ‘technical’ interest essentially seeks instrumental knowledge. That

is, assuming that ends are given, effort is directed towards ascertaining how best to achieve those ends and whether the ends have been achieved.

question whether reduced admission rates, increased bed/hospital closures, decreases in the length of inpatient stay, declines in intensive care use and reduction in the number of inpatient tests and procedures suggest an improvement or decline in the quality of care. The answer is equivocal. Also, increases in the number of discharges from inpatient to post-hospital care facilities, particularly to nursing homes raise quality questions. Care quality may not have improved if patients are simply being transferred to unregulated non-acute care facilities. Coombs (1987) reveals that in the implementation of accounting-based interventions in the Swedish health care system, there was little mention of the issue of quality of care as efficiency considerations dominated and focused more on lowering resource costs. Indeed, rather than ensuring quality of care, Preston et al. (1997) conclude that accounting technologies contributed towards compromising quality and indeed diverted attention from the negative implications of health care reforms.

### 3.2.2. *Cultural Legitimacy—Reconstructing Health, Hospitals, Rights to Health*

On the moral axis, accounting-based allocative mechanisms are said to have shifted the social construction of a range of cultural ‘objects’ and legitimated alternative translations. Chua & Degeling (1993) argue that the introduction of DRG-PPS altered health debates in two main ways: (a) it redefined the problem of health from a social to a budget-deficit problem and (b) it also redefined the output of a hospital. Health was no longer a medical issue that was wholly within the domain of doctors and nurses but an economic issue to be managed by different knowledge experts—economists, accountants, government agencies, financiers, etc. (see also Kurunmaki, 1999; Samuel et al., 2005). The output of hospitals was not just individual patients (and their families) who had been assisted but several hundred commodities that could be costed strategically and managed by product class.

Such translations displaced a public discourse of ‘equal right for all citizens of access to affordable health care’ to one centred on strategic cost reduction and economic efficiency. That is, concerns with equity and distributive justice became redefined into concerns with economic prosperity and distributive efficiency. Additionally, Chua & Degeling (1993) point out that the DRG-PPS acts as an invisible, highly decentralised technology of government that makes ‘tragic choices’ (Fleck, 1987) about life and death in a highly decentralised and invisible way. Such invisibility is said to be fundamentally unjust.

Further, Chua & Degeling (1993) write that the commodification of health has been associated with the disintegration of a communitarian sphere of life and the concomitant rise in an individualistic, strategic, economic rationality (see also Lawrence et al. (1994) about health experiments in New Zealand). Hospitals are now resource-constrained, competitive players in a marketplace and must think and act accordingly—to reduce costs and ensure a profitable stream of revenues. Kurunmaki (1999) describes in detail how ‘financial augmentation’ became an accepted practice and the language of economics penetrated the Finnish hospitals she studied. Now doctors and nurses valued their new-found competence in the language of accounting. Covaeski et al. (1993) write that some private, financially strong hospitals used casemix accounting to screen patients and as much as possible to admit only the profitable ones among them. There were also reports of widespread closure of small, rural and financially constrained hospitals that did not fare well under the new DRG-PPS system. Finally, Samuel et al. (2005) point out that professional service firms now sell software that enable the audit of diagnostic codes to maximise hospital revenues, to track lengths of stay and associated costs. Health is now a business and ‘needs’ to be managed as such.

In summary, while debate continues as to whether health care accounting has managed to contain costs without sacrificing quality, there is some consensus that in association with other changes, accounting has built new conceptualisations of health (a budget-deficit problem), hospitals (multi-product firms) and access rights to health care (in the long run, rights must be subordinated to the competitive ‘laws of the market’).

### 3.2.3. *Knowledge, Power and Discipline—Sick Bodies, Different Identities, Different Experts*

On the aesthetic sphere, Chua & Degeling (1993) argue that health care accounting, as a disciplinary practice, operated as a biopower that enabled government from a distance. DRGs, in particular, through the application of statistics, redefined sick bodies as belonging to classes of diagnoses and associated treatments that consumed resources. In effect, patients came to be seen as objectified products that can be made subject to surveillance (see also Samuel et al., 2005) and processes of normalisation (cf. Llewellyn & Northcott, 2005). Further, decisions as to how resources ought to be allocated and costs cut are now mediated through complex calculations that distance those decisions from the agency of

defined actors. Government is thus decentralised and distant, operating through dispersed forms of expertise and networks of experts. But not only has increased space been given to accounting and accountants, medical professionals have been made to see the 'logic' of speaking the language of business (Kurunmaki, 1999; Llewellyn, 1997).

Even with the acquisition of new linguistic competence, power and authority has shifted from medical professionals to administrators and financiers in certain health care jurisdictions (Abernethy & Chua, 1996; Covaleski et al., 1993; Doolin, 1999; Ezzamel & Willmott, 1993). Drawing on Bourdieu's notions of the field and capital, Kurunmaki (1999) demonstrates how accounting allocations were used to redistribute symbolic and economic capital between the health care providers (professional clinicians) and financiers (municipalities) in Finland, thereby shifting power and authority away from clinicians to municipalities. Prior to this, clinicians had exercised significant control over health care matters through the 'professional freedom' they enjoyed. Similar redistributions of authority were observed between clinicians and administrators in different countries, with the latter assuming more control over what was traditionally under the jurisdiction of the former (Chua, 1995; Coombs, 1987; Lawrence et al., 1997).

The redistribution of power and the gradual shift in control from professional clinicians to administrators was considered by some clinicians as a subversion of professional judgement and as an unnecessary incursion into their jurisdiction. This brought about strong resistance to, and covert circumvention of, the disciplinary power of accounting and health care administrators by clinicians (Chua, 1995; Coombs, 1987; Doolin, 1999; Ezzamel & Willmott, 1993; Lawrence et al., 1997; Llewellyn, 1997; Preston, 1992). Preston et al. (1992) report of tensions between clinicians and technocrats in the context of the fabrication and implementation of management budgets in the UK NHS. The budgets increased administrators' visibility over medical practices and thus enabled them to exercise government over health care institutions. Realising the shift in the authority that was embedded in management budgets, clinicians sought to limit the legitimacy of accounting intervention on the ground that they inhibited or distorted the exercise of professional judgement. In other struggles for power, clinicians have questioned the validity of accounting information and have called for medical activities to be determined by the progress of medical techniques and clinical judgement (Coombs, 1987; Doolin, 1999).

Accounting interventions also divided the medical fraternity. Using Abbot's notion of internal differentiation, Llewellyn (1997) theorises the UK-based GP (general practitioner) fundholding scheme as a political redistribution between GPs and consultants. Fundholding provided GPs with purchasing power; this enabled them to influence the decisions of consultants. GPs, according to Llewellyn (1997) used fundholding as a means to reduce the power and status differentials between themselves and consultants. The GPs challenged the jurisdiction of consultants and renegotiated territorial claims through the medium of contracting. For example, GPs expanded the range of services within primary care and took back certain procedures from hospital consultants. The re-emergence of the 'GP surgeon', particularly, created relative unease between GPs and consultants as the consultants saw that as a challenge to their professional monopoly over surgery. Hospital consultants contested this, though their attempts to circumvent the processes were ultimately unsuccessful.

Though the above conflicts have a potentially negative impact on health care delivery and may even undermine the objectives of health care reforms (for instance, clinicians may be distracted through active engagement in the politics of resource allocation and power struggles), some researchers argue that such conflicts should not be viewed only in negative terms (Ezzamel & Willmott, 1993; Llewellyn, 1997). In the case of GP fundholding, the accounting intervention was said to have increased the interface between GPs and consultants, reconnected a polarised medical profession and improved the processes of case management at the hospital interface.

Overall, despite the above shortcomings of accounting-based interventions, some positive benefits have been noted by some researchers. Accounting technologies are said to have contributed to enlarged autonomy and responsibility for clinical units, ensuring that operating decisions are taken locally (Ezzamel & Willmott, 1993). The interventions have also seen increased cost awareness among budget holders (Coombs, 1987; Ezzamel & Willmott, 1993; Kurunmaki, 2004; Nahapiet, 1988) although given the fixed cost nature of hospital operations, this may ultimately have little impact on the costliness of health delivery. It furthered economic reasoning within health care as economic notions and accounting came to play significant roles in resource allocation (Kurunmaki, 2004). To a growing extent, clinicians sought more elaborate ways of describing the relationships between clinical activities and resource consumption as cost data became an accepted framework for discourse between doctors and

administrators (Coombs, 1987). Even where there is effective resistance, economic arguments are mobilised to fortify opposing views.

### 3.3. Summary

Health care accounting research that is located within a broadly sociological and critical tradition has contributed to consolidating our understanding of the pervasiveness of social change; health systems, previously perceived to have a 'fixed social order' premised on clinical freedom have been shown to be evolving totalities that are under continuous transformation. Change within health care, it is argued, is part of broader changes taking place in society involving the state, the citizenry, knowledge experts and technological systems. In exploring these complex linkages, sociological and critical researchers have drawn our attention to how accounting can act as both a political and a social regime. The research reviewed in this section of the chapter has brought to the fore: (a) the role of accounting discourse in the distribution of power/knowledge and subsequent domination of others at a distance, and (b) how accounting contributes to the creation of legitimate spaces and helps operationalise practices within these spaces. It also highlights that accounting is not amoral; it overtly mediates moral discourses in health care delivery processes. Some of the case studies also demonstrate that the process of accounting change does not pass smoothly as there will always be resistance, contestations and struggles but equally important is the idea that in enacting change, actors do not necessarily discover new ways of acting before giving up the old. Accounting change, as indicated by Preston et al. (1992), is a process and an effect of experimentation: it is a fragile and uncertain activity.

### 4. Integration of Research Findings

This section of the paper compares the key differences and contributions of the two alternative strands (behavioural/organisational and sociological/critical) of research reviewed in this chapter. Integrating these findings permits a more complete understanding of the antecedents and effects of accounting and control system design and use in health care organisations.

The studies reviewed in this chapter reveal that health care accounting has multiple diverse origins, operations and effects. Whereas behavioural research traces the origins, operations and effects of health care accounting to efficiency factors, sociological and critical studies locate health care accounting within particular historical, institutional, social and political matrices. For example, behavioural researchers

attribute the demand for accounting and control in health care organisations to the need for the efficient allocation and management of scarce resources in the face of rising health care expenditure. Accounting is conceptualised as a mechanism for exacting efficiency and effectiveness in the manner in which health institutions are organised and managed. Sociological and critical research, however, offers alternative ways of perceiving and interpreting the significance of accounting in health care. Researchers within this tradition see accounting as a political and social regime that enables governments to question prevailing modes of organising medical practices and to introduce managerial discourse into the everyday practices of organising and managing health care delivery. They draw on historical, social and political shifts to explain how the calculative practices of accounting are tied to the health system. Accounting, they argue, acts as a technology for enacting social and political change.

While at present there seems to be little cross-paradigmatic conversation between the behavioural and sociological/critical strands of research, there is enough evidence to suggest that the efficiency imperatives, to which behavioural research is devoted, cannot be disentangled or decoupled from the historical, institutional and socio-political context. As Covaleski et al. (1993) rightly argue, the reform of the health sector was as much to conform to social and ideological shifts, as it was to improve efficiency and effectiveness. Accounting, in particular, simultaneously provided instrumental solutions to cost problems and acted as a socio-political regime. Thus, in the highly politicised environment of health care, efficiency imperatives are almost inseparable from the social and political. Adopting a 'pure' behavioural or a 'pure' sociological/critical perspective thus limits the scope of analysis and understanding of the origins and the situated practice and effects of health care accounting, for health care actors or agents do not behave or decide as atoms outside a social context, nor do they adhere slavishly to a script written for them by the particular intersection of social categories that they happen to occupy (Granovetter, 1985).

The challenge for future accounting research is the exploration of the extent to which the integration of behavioural and sociological/critical perspectives is both possible and indeed desirable.

In the next section possible directions for future research are identified, aimed at increasing our understanding of accounting and control in health care institutions through an integration of behavioural, sociological and critical literatures.

## 5. Directions for Future Research

The reviews of the behavioural/organisational and the sociological/critical literatures intimate a number of spheres in which our understanding of the inception, development, operation and implications of health care accounting and control systems can be improved. As such the resultant directions for future research suggested in this section seek to prompt research in relatively un- or under-explored aspects of health care accounting as well as initiate efforts to overcome design-related limitations inherent in extant studies that impinge on the ability to interpret, generalise or rely on these research findings. Finally, this section identifies emerging developments in health care delivery and management and the associated accounting and control implications that can potentially be explored from either a behavioural, organisational, critical, sociological or 'combined' perspective.

### 5.1. Advancing Accounting and Control Research in the Health Care Sector

In reviewing the sum of evidence from behavioural/organisational and sociological/critical endeavours, the scarcity of knowledge with respect to the total costs and benefits as well as the implications of accounting implementations in the context of health care is immediately apparent. It is unclear whether the introduction of accounting technologies have in fact resulted in curtailed health care expenditures, improved resource allocations, greater accountability, improved quality of care, increased access to health care or have indeed impacted on the decisions of policy makers or health care managers. While the extant literature provides some insights to this end, the evidence is mixed and the majority of the literature is somewhat *ad hoc* in its approach to addressing these issues. The following suggestions offer a number of interesting ways to progress our understanding of the causes and effects of accounting and control interventions in the health care sector.

#### 5.1.1. Access to Relevant Empirical Data

Traditionally, comparative data with respect to health care expenditures has been difficult to obtain longitudinally and across national boundaries. Furthermore, attributing a cause to any change in expenditure is problematic and would be improved through a joint consideration of technical, historical, social, political and institutional forces. It is unclear for example, whether a decline in hospital expenditures reflects efficiency gains or the effects of cost shifting to other categories of health care expenditure. Advances in information technology and an

increased interest in the availability of such data, however, are likely to render available the required data to address such issues in the future.

#### 5.1.2. Antecedents and Outcomes of Accounting Penetration in Health Care Organisations

There is some evidence that a culture of 'resource consciousness' has permeated the decision-making context of health down through to the clinical unit levels of health care organisations (Abernethy, 1996; Abernethy & Lillis, 2001). It is not possible, however, to conclusively attribute this outcome to the increased use of accounting technologies. Evidence has not been sought to determine whether activities associated with clinical costing have influenced key decision makers in health settings. Do policy makers and directors of clinical units incorporate this 'new' accounting information into decision parameters or is evidence of increased resource consciousness in fact due to other forces that have necessitated a shift in underpinning philosophies? Existing studies that are related to this issue have typically been conducted using archival or survey-based research methods. Such questions are likely to be best addressed, however, through field-based research that permits questions as to why accounting information is used in certain contexts or circumstances and not others to be explored.

#### 5.1.3. Testing Sophisticated Models of Accounting and Control System Design

In order to understand the relative importance of the range of factors that have been identified as influencing the design and use of accounting and control technologies within health care organisations more sophisticated models need to be developed and tested. In particular, the study of models of accounting system design that test the interdependent influence of a range of theoretical perspectives would seem warranted. Abernethy & Chua (1996) draw attention to the impact of both technical and institutional influences on accounting and control system design and Grafton (2005) drawing on the framework of Oliver (1991) assesses the interplay of these factors in influencing accounting and control system design in hospital networks.

#### 5.1.4. The Need for Diversity of Research Method and Methodology

The vast majority of behavioural and organisational evidence has been accumulated through the use of arms-length questionnaires, although more frequently case study research methods are being adopted to inform this literature. Case studies and

field-based research have the potential to offer fruitful insights into both the design and use of accounting and control systems in the context of health as they permit answers to be sought to explain questions as to 'why' and 'how' particular accounting-related phenomena are observed. Irrespective of research method, however, as has already been observed, behavioural and organisational research has rarely considered the depth of forces beyond technical, or efficiency focused factors despite mounting evidence that 'rational' behaviour is not always observed in health care studies. Socio-political and other factors must be explored in conjunction with technical influences to explain comprehensively a variety of choices that are observed. To this end cross-sectional field studies (see for example Lillis, 1999; Lillis & Mundy, 2005) offer the promise of observing complex patterns across multiple organisational settings. Pluralism with respect to both method and methodology can only improve our understanding of the antecedents and consequences of accounting and control system design and use in health care settings.

#### 5.1.5. *The Potential to Inform Public Policy Debate*

Finally, it is observed that the dramatic changes in the health care sector identified throughout this chapter are in the main not driven by theoretical or empirical contributions. Research has followed rather than led the introduction of accounting technologies in the health care context. There thus remains much scope for researchers to proactively influence policy choice (Lapsley, 1991). For example, research evidence from other not-for-profit sectors could be extrapolated, or contingency theory findings adapted, to health care organisations.

#### 5.2. *Exploring Emerging Developments in Health Care Delivery and Management*

This section reflects on four emerging developments in health care delivery and management (global regulatory regimes for health; the transformation of health systems in developing countries; the vertical integration of health care delivery organisations with both 'upstream' and 'downstream' activities; and the increased importance attributed to understanding the dynamics of the ultimate health consumers' needs) and the implications of these trends for behavioural, organisational, sociological and critical research directions.

##### 5.2.1. *Engaging with Global Health*

The challenges and opportunities for accounting thought and practice associated with the globalisation of social and economic activities have been

increasingly recognised by researchers over the past decade (Arnold, 2005; Arnold & Sikka, 2001; Barret et al., 2005; Cooper et al., 1998). Health systems are not immune to the machinations of globalisation. Contemporary discourse regarding health care delivery is gradually shifting from health and health care as 'national' issues to health and health care as 'global' issues. Supranational institutions such as the World Health Organisation (WHO), the World Bank, the International Monetary Fund (IMF), the World Trade Organisation (WTO), the European Union (EU) and other similar institutions are assuming significant steering roles in developing, funding and regulating health care strategies at a global level. WHO, for example, is collaborating with the WTO to develop international health regulations and there are equally a growing number of global health security initiatives and international cooperatives for global health that seek to redefine the problem of health and to create new spaces for managing health care delivery. This globalisation of health care has significant consequences for the accounting craft that are yet to be explored from either a behavioural, organisational, sociological, critical or combined perspective.

First, accounting researchers need to explore how the rationalities for global governance for health are articulated and made operable (Miller & O'Leary, 1994; Miller & Rose, 1990). Rationalities, according to Miller & O'Leary (1994) are the discursive fields through which significance is symbolically attached to ideals that spell out the object and objectives of government. The global health governance literature articulates the rationalities for global health by linking health to wealth (trade) and welfare. The WHO/WTO initiative, in particular, seeks to constitute the rationality for global health governance by linking the effectiveness of health systems to income effects of global trade regimes and providing a new landscape for health care. It will be interesting to examine how accounting discourse may or may not be mobilised in constituting these rationalities. Can accounting be mobilised to establish the link between health and trade, and if so how? Also, the ideal of global health governance raises questions about resource distribution, regulation, surveillance and accountability (Arnold & Sikka, 2001). These questions hinge on how such governance rationalities may be made operable. Miller & O'Leary (1994) argue that rationalities are made operable through technologies, accounting being one such technology. Prior research has dealt with how accounting achieves governance in health care, albeit in a 'nation-centric' manner. Global level governance may involve more 'complex connectivity' and it would be interesting to investigate how



accounting is implicated in navigating the complexities of global health governance and the resulting consequences.

Second, global regulatory regimes for health create local–global connectivity with significant potential for contradictions. Accounting researchers have variously explored the oppositional interplay between globalising tendencies and situated local practices (Arnold, 2005; Arnold & Sikka, 2001; Barret et al., 2005). At various national (local) levels, there are health care governance policies and practices already in place. Coupling these national practices with the notion of global health governance creates what Giddens (1991) calls ‘local–global dialectics’ where the local practices feed into the global and the global constraints and enables the local (Barret et al., 2005). The global health governance has the potential to disembed the existing national health care governance schemes and rearticulate them in new ways. Such dialectics may create contradictions especially with regards to national sovereignty and global health objectives. Global rules of surveillance and accountability may contradict with national policy agendas. How are likely conflicts between local, national and global objectives resolved and with what effects? To what extent can accounting act as a coordination mechanism between local and global organisations given the need for systems that span national boundaries? What are the effects of using accounting as a coordination mechanism in such a context? How do the local–global dialectics create new modalities of power/knowledge and to what extent is accounting implicated in that?

### 5.2.2. *The ‘Other’ Worlds of Health Care*

Very little is known from existing research as to how accounting is implicated in health care in developing countries. Most of the health care research focuses on the transformation of health systems in developed western economies. The health care systems of developing countries present unique opportunities for extending our understanding of the operation of the accounting craft in health care delivery. The transformations of health care systems in developing countries are unique for at least two reasons.

First, the transformation of health systems in developing countries presents unique governance problems. Unlike health system transformation in western economies where the state is the major visible actor in the transformation processes, the transformation is driven at a multi-level requiring multi-level governance. The health care transformations in the developing world are heavily influenced by global actors such as the World Bank and the IMF through

the funding they provide to governments of these countries. The World Bank, for example, has initiated ‘health sector development support projects’ in developing countries with the expressed aims of introducing structural changes to health care in developing countries. Such changes are currently being implemented in countries such as Armenia, Peru and other similar countries. Performance-based funding for health is linked to the health sector component of capital flows to developing countries with the view of linking health system efficiency and effectiveness to lending policies and practices. Similarly, the IMF, in seeking to boost health spending in developing countries stimulates structural changes and provides policy advice on how to make the health systems of these countries more efficient and effective. Overall, the structural transformations engendered by these global actors focus on financial accountability in the health system by tying state governments, health agents and the citizenry to networks of calculation that enable ‘good governance’ to be exercised. But the ‘problematic of government’ (Foucault, 1991; Preston et al., 1997) in these contexts is different from those in western countries. The governance proposed by the global actors is channelled through national governments whose traditional role is to provide government to their nation-states. This creates a nested system of government with increasing interdependence of governments operating at the two levels. This is akin to the problematic of multi-level governance. How is such multi-level governance achieved? Accounting, as a technology of government, may be implicated in these new problematic of government yet very little is known about the situated practices of accounting and the effects they generate within this context.

Second, health care transformations in developing countries also present unique opportunities for studying the ‘local–global dialectics’. Through their lending policies the global actors seek to disembed local health care practices and reconstitute them into economic markets where technical rationalities and instrumental objectives come to dominate (Dillard, 2002). Yet local practices are based on social considerations and communitarian spirits where the moral–ethical is more prepotent. The global ideals and the local concerns are both necessary and contradictory. How does the global translate the local and in what ways is the global retranslated by the local? Or how are the global ideals translated into action in a concrete locality and to what effects? How would the local contest the global? How is accounting used to mediate, suppress and/or transform the local–global contradictions? And how does the accounting craft become transformed in the process?

### 5.2.3. The Health Care Industry as a 'Relational System'

There is a growing theoretical interest in social sciences in analysing phenomenon (organisational, national etc.) as part of networks. Contemporary social researchers focus on the interconnectedness of interacting units and the consequences of this for social action. The health care industry is one such social field where movement, linkages and flows shape interacting units in significant ways. But health care accounting research is yet to engage with the health care industry as a social network or what *Granovetter (1985)* prefers to call a 'relational system'. Existing health care research focuses on hospitals (clinical units) and related care institutions to the virtual exclusion of other units that interact with and shape these care institutions. For example, little is known about the interactions and flows between care institutions and pharmaceutical, biotechnology and other connected institutions. These 'connected others' are significantly transforming current medical practices and vigorously redefining of the future of health care. Pharmaceutical and biotechnology institutions, in particular, are constantly developing new medical products and designing innovative medical equipment and technology that is continuously reshaping the practice of medicine in health care institutions. The development of digital medical technology, for example, is profoundly altering medical practices by making possible remote medical care, shorter hospital stay and new approaches to diagnosis and treatment of illness. These 'connected others' are not only transforming medical discourse and practices but also participate in shaping the quality of care, health care cost structures and the society's expectations of health care delivery. While better technology may imply better care, the technological development can potentially create resource conflicts in the health care industry as techno-medical costs rise rapidly.

Given the significant impact of 'other' units in the health care industry, especially on cost and quality of care, it is pertinent for health care accounting research to begin to study the industry as a relational system by studying how the nature of the relationships between interacting units influence modes of thinking and acting within the industry. For example, accounting research could focus on the interdependencies and positions of interacting units within the health system and the effects of this on resource mobilisation and distribution, cost, health care management and control processes. Further issues will relate to the integration of accounting systems across these units of the integrated delivery systems.

### 5.2.4. Rethinking the Clinic

In studying the clinic, existing sociological and critical accounting research perpetuates the very power relationships they seem to be criticising. Researchers seem to be privileging some health care actors over others. For example, most of the studies tend to give voice to experts, clinicians, administrators and financiers (state, municipal and local governments) while silencing the patient who is the ultimate consumer in the health care market. Patients, through their consumption behaviour, participate in shaping interactions and in generating effects in hospitals and clinics; hence accounting researchers need to broaden their investigation by giving voice to the patient and symmetrically examining how patients interact with experts, clinicians, administrators and financiers to generate particular health care processes and effects. To this end the challenge remains to build accounting and other information systems around patient needs rather than those of the organisation.

Also, the existing research seems to be marginalising the resource and accountability implications of outpatients by focusing almost exclusively on in-hospital care. In practice, the outpatients are not insulated from the economic and political discourses within clinics. They shape the way clinicians and administrators go about their everyday business in managing hospitals and clinics. Consequently, research needs to focus on the agency through which inpatient care and outpatient care simultaneously produce and reproduce the health system.

## 6. Conclusion

This chapter sought to comprehensively review the antecedents and implications of accounting and control systems in the context of health care organisations by considering literature from diverse social science and paradigmatic origins. To this end, key insights from behavioural, organisational, sociological and critical perspectives were identified. In locating accounting interventions in health care reforms, the chapter shows accounting originated from, and was tied to, a diverse set of factors, which influence the organisational uses of accounting technologies. The review also demonstrates that accounting has effects not only for the technical/economic aspect of health care delivery but also for the social, political and moral dimensions of health care discourse and practice. While the majority of extant research is conducted within the boundaries of a single paradigm an assessment as to how method and methodological pluralism has thus far improved our understanding of accounting in a health care context and its potential to do so in the future is included. A number

of directions for future research to this end were identified.

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# Management Accounting in the Manufacturing Sector: Managing Costs at the Design and Production Stages

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**Abstract:** This chapter analyzes the empirical research literature on management accounting in the manufacturing sector including the development as well and manufacturing phases of the product lifecycle. As managing product development has gained terrain in companies over the last 15 years, management accounting research has contributed to the advancement of this field of knowledge. Changes in the manufacturing environment, such as significant upfront investments and ongoing overhead costs, demanding performance criteria besides efficiency, or critical linkages across the value chain have contributed to a fruitful research in management accounting in manufacturing. The chapter identifies significant advances in this knowledge base and highlights future research opportunities.

## 1. Introduction

This chapter focuses on management accounting in manufacturing, whereby “manufacturing” refers to “tangible” products. We further focus on two stages of manufacturing processes: new product development (NPD) and modern manufacturing systems (MMS). We focus on environments characterized by (1) significant investments justified by intangible benefits, (2) high overhead costs because of innovation and product variety, (3) the use of non-financial performance measures, and (4) the existence of critical linkages across the value chain and product lifecycle stages.<sup>1</sup> To further limit the scope of the chapter, we look at empirical research; therefore leaving aside “optimization papers” that take cost information *as given* and look for optimal contracts (e.g., purchasing, labor, or management) or optimal decisions (e.g., investments, inventory management, or production

scheduling) (Graves & De Kok, 2003).<sup>2</sup> We also briefly refer to topics that have been studied mostly in manufacturing settings but that are covered more in depth in dedicated chapters of this multi-volume series (such as activity-based costing or target costing). However, we do not limit our review to research published in management accounting journals.

The 1980s marked an important shift in the manufacturing field. Competition from Japan and other Southeast Asian countries threatened manufacturing industries in the United States and Europe. There was a sense of urgency and improving manufacturing was at the core of the threat (Hayes et al., 1988). The central argument was the need to excel in different dimensions of manufacturing at the same time, rather than thinking about tradeoffs. Competition required having both low cost as well as high quality. Customers wanted products with more functionality and adapted to their preferences. New technologies had to be incorporated fast in new products. The focus on manufacturing spurred research in management

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<sup>1</sup>We also refer to the chapter by Anderson (2006) in this multi-volume series that reviews literature on strategic cost management. That chapter argues for management accounting research investigating decisions that impact cost structures in *radical* ways, and such decisions are often taken by non-accounting managers, and throughout the value chain and lifecycle of products and services.

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<sup>2</sup>This reference is a recent volume within a collection of edited handbooks on operations management close to this topic. Other volumes also have information relevant to the reader interested in this topic.



accounting (Kaplan, 1990), such as how advanced manufacturing changed the role of accounting regarding investment decisions, cost accounting, or performance measurement (e.g., Kaplan, 1984). The 1990s saw an emphasis on product development and R&D as the new source of competitive advantage and management accounting also devoted efforts to this stage in the product lifecycle (Cooper, 1995).

This chapter addresses these two broad topics: product development and modern manufacturing. Each topic is addressed using a simple framework that helps organizing the review. The review progresses from cost modeling (*ex ante*) and measurement (*ex post*)—the traditional focus of

management accounting—to non-financial performance measures. Then, it moves to uses of management accounting information, from rewards to motivate social actors based on measures, to management accounting information for purposes other than motivation (decision-making, learning, or gaining power) and management control systems (see Table 1).

**2. Management Accounting in Research and Product Development**

In the late 1980s the view that researchers and practitioners had on NPD changed significantly. Before, NPD was seen as too uncertain with a large component of creativity. Management accounting and

Table 1. Framework for review.

Theories	Management accounting tools	Product development	Manufacturing
Measurement theory	Cost modeling estimating the future cost	Target costing Cost information Cost experts New cost management approaches	Intangible benefits Risk assessment MMS investment financial criteria
	Cost measurement measuring realized costs	R&D returns Budgets in R&D	Cost structures Cost drivers Cost system design Importance of cost accounting Non-financial measures in MMS
	Non-financial performance measures reporting expected and realized non-monetary performance	Quantitative vs. qualitative measures Project-level measures  R&D level measures Portfolio measures	Design of management accounting systems: scope, integration, aggregation, timeliness Fit with manufacturing strategy and impact on performance
Management-based Economics-based Sociology-based Psychology-based theories	Rewards motivating social actors based on measures	Extrinsic vs. intrinsic motivation Design of economic and social rewards	Non-financial measures in reward systems Group-based rewards Team-based and broader-based reward structures Impact of economic incentives on performance
	Management accounting systems using management accounting information for purposes other than motivation (e.g., decision-making, learning, gaining power)	Fit between management information and strategy	Management accounting differs to match the needs of different levels within the organization Management accounting as supporting learning, improvement Accounting information systems
	Management control systems designing the management infrastructure	Coercive vs. enabling control systems Types of control and performance	Impact of manufacturing strategy on budgeting process Completeness of non-financial performance measures Manufacturing strategy as a contingency factor to the design of management control systems

control systems were perceived irrelevant because they stifled creativity and innovation. They imposed a bureaucracy that could only be damaging. This assumption was not foreign to management accounting research; quite the contrary, it was a working assumption—accounting had nothing to do with NPD or R&D in general (Anthony, 1965; Ouchi, 1979). Then, the tide changed. Product development and soon research activities could benefit from management tools. The first hints of change came from practice and were picked up by operations researchers and a bit later by management accounting researchers.

### 2.1. Cost Modeling in Research and Product Development

A significant percentage of product costs are determined at the product development stage—80% has been frequently suggested (Cooper & Slagmulder, 1999a). Costs are designed into the product and become engineered once the product moves into manufacturing. Not surprisingly, the research literature has devoted efforts to understand how cost information is embedded in product design. Within management accounting, most of this effort has been invested in understanding target costing.

Target costing is a detailed technique to reduce costs during the product design stage (Koga, 1999). It is best suited for products for which price is a key competitive dimension. In these product markets, companies have little room to set prices and thin margins. Therefore, profits come from the ability to keep the functionality that the price point requires at the lowest cost. Market prices and required profit margins define a target cost that product development teams use as a target to be met. From this starting point, target costing provides the discipline and tools to bring the estimated cost down to the target cost though the product development process.

Ansari et al. (2006) in this multi-volume series provide an overview of the development and state-of-art of the target costing literature. Accordingly, we do not devote space to this important cost management technique and refer the interested reader to the appropriate chapter. Instead, we present alternative approaches to manage costs during product development.

Target costing is better suited to environments where costs are a crucial competitive dimension and modeling costs is simple. When these two conditions are not met, and costs are not a critical competitive dimension—technology, time-to-market, or customer needs dominate the attention of the development team—but cannot be ignored, companies rely on alternative techniques to bring costs management to

product development. For instance, the main challenge in the design of chip manufacturing equipment is to solve the technological problems associated with the physics of electrons. Once these challenges have been overcome and the product is in the market, competition shifts to cost reduction, which makes costs a secondary but important aspect of product development. In computer peripherals where the Christmas season accounts for almost half of the sales, time-to-market is the main focus of development teams. However, product costs cannot be fully ignored if companies want to make a profit.

These alternative cost management techniques can be classified into two groups—techniques at the product development project level and techniques at the product family level (Davila & Wouters, 2004).

At the project level, an alternative to raise the level of attention to cost considerations is to supply more relevant cost information: “to send specific messages to product designers and process engineers about how to improve the manufacturing capability of the firm” (Cooper & Turney, 1990). Rabino & Wright (1993) describe how activity-based costing (ABC) improves financial information for product introduction decisions. Anderson & Sedatole (1998) propose an advanced cost accounting system that brings together target costing, ABC, and traditional cost engineering estimation methods in product development to enhance design and manufacturing quality. Ben-Arieh (2000) and Ben-Arieh & Qian (2003) propose a hybrid of ABC and engineering cost estimation methods to enhance cost estimates in product design.

Another approach to achieve this increased level of attention to costs is assigning a management accountant to development teams (Hertenstein & Platt, 2000). These authors offer evidence that complements prior work (Nixon, 1998) that highlighted the role of management accounting as a language that brings together the different constituencies involved in product development.

Another alternative to manage costs at the project level is to use parallel cost teams (Davila & Wouters, 2004). Rather than integrating cost specialists into the product development team, these people work in parallel but outside the main team. Rather than trying to force cost criteria that may be ignored for the sake of technology or time, these parallel teams do not try to influence the main team but take sub-systems already designed and optimize them from a cost perspective. The timing of these parallel cost teams varies. In some cases, they may redesign the part before the product is released in the market; but often their cost reduction efforts come as engineering

changes after product introduction and as part of the continuous cost reduction efforts.

Another approach to manage costs within projects is to leverage the concept of modularity (Baldwin & Clark, 2000; Schilling, 2000). Sub-systems that are not critical to the main competitive dimension of the project are designed as independent projects. As such, the team in charge of designing this particular sub-system can adjust the criteria to the characteristics of the project. Typically, cost considerations come higher in the priority list of these projects. Once designed, these sub-systems come as standard modules into the design of different products. This approach leverages the concept of modularity where the different sub-systems are designed as black-boxes and “plug-in” through detailed interface specifications.

The role of external networks in organizations and the integration of suppliers in product development are important ways of managing product lifecycle costs. Management accounting research has recently focused on understanding this relatively recent phenomenon and the particular challenges that it poses from an accounting perspective. Hakansson & Lind (2006) in this multi-volume series review this important line of research; from the perspective of management accounting and product development, research on how buyer-supplier cost systems integrate to manage costs during the design phase is sparse.

The evidence on these techniques is still limited and management accounting research has a fertile ground to advance knowledge in this area. Are there other techniques that have not been researched? How do cost specialists use cost information? Is it comparable to target costing? How do effective cost specialists interact? What is the influence of outsourcing certain modules to cost? Which of these techniques are complements/supplements to target costing? Why? How do companies model tradeoffs? These questions are just a sample of issues that have not yet been adequately answered.

Target costing loses some of its effectiveness in environments with complex cost behaviors, typically when indirect costs are a significant proportion of total costs and when direct costs depend on the interaction between products. In these environments, target costing is challenged with modeling such complex behavior. Often the solution is to limit cost models to direct costs rather than designing cost systems that design teams will have a hard time to understand and use. However, companies are left with the challenge of managing these indirect costs during product development.

These problems have been addressed mostly from an operations point of view where several practices

have been examined. Design for X (DFX) techniques—for instance, design for manufacturing, design for recycling, design for usability, design for serviceability, etc.—have as their common denominator to maximize profitability over the lifecycle of a product often with a focus on cost reduction. These techniques provide heuristics to product design teams with the objective of reducing overall costs. For instance, design for assembly brings in rules intended to reduce costs at the manufacturing stage (Dalglish et al., 2000).

Another significant thrust in this literature is parts and process commonalities. Both concepts are based on the idea that is the backbone of ABC, namely that complexity (and two of its manifestations—parts and process proliferation) is a significant driver of indirect costs. But instead of modeling this complexity—as cost systems attempt to do—commonality techniques posit that increasing commonality has a positive impact on profits (up to a point) and that most companies are far from this optimal solution. Parts commonality decreases complexity by decreasing the number of parts that a company works with—this is achieved through the sharing of designs and parts across products (Desai et al., 2001). Process commonality decreases complexity by decreasing the mix of supply chains. This is done through postponement—moving closer to the customer the point at which two products (usually from the same product family) differ (Fisher et al., 1999; Hillier, 2000; Lee & Billington, 1995).

This literature also investigates the use of platform planning as a way of managing costs over the lifecycle of product families (Robertson & Ulrich, 1998). Platforms are products designed taking into consideration that they are the basis for future derivative products and product redesigns. Platforms are designed not to reduce their cost but to minimize the cost of the product family.

Cost management of indirect costs during product development can also be achieved through the definition of cost strategies (Davila & Wouters, 2004). This technique defines an objective common to all product development efforts in the firm. For instance, an objective may be to eliminate manual adjustments to the finished product to configure to customer demands. This objective has almost no impact on costs if just one product achieves it, but significant consequences if all products do—for instance, an entire department is eliminated. Anderson (2006) in this multi-volume series further develops the topic of adopting a strategic perspective in managing costs.

Managing indirect costs during product development is also another rich field for research. How can

cost information be designed such that project teams minimize indirect costs? How does the effect of commonality impact the design of cost systems? What is the role of cost information in deciding commonality policies? How do companies use cost information in designing their platform/product family strategies?

### 2.2. Cost Management in Research and Product Development

Measuring R&D has always been challenging (Hodg, 1963). But as R&D investments have become a more significant part of technology firms' income statements, the demand to measure the returns on those investments has become more acute. Researchers, responding to managers' needs, have addressed the problem of how to measure R&D performance. However, the challenges of measuring performance—timeliness (Hultink & Robben, 1995), completeness, noisiness, congruency, and risk considerations—are more pressing in R&D (Davila, 2003). The solutions proposed come short of fully satisfying managers' needs and highlight a fruitful path for future research.

Efforts to measure R&D performance include financial, quantitative and qualitative non-financial approaches. Within the financial measures, the most common one is planning and tracking project budget. Nixon (1998) describes a case study where the controller tracks the expenses associated with the project, estimation of product costs, and cost of resource usage. Budgets within R&D are also the focus of Rockness & Shields (1984, 1988) who conclude that the perceived importance of budgets “decreases monotonically from planning to monitoring, monitoring to evaluating, and evaluating to rewarding.” Shields & Young (1994) study the attention to costs among R&D managers and find that budget participation and cost knowledge are positively associated with these managers' attention to costs while cost-based compensation has no effect.

Efforts to measure beyond development costs to include value creation have also been reported. For instance, Drongelen & Bilderbeek (1999) list expected or realized IRR, ROI, percentage of sales by new products, profits from R&D, and market share from R&D as financial measures intended to measure value creation. Hertenstein & Platt (2000) also include sales, sales to break even, profit percentage of sales from new/repeat customers, cash flow and economic value added as additional financial measures. McGrath & Romen (1994) propose a financial R&D effectiveness index to estimate the value that R&D generates. This index is the ratio of profits from new products (adding back R&D expenses which are considered an investment) divided by R&D expenses

(treated as an investment). Alternative indexes include revenues from new products over R&D costs or over sales, or net present value of profits over investments (Werner & Souder, 1997a). Real options have also been proposed to assess the potential financial returns of R&D investments (Huchzermeier & Loch, 2001; McGrath & Nerkar, 2004; Worner & Grupp, 2003).

### 2.3. Non-Financial Performance Measures in Research and Product Development

Most of the work on R&D measurement has focused on non-financial performance measures—both quantitative and qualitative—and integrated performance measurement systems. The literature is large around this topic and we do not attempt to cover it all but to highlight the most important lines of research. However, there is still no accepted solution to the design of performance measures in R&D. Hertenstein & Platt (2000) examine a variety of measures both at the project level and the R&D level (but not at the portfolio level). They conclude that managers are not satisfied with the current state of performance measurement with a mean rating of 4.9 (1–10 scale) on current emphasis and of 7.2 on desired emphasis.

Performance measurement systems in R&D can be examined at four levels. The first one where more progress has been made is the project level. Next, measurement systems also need to address how these various projects combine with each other to create a portfolio that captures the strategy of the firm. A third level of analysis is the R&D function to understand whether technological capabilities are being developed in the right direction and fully leveraged. Finally, measurement systems are needed to assess the overall level of innovation of an organization.

At the project level, companies at the forefront use advanced measurement systems based on some model of project execution (such as the balanced scorecard methodology). These systems are used for upfront planning and on-going monitoring through stage-gate systems (Ulrich & Eppinger, 1995). These systems include input measures—costs associated with the project, scheduling of cross-functional experts; process measures—product cost estimates, time-to-market estimates, product specifications, customers' reactions to prototypes, and output measures. Meyer (1994), Bremser & Barsky (2004), and Curtis & Ellis (1997) are examples of integrated performance measures proposed.

Griffin and her co-authors have done extensive work on NPD measures at the project level (Griffin, 1997a). Her work encompasses detailed definitions of particular measures such as development time

(Griffin, 1997b) to summaries of associations' surveys on measures used in practice (Griffin & Page, 1993). She also presents evidence consistent with the idea that measurement systems for product development should be contingent on product strategy (Griffin & Page, 1996); a finding consistent with the idea of having a business model as the basis for designing performance measurement systems.

A more recent effort in designing measurement systems is the idea of metrics thermostat where the weights of the different performance measures vary with their impact on profitability (Hauser, 1998, 2001).

Measurement systems have also been examined beyond project level into three distinct directions: portfolio measures, R&D function measures, and innovation measures.

Measurement systems at the portfolio level are designed to give management an overview of how the various R&D efforts complement each other (Levine, 2005). Often, these systems are summarized in graphs that position projects along two dimensions. These dimensions vary from system to system but usually they include two of the following: time to value, risk, expected value, type of project, and implementation stage (Davila et al., 2005). In some cases, these various dimensions are combined to create an overall measure of project attractiveness that helps rank projects (Cooper & Edgett, 1999).

A further effort to measuring the interrelation among various projects is the concept of platform leverage (Meyer et al., 1997). This measure is based on the concept of platform product as the core of a multi-product family. The basic formulation of this measure compares the cost (or time) to develop a derivative product relative to the cost (time) of the original platform. Over time, this ratio increases as derivatives need more design to keep up with market changes until the ratio is high enough to signal the need of a new platform.

At the level of the R&D function, performance measures help coordinating and evaluating the overall performance of the R&D function. Feed-forward mechanisms coordinate the use of resources. For instance, the uncertainty associated with the process makes the scheduling of different types of expertise difficult—a project that ends up using more quality control expertise than expected may delay projects running in parallel that also need this type of expertise. R&D performance is also evaluated in terms of the exploration and exploitation of knowledge (Drongelen et al., 1999). These same authors in a study of R&D performance measures find that R&D departments doing external work use more objective measures. Furthermore, these authors report detailed

lists of reasons why companies use measurement systems at the project and R&D level, of (financial and non-financial) objective performance measures and of qualitative performance measures. Werner & Souder (1997a, 1997b) provide further evidence on various metrics that are used to evaluate R&D performance (Brown & Svenson, 1998). Szakonyi (1994a, 1994b) suggests measuring R&D effectiveness relying on managers' opinions. Lin & Chen (2005) rely on patents—a common metric for R&D performance evaluation—to examine R&D success. Finally, Loch & Tapper (2002) provide case-study evidence on the implementation of a performance measurement system in an R&D setting.

At a broader level, measurement systems are of interest beyond the R&D function to encompass the innovation performance of an organization. The topic of innovation management and innovation measurement has been gaining interest. However, measuring innovation presents the challenges outlined for product development (Davila, 2003) plus the empirical fact that innovation is a multi-dimensional concept. Green et al. (1995) and more recently Gatignon et al. (2002) have shown that measuring innovation in a single dimension is bound to be too simplistic and provide evidence of the various dimensions that characterize the variable. Davila et al. (2005) provide an empirical application of innovation measurement.

The interest in measuring return to R&D is not limited to projects, portfolios, and companies but is also of much interest at the level of regions and countries. For instance, Archibugi & Coco (2005) compare five different metrics of technology capabilities at the country level and rank 47 countries according to them. These metrics have been introduced by the World Economic Forum, the United Nations Development Program, the United Nations Industrial Development Organization, RAND Corporation, and the authors. While the correlation among these metrics is high, they face the same challenges as non-financial measures at company level but at an even higher level; in particular, what is their relevance to economic performance and are higher technological capabilities always better.

#### 2.4. Incentives in Research and Product Development

Incentive design is an important application of performance measures and as such it has a prominent role in management accounting research. Product development presents unique challenges from this perspective. Namely, creativity and intrinsic motivation have a relatively more relevant role to the success of development efforts. Organizational behavior

researchers have examined this topic because of the intersection between creativity and the need for performance. Overall, their conclusion is that economic incentives—the traditional focus of incentive design in management accounting—drive away intrinsic motivation and reduce performance (Amabile, 1997). This conclusion is at odds with traditional agency theory predictions which rely on the assumption that actors will react to external incentives—typically to economic incentives (Baiman, 1982).

This tension has driven the sparse empirical research on this topic. Eisenhardt & Tabrizi (1995), using a sample of companies in a fast-moving industry, investigate whether greater variable rewards for schedule attainment are associated with shorter development time. They conclude that rewards (and planning) are ineffective ways to motivate faster execution. Davila (2003) addresses this tension and examines the relationship between the intensity of economic incentives (percentage of variable pay linked to performance) and performance in a sample of product development managers in the medical devices industry. He finds a non-linear relationship where smaller percentages of variable pay are associated with higher performance at a decreasing rate until a point where further increases in variable pay are associated with lower performance.

These studies provide some initial evidence on the role of incentives in NPD. However, they leave significant questions unanswered. The studies do not address how performance variables come into determining the bonus of the managers. They do not examine how bonuses interact with alternative rewards—from salary raises, promotions, peer recognition, outside market opportunities, multi-period contracts, etc. They do not address how organizational structure—heavyweight vs. lightweight project manager (Clark & Fujimoto, 1991)—interacts with performance measures and incentives.

### 2.5. Management Control Systems in Research and Product Development

The broader topic of management control systems has received attention in product development. Underlying this topic is the tension between two views as how these systems interact with innovation and creativity. On the one hand, formality constrains freedom to experiment and therefore these systems are detrimental to innovation performance. Damanpour's (1991) meta-analysis of this interaction confirms this argument reporting a negative association between administrative intensity and innovation. Abernethy & Brownell (1997) confirm but qualify this conclusion and find that personnel controls are

effective mechanisms in R&D settings, while behavior and accounting controls are detrimental.

Bonner et al. (2002), in a study of 95 product development projects, show mixed results on the relevance of management control systems to performance; they conclude that the use of upper-manager-imposed process controls and the degree to which upper-managers intervene in project-level decisions during the project have a negative effect on project performance, but early upper-management involvement in defining operating controls has a positive impact.

In contrast to this view of management control systems as constraints and blocks to innovation, the concepts of enabling bureaucracy (Adler & Borys, 1996) and interactive systems (Simons, 1995) argue for a supportive role of these systems in innovation. Cardinal (2001) examined the use of input, behavior, and output control in the pharmaceutical industry with the expectation that some of these controls would be detrimental to performance. She finds that the three types of controls are positively associated with performance. Bisbe & Otley (2004) find mix results, with interactive systems enhancing performance in low-innovation firms and hurting performance in high-innovation firms. Davila (2000) highlights that the information reported through management accounting systems interacts with product strategy to enhance (cost and design information) or worsen (time information) product development performance. Bajaj et al. (2004) find that oversight from upper-managers has a negative impact on development costs lead time but a positive effect down the value chain on manufacturing costs and lead time.

In addition to the empirical work that addresses the impact of management control systems on product development performance, another line of empirical work has taken a more descriptive approach to the topic. Hertenstein & Platt (2000) describe how product development process is structured around well-defined stages. Stage-gate management processes divide product development projects into stages with milestones to be accomplished at the end of each stage and an evaluation at these points (gates) where projects are given funding for the following stage or killed (Cooper, 1990; McGrath, 1995). This approach to product development management was a significant change to a process where formalization was absent.

### 3. Management Accounting and Modern Manufacturing

The modern manufacturing environment, also labeled advanced manufacturing systems, encompasses

production technology (such as robots, numerically controlled manufacturing equipment, and computer-integrated manufacturing) and management technology (such as total quality management, TQM, and just-in-time, JIT). Several characteristics make MMS challenging from a management accounting perspective:

MMS involve large investments with intangible benefits such as higher quality, shorter lead-times, or more reliable production processes that are hard to translate into financial measures. This characteristic raises the question of whether “traditional” decision-making management accounting tools are appropriate in MMS settings.

MMS is a more complex manufacturing setting because of rapid product and production process innovations, product variety, flexibility, and demanding requirements for quality, throughput times, and inventory levels. A consequence is that overhead costs become a significant proportion of overall costs, displacing direct manufacturing costs. This characteristic has led management accounting to provide better costs measures throughout products’ lifecycles and methods for better tracing and allocating costs.

Other aspects of performance are important besides low costs. Modern manufacturing operations need to comply with demanding requirements regarding costs, quality, throughput times, etc. Achieving good performance on these various dimensions not only requires high investments leading to higher overhead costs, but it also means that skills for team working and problem-solving are important. Interdependencies across functions and organizations compound this challenge. TQM, JIT, Kanbans, advanced planning systems (such as MRP), and flexible manufacturing systems are used to reduce inventories (that act as buffers) in the supply chain, without compromising responsiveness to customers. These operations management techniques demand higher collaboration within and across organizations. Management accounting research has studied performance measurement systems that pay attention to behaviors and performance characteristics pertinent in modern manufacturing operations, which can also be linked to performance-dependent reward systems.

Other parts of the value chain and of the product lifecycle become more important for success of manufacturing firms. Having an efficient, flexible, and innovative factory is not enough. It is also important to change the ways of working with suppliers and with customers to incorporate new technology and develop new products. The linkage between product development and manufacturing operations needs to improve to better understand relationships between

decisions made during product development and performance later in the product lifecycle. These developments have led to research on management accounting in NPD and in supplier–buyer relationships, and management accounting research has started to pay more attention to costs throughout the product lifecycle.

Young & Selto (1991) provide an excellent review of the literature about the early research on management accounting in relation to modern manufacturing operations. There are several in-depth case studies investigating implementation of modern manufacturing and the implications for accounting which also provide a good background to “set the stage” for this section, e.g., Jazayeri & Hopper (1999), Lind (2001), and Ezzamel & Willmott (1998).

### 3.1. Cost Modeling in Modern Manufacturing

Cost modeling refers to *forecasting future costs*. In the previous section we reviewed how it has been addressed in product development; here cost modeling refers to calculating the economic impact of changes in the manufacturing system. The key issue is how to account for the intangible manufacturing benefits (related to factors such as quality, throughput times, manufacturing flexibility to quickly change to other products, or additional production capacity to allow volume flexibility) when initial investments in MMS are high, while direct (in monetary terms) and monetarily quantifiable effects (such as lower material costs and lower labor costs) are not sufficient to justify the investment,<sup>3</sup> but qualitative and quantitative non-financial criteria suggest that the investment may still be economically beneficial for the firm. We assume that potential changes in manufacturing have been analyzed and that information about required investments and change costs is given, as well as information about benefits.<sup>4</sup> We also refer to Haka (2006) for a review of the literature on capital budgeting and investment appraisal.

<sup>3</sup>Other research areas also look at investment appraisal and address many of the same issues, but with different emphasis. For example, corporate finance pays more attention to the question of risk and the appropriate discount rate for investments in modern manufacturing operations; engineering economy look at how to estimate and evaluate the financial consequences of engineering decisions.

<sup>4</sup>It is worthwhile to consider that behind the analysis of these benefits there may be a whole engineering exercise that is far more comprehensive than the “final” financial analysis. We refer to Kumar et al. (1996) for a description of the larger decision-making process. We also refer to Raafat (2002).

Before we discuss empirical studies, it may be helpful to discuss approaches to this decision problem (see also Lefley, 1996). One alternative is to be disciplined at including and valuing all the alternatives (e.g., the “do nothing” may actually require investments). This implies translating every potential benefit into economic terms, even if the translation is only a rough approximation. The idea is that financial evaluation methods such as Discounted Cash Flow (DCF) methods are not wrong, but they should be applied with care (Kaplan, 1986). For example, an investment that enables a reduction in throughput time may have cash effects through lower inventories and shorter delivery times that translate into higher sales (Corbey, 1991; Krinsky & Miltenburg, 1991; Miltenburg, 1987; Son, 1991; Wouters, 1991). Yet some benefits might be concrete and quantified but it still may be considered too speculative to put a monetary value on it. A firm could then use multi-attribute decision-making methods to combine “apples and oranges” (cash flows and intangible benefits). See, e.g., Bhimani & Bromwich (1991), Abdel-Kader & Dugdale (2001), and Angelis & Lee (1996).

Empirical studies have examined whether firms explicitly consider intangible benefits from their manufacturing strategy. Abdel-Kader & Dugdale (2001) based on a survey in large UK companies, found that analysis of non-financial investment criteria had become more important in MMS investment and significantly so in four cases: quality and reliability of outputs, greater manufacturing flexibility, reduced lead-times, and reduced inventory levels. In a case study of Caterpillar, Miller & O’Leary (1997) showed that the firm reviewed investments in manufacturing to ensure that every proposed investment program conformed to the firm-level vision of modern manufacturing. Based on a series of case studies, Lee (1996) provided evidence that performance expectations at the investment justification stage reflected accurately the different companies’ manufacturing strategies.

Are intangible benefits included in the *financial* analysis, and if so, how? There are indications that firms include intangible benefits as part of the financial analysis—even if the exact value is uncertain—rather than excluding them and then having to do qualitative, multi-attribute tradeoffs. Abdel-Kader & Dugdale (1998) found that while strategic analysis became more important for MMS companies, this was not at the expense of financial analysis, which MMS companies found at least as important as non-MMS companies. They further found that most firms quantified seven benefits of MMS investments in financial terms: reduced labor costs, reduced material

costs, reduced inventories, reduced scrap and rework costs, increased sales volume, savings from less frequent setups, and increased manufacturing capacity. The benefits considered on a non-financial basis by the majority of respondents were improved product quality, faster response to market needs, consistency with corporate strategy, improved competitive position, greater manufacturing flexibility, reduced lead-times, improved company image, easier production scheduling, retention of market share, and increased market share.

The incorporation of intangibles in the financial analysis was also investigated by Wilkes et al. (1996). In a survey they asked companies how they considered intangible factors when evaluating MMS investments. Firms used different approaches: placing a value on them and including this in the financial appraisal (21%), making a judgment about the worth of these intangible benefits compared to any shortfall on a narrower financial appraisal (do we think they are worth the X Euros negative NPV?) (24%), 19% made a judgment by other means, 8% used a mixture of methods, and 32% did not include any allowance for such effects. The majority of firms (87%) felt that existing methods allowed a fair comparison of MMS investments with conventional alternatives.

Another empirical study is reported by Lee (1996), who provided case studies of firms translating the benefits into financial numbers based on an analysis of the firms’ intended usage of the system. For example, firms that introduced flexible manufacturing systems to increase production volume were more likely to quantify reductions in labor, increased output arising from reducing machining time and changeovers, and reductions in sub-contracting costs. Similarly, savings in work-in-progress feature most prominently in financial justifications when the objective is reducing inventories. See also Jones & Lee (1998).

In a study of illustrative case studies of Advanced Manufacturing Technology (AMT) investments in six Belgian manufacturing firms, Bruggeman & Slagmulder (1995) describe a number of examples where firms were able to include relevant “intangible effects” in the financial analysis, but only if the firm had a clear manufacturing strategy and clear objectives for what they wanted to achieve through the AMT investment. Similarly, Miller & O’Leary (1997) found that the firm in their study considered investments in MMS as “bundles” of projects, and in this way it wanted to ensure that the full impact of the related costs and benefits was captured in investment analysis process.

What kind of *financial criteria* are used? More general surveys on investments evaluation (not



specific to modern manufacturing technology) indicate that discounted cash flow measures (NPV, IRR) are the most common investment criteria (Arnold & Hatzopoulos, 2000; Bruner et al., 1998; Farragher et al., 1999; Graham & Harvey, 2001; Payne et al., 1999; Trahan & Gitman, 1995). The use of these criteria has increased over time (Klammer et al., 1991; Pike, 1996; Ryan & Ryan, 2002), and large firms use them more than small firms (Graham & Harvey, 2001; Payne et al., 1999). Small firms often use payback time as the most important criterion (Block, 1997). However, the accounting rate of return still plays an important role as an investment criterion, often in combination with other methods (Arnold & Hatzopoulos, 2000; Block, 1997; Pike, 1996; Ryan & Ryan, 2002; Trahan & Gitman 1995). There is not much empirical evidence for how firms appraise MMS investments, and this suggest that MMS investments are probably evaluated on basis of the same criteria as other investments (Abdel-Kader & Dugdale, 1998; Lefley & Sarkis, 1997; Low Lock Teng & Seetharaman, 2004). Lefley & Sarkis (1997) found that the payback method (either without or with discounting the cash flows) was the most widely used and it was considered to be the most important by both US and UK respondent companies. Internal rate of return was the second most used method, followed by NPV.

How is financial *risk and uncertainty* of MMS investments accounted for? The results of Abdel-Kader & Dugdale (1998) do not support the hypothesis that more sophisticated treatments of risk are employed in the evaluation of MMS investments. Only the relatively unsophisticated technique of sensitivity analysis was considered to be important by respondents, and the MMS companies were just as reluctant to use sophisticated methods such as simulation and the capital asset pricing model as non-MMS companies. In general, sensitivity and scenario analysis were the most important ways for handling risk (Arnold & Hatzopoulos, 2000; Farragher et al., 1999; Payne et al., 1999; Pike, 1996; Ryan & Ryan, 2002; Trahan & Gitman, 1995).

Corporate finance theory indicates that the *discount rate* should reflect the risk of the project (Brealey & Myers, 2000). If MMS investments are relatively risky, a higher discount rate should be used. However, this practice amplifies the potential problems with financial justification of MMS investments because they become less attractive in the context of procedures for financial investment appraisal. This reasoning leads to the empirical question of what discount rates firms use. There is some empirical evidence that firms tend *not* to adjust the discount rate to reflect the risk of individual investment

opportunities (Akula, 2003; Bruner et al., 1998; Graham & Harvey, 2001; Seal et al., 1999). Abdel-Kader & Dugdale (1998) also found no statistical difference between the financial hurdles in MMS vs. non-MMS firms. Drury & Tayles (1997) found that half of the respondent organizations in their study used discount rates in excess of 19%, but they found no different rates from non-MMS firms; yet they also found that firms allowed longer payback times for MMS investments. Carr & Tomkins (1996) reported payback as the most important financial criterion for MMS investments, and found that firms played these down in the light of other non-financial considerations. However, Lefley & Sarkis (1997) found that investments in MMS are seen as more risky than conventional investments, and if the financial analysis is adjusted for risk, firms placed *more stringent* requirements on financial criteria by expecting a higher rate of return, using a higher discount rate, or shortening the required payback period. Slagmulder et al. (1995) also found that risk analysis led to shorting the required payback period or increasing the required hurdle rate.

However, imposing stringent financial criteria may be particularly difficult if projects are surrounded with much uncertainty. Carr & Tomkins (1996) found that when financial targets imposed on MMS investments were tough and seriously imposed, financial calculations were frequently based on very questionable assumptions, and cheating sometimes occurred. In a similar vein, Lefley & Sarkis (1997) found that if projects did not meet the financial requirements, a large majority of companies re-evaluated projects. They also found considerable concerns with short-term bias and giving appropriate weight to intangible benefits.

Do accounting methods hinder MMS investments? Selection bias makes it hard to investigate whether accounting methods have led to rejection of MMS investments that should have been accepted. It would be possible to study the reverse, but we are not aware of objective studies doing so: do accounting methods lead to investments that should have been rejected? Abdel-Kader & Dugdale (1998) provided perceptual evidence relevant to these questions. They asked respondents whether: "It is difficult to get MMS investment proposals approved because of stringent financial criteria." Only 15% of respondents agreed or strongly agreed with this statement; the vast majority of respondents was either neutral or disagreed. Lee (1996) is also not "pessimistic." Based on a study of 21 MMS investments, he found that companies introduced their systems to realize the manufacturing objectives of volume production, JIT production, or

flexible manufacturing. In all of these instances, the companies were able to adapt their investment appraisals to reflect their proposed use of MMS.

### 3.2. Cost Measurement in Modern Manufacturing

Cost measurement refers the *ex post* monitoring of *actual* manufacturing costs. The key issue here is how to measure indirect manufacturing costs, especially in settings where this is not trivial because of circumstances such as high product variety and demanding requirements for quality, lead-times, inventory control, etc. We will first discuss studies on cost drivers in manufacturing, then studies on design choices for cost accounting systems, and conclude with a section on the role of cost accounting in manufacturing. We also refer to Gosselin (2006) in this series for a review of the literature on ABC.

#### 3.2.1. Cost Drivers in Modern Manufacturing

Are cost structures different in firms with modern manufacturing operations? Kerremans et al. (1991) investigated the impact of automation on costs and on cost accounting systems using survey data from 90 companies. They found no difference between high and low automation firms with respect to the percentage of fixed vs. variable costs, but they did find a significantly higher percentage of *indirect costs* vs. *direct costs* in firms with high level of automation. They also found that the proportion of *direct labor cost* is lower in such firms. (They did not find differences regarding management's perception of limitations of cost accounting systems and of uses of cost accounting information.)

Do non-volume variables drive indirect costs? ABC systems are based on the premise that variables other than production volume drive indirect costs. At the conceptual level, cost drivers include unit level ("traditional" production volume driver), batch level, product sustaining, and facility sustaining. Several empirical studies support the existence of non-volume drivers of overhead costs (Anderson, 1995; Banker & Johnston, 1993; Banker et al., 1995; Datar et al., 1993; Dopuch, 1993; Dupoch & Gupta, 1994; Fisher & Ittner, 1999; Foster & Gupta, 1990; Ittner & Macduffie, 1995; Ittner et al., 1997). We refer to Banker & Johnston (2006) for a literature review on cost driver research.

What is the behavior of *quality-related costs*? Kim & Liao (1994) discussed and illustrated (with numerical examples) several possibilities for non-conformance costs as a function of the difference between the target value and the actual value of a quality characteristic. Ittner (1996) found empirical support for the premise in the quality literature relating improved

quality management with ongoing reductions in non-conformance costs *without* an increase in prevention and appraisal costs. Foster & Sjoblom (1996) examined drivers of quality improvement in the electronics industry. Based on archival data from a case-study company, they concluded that improvement rates were not well explained by either production volume or number of components—traditional "learning by doing" variables. On the basis of the survey data gathered both in the case-study company and in the electronics industry, they suggested that variables related to product design, production infrastructure, supplier and customer relations are drivers of quality improvement.

Which cost drivers are related to *congestion* in manufacturing systems? Another group of studies has investigated stochasticity—variability and its impact on queues—as a cost driver in manufacturing systems (e.g., Banker et al., 1988; Leitch, 2001; Srinidhi, 1992). As products move from one activity to another they may have to wait in a queue before being processed. Queues impact work-in-progress (WIP) inventory (hence costs), throughput times—which may affect product availability—and throughput volume—which may affect total sales. The impact of stochasticity on throughput volume extends traditional bottleneck analysis. Without considering variability, the bottleneck resource can easily be identified and the maximum output volume can be calculated. However, production capacity on the bottleneck resource might be lost if variability and queues in upstream activities cause some idle time on the bottleneck resource. Furthermore, there could be a reduction in quality or efficiency due to having to rush orders in congested systems. Analytical models (e.g., Banker et al., 1988; Srinidhi, 1992) and simulation studies (e.g., Balachandran et al., 1997; Leitch, 2001) found support for effects of variability on congestion in production systems. Variability may be caused in several ways, such as variability of set-up times and processing times (Banker et al., 1988). Empirical studies in this topic are scarce, but Balakrishnan & Soderstrom (2000) found empirical support (in a healthcare setting) for a relationship between congestion and a proxy for the cost of congestion (caesarian section rates in a maternity ward).

Studies have also investigated the relationship between costs of congestion and cost allocations. Zimmerman (1979) argued that resource allocation decisions may involve hard-to-measure opportunity costs and suggested that cost allocations may serve as an approximation of those costs. In the context of manufacturing systems, decisions about accepting orders and using resources may increase congestion

and associated costs. Are these opportunity costs approximated by cost allocations? Balachandran & Srinidhi (1988) modeled a service center where potential users arrive whenever they have requirement, and they incur costs of delay if the service center is busy. It was assumed that an external service facility could not be used, so that all users had to rely upon the service center. The users determined the total demand for the service center. Their model demonstrated that a fixed charge on all users based on allocated fixed capacity costs was needed to achieve a firm-wide optimal demand. No allocation led to a sub-optimal, too high demand rate (from the viewpoint of the firm) because it was beneficial for the individual user to increase his demand, even when this benefit would be more than offset by the increased waiting costs of other users. Other papers within this line of research include Banker & Hughes (1994), Dewan & Mendelson (1990), Hansen & Magee (1993), Stidham (1992), Whang (1989), Dickhaut & Lere (1983), Miller & Buckman (1987), Gietzmann & Monahan (1996), Cohen & Loeb (1982, 1988), and O'Brien & Sivaramakrishnan (1996). Findings in this literature suggest that cost allocations can be approximations of the costs of congestion, but with varying degrees of accuracy.

### 3.2.2. Cost Accounting Practices in Modern Manufacturing

What kinds of cost accounting practices are used in manufacturing? Brierley et al. (2001) provide an excellent overview of descriptive research based on surveys of cost accounting practices in the manufacturing sector in Europe. The results of prior research are examined in seven areas: how many accounting systems firms use, product cost structures, the application of blanket overhead rates, the bases used to calculate overhead rates, the use of product costs in decision-making, the use of product costs in product pricing, and the application of activity-based costing (ABC). Examples of studies about cost accounting practices in other parts of the world include Boer & Jeter (1993), Guilding et al. (1998) comparing New Zealand and UK; Wijewardena & De Zoysa (1999) comparing Australia and Japan; and Al Chen et al. (1997) comparing US and Japan. Chenhall & Langfield-Smith (1998a) also review the empirical literature on management accounting practices when presenting their findings of a survey of manufacturing firms in Australia. Fry & Steele (1995) and Fry et al. (1998) investigated differences between users and non-users of standard costing. Using survey data they found no statistically significant differences between

these two groups in terms of production environment. However, they did find that manufacturing companies that did *not* use standard cost systems had a better performance on non-financial criteria for inventory turns, scrap reduction, quality complaints reduction, and delivery complaints reduction, and fewer situations of dramatically increased shipments near the end of the financial reporting period.

What kind of “technical” changes do firms make to adjust cost accounting to modern manufacturing operations? Patell (1987) studied the impact of manufacturing changes on cost system design. In a case study of the implementation of JIT, he found that more effort was directed to understanding the causal structure of indirect manufacturing costs, moving away from using direct labor as the only basis for allocating these costs. Also, the accounting system was simpler as it evolved from product batches to process costing. The study highlighted the interplay of cost accounting and quality control and suggested that the design and role of the cost accounting system should be interpreted in the context of the information gathered from other sources, such as quality control systems. For instance, higher level of cost aggregation may come with increasing detail of non-financial information from such systems. Also using a case study, Ahlstrom & Karlsson (1996) found that the modernization of manufacturing led to simpler and less detailed formal reporting, and easier cost tracing.

Other studies looked at multiple companies (either on the basis of a limited number of site visits or on the basis of a survey) and generally found little support for a systematic relationship between manufacturing changes and accounting change. Gosse (1993) investigated how the integration of manufacturing processes and the application of computer-aided technology affected the design of cost accounting systems (cost identification, cost entry, cost assignment, and cost reporting). Contrasting four computer-integrated manufacturing plants and four traditional plants, he found some support for the hypotheses that firms adjusted their cost center structure, cost allocation basis, and reports (financial and non-financial) to computer-integrated manufacturing systems. Using survey data, Karmarkar et al. (1990) investigated the relationship between cost accounting design and characteristics of the firm’s output market and production technology. The cost accounting characteristics were number of overhead cost pools, number of standard cost variances reported, frequency and reporting lag of accounting reports, and degree of reporting performance evaluation data. The independent variables were type of production

process (continuous, batch, or custom), production complexity (measured by variance of production lead-time), number of products, instability of production process (measured by number of engineering changes), relative importance of overhead, and extent of competition in the product markets. All these variables were expected to lead to more elaborate cost accounting systems. However, they found limited empirical support for these hypotheses. The number of observations being rather low may explain the lack of stronger findings.

Also based on survey data, Durden et al. (1999) investigated the effect of JIT production on cost accounting and performance measurement. They obtained data from 85 manufacturing companies in New Zealand. Overall, they found no significant difference between JIT and non-JIT companies regarding to the level of accounting modification. However, JIT companies that redesigned their costing systems had better performance than JIT companies that had not made these changes. They also found that non-financial performance indicators—supplier quality, supplier on-time delivery, scrap, set-up times, and inventory turnover measures—were used to a significantly greater extent in JIT companies. However, they also found that greater use of non-financial performance indicators was associated with performance irrespective of the production management system adopted.

### 3.2.3. Need for Cost Accounting Information in Modern Manufacturing

Are more sophisticated cost accounting systems considered more important for modern manufacturing operations? If modern operations have more indirect costs, then more elaborate cost accounting information could be expected to be used for understanding and managing these costs. Alternatively, the availability of *alternative* sources of information and control mechanisms—such as computer systems for process control (e.g., numerically controlled production systems) and for planning (e.g., ERP systems), or mechanisms for quality and materials management (such as JIT)—may reduce the need for sophisticated cost accounting systems.

The empirical evidence on this question is mixed, but it becomes clear that modern manufacturing operations are not clearly associated with more sophisticated cost information: Lee & Monden (1996) described a field study of Daihatsu in Japan. The company put a lot of emphasis on cost reduction during product development and during production (target costing, kaizen costing), using techniques for

value engineering, JIT production, TQM. The company did not use ABC. The analysis of the case suggested that because this firm had so many other tools that focused on cost reduction more directly, it did not need comprehensive ABC systems. We will discuss more studies in the remainder of this section.

Many different characteristics of manufacturing have been investigated in relation to the usage and importance of cost accounting information. In an early study, Kaplan & Mackey (1992) used survey data, and they found that organizations using a flow manufacturing process (in contrast to job shops) were more likely to rely on accounting numbers for evaluating the performance of production managers. Results for two other characteristics (use of work-in-progress inventories; accounting for set-up costs) were only marginally significant.

The influence of product diversity, production process, and the cost structure on costing systems was investigated by Abernethy et al. (2001). At five research sites, they examined the influence of these three variables on three dimensions of costing systems: nature of the cost pools (i.e. activity cost pools vs. responsibility cost pools), number of cost pools (single vs. multiple), and type of cost pool (whether the system had hierarchical cost pools). They evaluated a costing system's level of sophistication based on where it fitted on a continuum representing these three dimensions. The findings suggested that when product diversity was high and production process complexity was reduced by flexible MMS, there was less of a need for sophisticated costing systems; more specifically: multiple cost pool were relevant, but less relevant were hierarchical cost allocation keys (unit-level cost pools could be sufficient) and activity-cost pools (process cost pools around flexible equipment could be sufficient instead).

JIT, automation, and quality management practices may also impact the importance of cost information. Hoque (2000) investigated the impact of JIT production and automated manufacturing systems on cost allocation and the importance of cost information to management, based on a survey of New Zealand-based manufacturing firms. The findings supported the hypothesis that organizations operating in a JIT environment put less emphasis on the use of ABC systems, and this could reduce managers' need for detailed cost information for their day-to-day activities. The effects of automation were not as clear cut. Gurd et al. (2002) investigated the impact of implementing TQM on cost accounting systems, based on site visits to six different companies. They concluded that industry, management commitment, organizational structure, participation, and financial

performance influenced the diffusion process, but in an inconsistent manner. Two companies in the automotive component-manufacturing sector cited that much documentation and performance measures were required to satisfy the requirements of customers. In both companies, powerful customers had a strong influence on the rate of adoption of performance measures. Daniel & Reitsperger (1992) studied whether a focus on quality reduced the need for short-term cost information for managers, because targets and feedback could be based on quality performance in non-financial terms (such as rejects, rework, scrap) that directly reduced costs. Using survey data from the US and Japan, they found that goal setting and feedback focused primarily on non-cost measures. However, a relatively large proportion of managers also received such feedback in cost terms. While cost feedback was seldom supplied on a daily or weekly basis, it was often provided to managers monthly.

Does “better” costing information contribute to better performance? Based on a survey of manufacturing companies, Foster & Swenson (1997) reported a positive association between ABC adoption and performance. In another study, Swenson (1995) investigated the benefits of ABC in 25 manufacturing firms. Respondents reported significant improvements in use of and satisfaction with cost management information. He also reported that ABC information was most frequently used for product pricing and product mix decisions as well as for process improvement decisions. Using survey data about reported financial and non-financial performance, Ittner et al. (2002) investigated the association between ABC and manufacturing performance. Extensive use of ABC was associated with higher quality levels and greater improvements in quality and cycle time. Also, ABC use was significantly associated with modern manufacturing practices. They found weak support for the association between ABC and profitability being a function of the “match” between a plant’s operating environment and ABC use.

### 3.3. Non-Financial Performance Measures in Modern Manufacturing

The basic proposition explored in much of the literature is that MMS need different performance measurement systems. Early research identified the need to broaden performance measurement systems to support new operations practices (Beamon, 1999; Eccles, 1991; Hall et al., 1990; Kaplan, 1990; Maskell, 1991; Nanni & Robb Dixon, 1992). Traditional performance measures in operations only emphasized direct costs minimization through low material costs, high

capacity utilization, and high direct labor efficiency. MMS, however, need also clear measures on quality, throughput times, flexibility, etc., linked to the operational strategy of the firm. Non-financial measures provide information about manufacturing goals, causes of bad (or good) performance, and early warning signals (before financial results reflect changes). Ittner & Larcker (1998b) and Nagar & Rajan (2001) found empirical support for non-financial performance measures being leading indicators of financial performance. We also refer to Ittner & Larcker (2006) in this series for an extensive and more general review of the literature on non-financial performance measures.

As we will discuss below, there is empirical evidence for the relationship between manufacturing strategy and the use of non-financial performance measures (e.g., Carr et al., 1997; Daniel et al., 1995; Hoque et al., 2001) and for a link to overall performance—performance is enhanced when MMS are used together with non-financial measures. However, non-financial performance measures are not the only adjustment in management controls to MMS. In this section, we will review a number of studies about the use of non-financial measures in manufacturing without linking these to reward structures. That linkage is discussed in the next section.

One of the first empirical studies, to our knowledge, investigating the relationship between manufacturing strategy and performance measures was Banker et al. (1993). This study used survey data from 362 people in 40 different manufacturing plants in the US. They found a positive association between the adoption of new manufacturing practices (JIT, teamwork, and TQM) and reporting manufacturing performance measures (on productivity, quality, defects, schedule compliance, machine breakdown) to shop-floor workers. In another early study, Daniel et al. (1995) focused on electronics manufacturing, in Japan and the US. They found that the implementation of a quality strategy was associated with quality feedback (on rejects, rework, and scrap) and quality being more important for financial rewards. Daniel & Reitsperger (1991) reported that management control systems supporting an ambitious “zero defect” quality management strategy were more likely to emphasize quality in their goal-setting and feedback processes.

Another early study is reported by Abernethy & Lillis (1995). Based on interviews at 41 business units, they found that firms pursuing manufacturing flexibility placed less emphasis on efficiency-based measures, and used integrative liaison devices (in the form of teams, task forces, meetings, and spontaneous contacts) to a greater extent than non-flexible

manufacturing firms. Using survey data, [Perera et al. \(1997\)](#) found that customer-focus strategy was associated with the use of non-financial (operations-based) performance measures (thus supporting the earlier [Abernethy & Lillis \(1995\)](#) results) but not with organizational performance. [Chenhall \(1997\)](#) investigated to which extent TQM should be developed together with managerial performance evaluation systems employing manufacturing processes measures. Based on a survey, he reported that TQM firms that also used manufacturing measures performed better than TQM firms without such measures. In contrast, results reported by [Durden et al. \(1999\)](#) do not support the need to adjust non-financial measures to manufacturing strategy. Rather, greater use of non-financial indicators was associated with higher performance irrespective of the production system (JIT) adopted.

More recently, [Baines & Langfield-Smith \(2003\)](#) examined organizational initiatives that lead to greater reliance on the management accounting systems, through the provision of a range of non-financial performance measures. These organizational initiatives were changes in organizational design (increased used of team-based structures), modern manufacturing technology (to meet customer preferences and improve product quality more efficiently), and techniques designed to support a customer focus. As a consequence of greater reliance on non-financial accounting information, they found improved organizational performance. The antecedent of these organizational initiatives was a changing strategy that emphasized customer service and product innovation. [Maiga & Jacobs \(2005\)](#) found that more communication about quality goals, more frequent feedback on achieved quality, and more usage of quality-related incentives were antecedents of better quality performance. As a consequence, this was associated with higher customer satisfaction and higher financial performance. Both [Baines & Langfield-Smith \(2003\)](#) and [Maiga & Jacobs \(2005\)](#) were based on survey data and used structural equation modeling.

The linkage between the use of performance measures and organizational performance has mostly been investigated using perceptual or survey data. However, [Mia \(2000\)](#) used interviews with controllers of 55 Australian organizations and information from annual reports, to find that JIT organizations with high (low) provision of information earn higher (lower) profits. Managers working in JIT manufacturing environments have little or no slack resources to cushion against the difficulties caused by defective raw materials, production errors, irregular supply and demand schedules, or to mask inefficiencies. This

made management accounting systems' information—financial as well as non-financial information—critical in such environments. [Said et al. \(2003\)](#) looked at both accounting performance and stock market performance related to the use of non-financial performance measures in compensation contracts. As hypothesized, it was found that the use of non-financial measures was associated with higher stock market performance (but not with accounting performance) as well as with higher future market-based and accounting-based performance. They also found that performance was higher when the use of performance measures was consistent with company's operational and competitive performance (i.e., when there was a match between the use of non-financial measures and the firm's operational characteristics).

Non-financial performance measures are only one aspect of providing broader information in the context of MMS. Another line of research in manufacturing settings examines the contingencies that explain the design of management accounting systems. [Chenhall \(2006\)](#) in this series carefully reviews this research thrust. However, two studies are closely related to our focus on modern manufacturing operations. [Bouwens & Abernethy \(2000\)](#) investigate the relationship between four dimensions of management accounting information—scope, integration, aggregation, and timeliness—and the extent of customization and interdependence. Customization is of particular interest here, as it captures the degree to which a firm changes its product design to customer specifications. They find that a higher level of customization leads to more interdependence between departments such as marketing, product development, production, and purchasing. More interdependence leads to management accounting systems with more integration (information about how performance in different departments is related), aggregation (summary information), and timeliness (frequency and speed of reporting). Recently [Gerdin \(2005\)](#) investigated how “broad scope management accounting systems”—with frequently issued, detailed, non-financial information instead of standard costing with little non-financial information (labeled “traditional system”)—are related to departmental interdependence and organizational structure. Using survey data from production managers, the study supports the hypothesis that the provision non-financial information depended on the type of interdependence and organizational structure.

### 3.4. Rewards in Modern Manufacturing

Working in a modern manufacturing environment requires different skills and behavior compared to

traditional manufacturing. Tasks are highly interdependent because there are fewer buffers. Performance must be delivered on a range of—sometimes contradictory—dimensions. These conditions make knowledge, teamwork, and problem-solving skills important. The introduction of non-financial performance measures, as discussed in the previous section, makes it possible to introduce performance-dependent rewards that are linked to the realized performance on these measures. Other elements of the reward system (besides the measures used) are likely to be also adjusted to that environment, such as rewarding group performance rather than individual performance, and rewarding skills and knowledge and not only output volume. In addition to compensation, other human resource practices could also be affected such as staffing, training, and performance appraisal. In this sub-section, we discuss studies that examine relationships between modern manufacturing operations, performance measures, and rewards.

Several survey-based studies investigating the relationship between manufacturing strategy and the introduction of non-financial performance measures, also explicitly address the usage of these measures as part of reward structures. Using survey data from manufacturing executives at 253 US firms, Fullerton & McWatters (2002) found empirical evidence relating the use of non-traditional performance measures (such as product quality and vendor quality), employee empowerment, and compensation rewards for quality production with the degree of JIT practices implemented. Sim & Killough (1998) used survey data from directors of manufacturing in 84 plants in the US and investigated the interactive effect of TQM/JIT and non-financial performance measures on performance. They found (as hypothesized) that the “right” combinations of TQM/JIT and (a) provision of customer-related performance goals and (b) usage of performance-contingent rewards were associated with high customer performance.

Case studies have been used to investigate relationships between manufacturing strategy and reward structures, and results demonstrated how some firms have broadened the basis for rewards in manufacturing. Wruck & Jensen (1994) describe a case study of the implementation of TQM at Sterling Chemicals. Training, more emphasis on teams to solve quality problems, and new performance measures used for day-to-day operations and problem-solving efforts became more important as part of the TQM implementation. Employee compensation was made of a base salary, stock ownership through an employee stock ownership plan, and a profit-sharing payout. Performance measures affected the subjective

performance evaluations of employees and their base salary adjustments.

A case study in Sweden is the topic of the study by Lind (2001). He describes a longitudinal case study investigating changes in production systems and in control characteristics (performance measures, the level of information, timeliness of information, the use of performance standards, and rewards) associated with the implementation of MMS. Changes in control characteristics in the case supported propositions from modern manufacturing operations: non-financial measures became more important, cost accounting was simplified, information was available faster, standard costs were tied to continuous improvement goals for productivity, and the reward system for operators became a group bonus—based on labor productivity, throughput time, and yield.

Two longitudinal UK case studies are presented by Ezzamel & Willmott (1998). In the first one, the company changed its production technology and grouped machines to product-focused cells. The company also changed the reward scheme from the production volume attained by each operator to teams attaining target production levels measured over a longer time period. Also, jobs became broader and more money was spent on training. In the second study, production was redesigned and reconfigured to introduce flexibility and teamwork, and the organization structure was simplified by taking out many layers. The reward scheme changed from individual and piece-rate to a scheme that consisted of an individual element based on the skill band plus a bonus based on group performance.

In another study, Chenhall & Langfield-Smith (2003) examine the history of the development of a performance evaluation and compensation scheme in a manufacturing company. They focus on compensation schemes at the shop-floor level and investigate the extent to which a company used performance measurement and a gain-sharing reward system to achieve strategic change over a 15-yr period. The case examines the initial impact of the gain-sharing scheme in overcoming inherent hostility within the workforce, its continued success in gaining the cooperation of employees to work toward the successful implementation of strategic initiatives, and, finally, its limitations in sustaining ongoing strategic change after a 10-year period of apparent success. The firm eventually adopted team-based structures to complement gain sharing and sustain commitment to strategic change.

The case studies referred to above do not link the introduction of a new reward system to firm performance. However, in an early case study, Symons &

Jacobs (1995) investigated the effects of introducing an incentive system to support TQM. According to this reward system a bonus payment to operators in a paper manufacturing company was based on a limited number of performance measures for output volume, quality, and safety. Furthermore, a bonus could be earned by engaging in team-based problem-solving projects. Several performance measures improved significantly over time (comparing 26 months of data before, during, and after the introduction of the system).

However, some studies point to the benefits of “traditional” piece-rate reward systems. Lazear (2000) analyzed archival data from a case study and demonstrated positive effects on moving from hourly wages to piece-rate pay. However, this case study was not in a context requiring high levels of knowledge, teamwork, problem-solving, or other skills and behavior important in a context of MMS. Potential benefits of a piece-rate system were also discussed by Wruck & Jensen (1994) and Millgrom & Roberts (1995) based on the Lincoln Electric teaching case. In both papers, the piece-rate system is seen as successful because it was part of a more broadly based reward system that included an end-of-year bonus that depended on cooperation with others, quality, and creativity; employee stock ownership (employees own over 40% of the company’s stock), and the fact that quality could be monitored effectively at the individual level.

Survey-based studies outside accounting have also examined relationships between manufacturing strategy and broader-based reward structures. Snell & Dean (1994) investigated the relationship between modern manufacturing—modern manufacturing technology, TQM, and JIT—and several compensation practices: group incentives vs. individual incentives, salary vs. hourly wage, and skill-based pay vs. seniority pay. They found virtually no direct effects of manufacturing characteristics on compensation practices. However, when integrated manufacturing is moderated by job uncertainty and interdependence (indicating that the work of operators required more knowledge), compensation systems emphasized group-based incentives (as expected), salary (as expected), and seniority pay (contrary to the hypothesis). Youndt et al. (1996) used survey data of 97 plants, and their results indicated that quality-manufacturing strategy moderated the link between human resource management systems (including staffing, training, performance appraisal, and compensation) and operational performance (employee productivity, machine efficiency, and customer alignment). MacDuffie (1995) reports similar results: firms

combining modern manufacturing (low buffers in the study) and a variety of human resource practices (team-based work systems, contingent compensation, extensive training) outperformed mass production firms.

The purchasing function may provide a critical contribution to manufacturing firms’ strategies, and Wouters et al. (2005) investigated antecedents of purchasing decisions based on total cost of ownership (TCO). The collected survey data and applied structural equations analysis. Their results indicated that stronger customer market pressure and a more strategic purchasing orientation were associated with more adequate TCO information, higher judged success of using TCO, and more use of TCO-based performance evaluation and reward.

### 3.5. Management Accounting Systems for Learning in Modern Manufacturing

In this chapter, we are gradually broadening the discussion of management accounting in manufacturing. We first talked only about the provision of data about cost and non-financial performance; then we discussed the use of such data for rewards. In this and the remaining sub-sections, we will discuss a number of broader topics related to the use of management accounting and control systems in manufacturing: learning in modern manufacturing, accounting information systems (this section), the impact of manufacturing strategy on budgeting, and using non-financial targets (next section).

First we will discuss the role of accounting information for local learning to improve manufacturing (Lukka, 1998). Operations managers have various concerns, such as quality, safety, efficiency, and completing activities on time. For daily, short-term activities, managers generally use non-financial operating data on units of output, units of input, scrap, quality, order quantities, inventory availability, etc. “In twelve varied manufacturing companies, we found no instance of a key daily production indicator being a cost or other financial number” (McKinnon & Bruns, 1992, p. 42). However, accounting numbers become important as the horizon lengthens (e.g., to control budgeted expenses, to identify problems and opportunities for improvement). The performance of managers is often measured in financial numbers and managers build a mental model of how physical counts impact financial performance. For instance, Jönsson & Grönlund (1988) describe how operations managers in a production plant used cost data over a longer period to detect problems and to monitor the results of experiments. Such existing, informal, locally developed non-financial performance measures may



also provide inputs to the development of centrally initiated, “official” performance measurement systems. Based on qualitative case-study data, [Wouters & Sportel \(2005\)](#) found that the development and implementation of new non-financial performance measures in the logistics department of a manufacturing company were strongly influenced by that organization’s existing performance information that was largely developed by operational managers.

Managers are often dissatisfied with the accounting information they receive ([McKinnon & Bruns, 1992](#)). First, accounting recognition and measurement criteria delay the availability of information until uncertainties have been resolved. But, timely information is important for managers: to be informed about the status of operations and to be warned in case the need for action, because of unexpected events, arises. Second, reliability is often a problem. Managers need consistent definitions and accurate registration. Third, relevance of accounting data suffers because of sub-optimal categorization of data or the failure to present desired relationships in reports. Aggregation and allocation of costs often obscure details that are important to managers.

The case study of [Jönsson & Grönlund \(1988\)](#) focuses on different ways of learning by higher-level and lower-level managers. The authors conclude that output-oriented accounting numbers comparing plans against budgets are appropriate for higher-level managers’ learning, which is based to a large extent on conceptual models. However, while these numbers provide signals if something is wrong, they do not provide causal information for taking corrective action. In contrast, lower-level operations managers need a few operating statistics to determine if things are out of control. Learning is more experiential and based on direct observation of processes. They focus on one problem at a time, take action, determine whether costs have improved, and then refocus on another problem ([Jönsson & Grönlund, 1988, p. 524](#)). Lower-level managers have an image of causal relations, and they try to complement that image with relevant operating statistics. Non-financial measures are developed at the local manufacturing units through experimental learning processes and more or less independently from the strategic goals of the firm. The authors suggest that information systems should be flexible to facilitate learning at lower levels, while being integrated with output-oriented information systems for higher levels. Higher-level managers need to be able to connect the measures with other sources of information, and to “see with your own eyes and talk to the people closest to the events” ([Jönsson & Grönlund, 1988, p. 524](#)).

[Van der Veeken & Wouters \(2002\)](#) also examined how lower-level managers used accounting information for cost control and learning. In a case study of a road building company, they found that lower-level managers did not make much use of a computer-based system for reporting and analyzing actual costs. Rather, these managers were involved in project budgeting and they could translate the budget to observable milestones for project progress and resource consumption. The study also points to the kinds of action-centered skills that lower-level managers used for project management, where computer-based reporting system was of less support. Most of the accounting information was designed for higher-level managers who did not observe work on-site and had to rely on formal reports for identifying problems and finding solutions.

Other studies investigate characteristics of *accounting information systems* to advance our understanding of what accounting is used for in manufacturing. [Libby & Waterhouse \(1996\)](#) in a survey study of Canadian firms looked at the relationship between capacity for change, size, intensity of competition, and decentralization, and the number of changes to management accounting systems. The management accounting included 23 different systems grouped around planning, controlling, costing, directing, and decision-making. The greatest number of changes occurred in systems that supported decision-making. Organizational capacity for change was the best predictor of accounting system change. [Williams & Seaman \(2001\)](#) replicated this study with data from firms in Singapore in three sectors (manufacturing, industrial, and service), and they found different results due to cultural and cross-sectional differences.

The accounting information system may also be related to manufacturing characteristics, such as JIT manufacturing. [Nicolaou \(2002\)](#) investigated factors associated with a broad scope of the cost management system—defined as its use for supporting a broad spectrum of operational as well as strategic decisions necessary for the implementation of manufacturing strategy (make or buy decisions for component parts; product pricing decisions; decisions to discontinue existing products; decisions relating to post-manufacturing, customer-related costs; identification of areas for process improvements; product design decisions; performance measurement and evaluation decisions). He hypothesized that the adoption of JIT and electronic data interchange (EDI) affects the scope of the cost management system, but that environmental uncertainty, product standardization, and the cost structure moderate the relationship. The findings indicated that the cost management system

had broader scope when JIT was combined with a low environmental uncertainty, more standardized products, or lower fixed factory overhead and indirect costs. As for EDI, the relationship between broad scope and the adoption of EDI was found to be moderated by product standardization and cost structure.

Who changes management accounting systems? Various studies investigated the contribution of management *accountants* to management accounting systems. However, it is clear that measurement of costs and performance is not the exclusive domain of the accounting function. Sillince & Sykes (1995) present a case study where operation managers did some of their own cost accounting and the accountant's data was separate from the production data with little dialogue between these professional groups. Jönsson (1996) presents several studies exploring the complex interplay between accountants and other professionals in preparing measurements and analyzing performance data. Chenhall & Langfield-Smith (1998b) propose, based on a case study, five interrelated factors that may explain the extent to which management accountants contribute to the development of integrated performance measures and change programs: a shared view of role of accounting within change programs; senior management support for accounting innovations; accounting champion; accountants have well-developed technical and social skills; and authority of accountants derived from formal hierarchy.

### 3.6. Management Control Systems in Modern Manufacturing

This sub-section discusses the role of accounting information for control purposes. Relationships between accounting and manufacturing are particularly interesting because the accuracy of cost targets and non-financial targets may depend on the manufacturing environment.

Relationships between *budgeting* and manufacturing characteristics are the topic of a number of early studies. Merchant (1984) investigated whether differences in departmental budgeting were related to differences in production technology, market factors, and organizational characteristics. Production technology that is more routine and repetitive makes it possible to put more emphasis on costs, both *ex ante* when setting goals and *ex post* when reporting actual costs. It was found that degree of automation of the production processes was associated with greater requirements to explain variances and react to budget overruns. Also, managers responsible for highly automated production processes met less frequently

with their superiors and their subordinates regarding budget matters, and they felt they had greater influence over their budget plans. Moreover, performance was higher where there was a fit between automation and the use of budgeting.

Brownell & Merchant (1990) investigated whether process automation and product standardization enhanced the accuracy of manufacturing cost budgets. When the levels of these characteristics are low, budgetary participation may become more important for resolving uncertainties. When automation and standardization are high, flexible budgeting is more accurate. They found that when product standardization is low, high participation and use of budgets as static targets were each significantly more effective in promoting departmental performance than where product standardization was high. They did not find such a moderating effect of process automation. However, Dunk (1992) found a moderating effect of automation: reliance on budgetary control in the evaluation of production sub-unit performance was more strongly associated with performance as the manufacturing process became more automated.

The introduction of non-financial measures brings up the question of *completeness* in the context of implementing manufacturing strategies. Non-financial measures need to help top management to get an overview, to drill down, and to compare. Consistency, transparency, and comparability are key elements. However, disaggregating these measures into partial sets of measures in functional manufacturing sub-units may lead to incompleteness. Operational processes involve trade-offs between various dimensions of performance, such as efficiency, productivity, quality, customer service, and responsiveness (Lillis, 2002). For instance, responsiveness may lead to more changeovers, shorter lead-times, and higher inventories. Without a well-designed system, trade-offs are not considered in setting targets for financial and non-financial measure, leading to frustration. Thus, it remains difficult to design measurement systems that capture these effects in setting targets. Solutions rely on dialogue, the use of explicit or implicit weightings on measures (Ittner & Larcker, 1998a), or slack in budgetary controls (Davila & Wouters, 2005; Lillis, 2002; Van Der Stede, 2000).

The above discussion on the completeness of budgets and non-financial performance measures suggests that the effect of budgets and performance measures depends on how these are used as part of a larger *management control system*. Some studies have looked at the fit between management control and manufacturing strategy. Selto et al. (1995) examined whether a fit between manufacturing practices and

management control explained performance of workgroups in a case-study company. Fit between JIT/TQM and management control was examined in various ways, but the central theme was that manufacturing practices required elements such as high worker authority, horizontal communication, high task difficulty, and variability for operators. They found that the firm had strong vertical dependence, which was not compatible with the concept of worker empowerment. However, they were unable to explain workgroup effectiveness with contingency theory.

A second study is by Kalagnanam & Lindsay (1998), who investigated management control in JIT manufacturing. Using three case studies and survey data from Canadian manufacturing plants, they found that mass production organizations that pursue JIT used an organic model of control to a greater extent than traditional firms. That is, these firms increasingly used informal and cross-functional communication, teams composed of individuals from different functional areas, and decentralization of decision-making to lower levels in the organization.

Ittner & Larcker (1997) investigated relationships between quality strategy and management control systems. They found that organizations supported their quality strategies with at least some quality-related strategic control practices for strategy implementation: reward (making quality performance important for compensation), internal monitoring (providing feedback, having meetings to discuss quality, the board of directors frequently reviewing plans, problems and achievements), and external monitoring practices (extent of benchmarking operations, frequency of external research and audits). However, a match between the organization's quality strategy and its use of these formal quality-related control practices was not associated with higher performance. In fact, they found negative associations between control practices and performance, as a direct effect or as moderated effect (the relationship between a quality strategy and performance being less positive as formal controls were used more). In another study using data from the same sample, Ittner & Larcker (1995) performed different analyses and found that TQM practices were associated with greater use of nontraditional information and reward systems. However, there was only mixed support for the claim that organizational performance is a function of the interaction between adoption of TQM practices and the use of non-traditional information and reward systems.

Finally, Chenhall & Langfield-Smith (1998a) used survey data from Australian manufacturing firms to examine the benefits of a variety of management

techniques and management accounting practices, as well as the firms' strategic priorities. They expected "traditional" techniques to benefit firms that place a strong emphasis on low-price strategies, while other techniques benefit firms placing a strong emphasis on customer service and flexibility. They found that strategy did not matter very much. Many firms across the sample gained high benefits from both traditional and contemporary management accounting practices, and traditional techniques ranked as providing the highest benefits.

#### 4. Conclusions

The large changes in manufacturing in the 1980s and in product development in the 1990s have been fertile ground for research in management accounting. The move toward modern manufacturing and related forms of NPD puts new demands on management accounting information. Significant developments out of this need are new ideas about cost allocation (activity-based costing), relevance of non-financial measures, valuation of intangible benefits, accountants as suppliers of cross-functional information, real options, cost of quality, or lifecycle costing. While the consequences have been examined to a significant extent, this paper outlines empirical results that are still mixed or against expectations that require more research.

But research is needed to better understand what the new manufacturing environment demands from *internal* accounting because new developments in manufacturing are putting new demands on external information such as customer satisfaction or partners' information to be part of management accounting information. For instance, globalization has enhanced the importance of logistics' costs and supply chain costs. Supply chain management has become an important research topic in operations, but it is only now starting to attract management accounting research (e.g., Cooper & Slagmulder, 1999b). The growing importance of externalities on the environment is also enhancing the importance of lifecycle costing and extending management accounting to the recycling or reusing stage of products (e.g., Epstein, 1995). These are only examples where new research opportunities are emerging; other chapters in this series review emerging fields of research such as inter-organizational relationships or service firms.

The chapter also attempts at summarizing the current state of research in management accounting and NPD. This organizational function is also going through a significant transformation, which is having a large impact in the field of management accounting. From being perceived as detrimental to performance,

management accounting is becoming a central piece to enhance performance. Product development started the revolution when it moved from being seen as a black box where money came in and hopefully a product would come out to being interpreted as a process to be measured and managed. Research in product development is still a fruitful area for management accounting researchers as new approaches to improve this process rely on techniques that are common to the accounting knowledge and as the process becomes more complex through dispersed development teams, cross-functional integration, customers and suppliers voices, etc. But fundamental and applied research are emerging as processes where research is scarce and becoming more relevant not only for the advancement of knowledge but also for the advancement of practice.

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# Management Accounting and Control in Health Care: An Economics Perspective

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**Abstract:** This chapter summarizes empirical archival accounting research in management accounting that is based on economic theory and uses health care settings. Three perspectives are investigated: (1) production cost economics, including cost structure, cost behavior, cost drivers, the design of cost allocation systems, and the appropriate level of cost aggregation; (2) agency theory, including incentives to bias information or shift costs, the relation between benchmark disclosure and cost containment, and issues pertaining to compensation contracts and performance evaluation; and (3) industrial economics, including the effects of competition and mergers on accounting systems and costs, and capital budgeting responses to regulation.

## 1. Introduction

This chapter provides a summary of extant management accounting research that uses economic theories and archival-empirical methods within health care settings. It also identifies and discusses promising opportunities for future research. The health care sector provides a rich setting in which to empirically examine many issues in managerial accounting such as production and cost functions, contracting and performance measurement, and regulation and competition. As elaborated below, these opportunities arise because the health care sector in most countries comprises organizations with complex production functions, multiple ownership types, offering multiple products, competing in various types of markets including regulated markets, and using both labor-intensive and capital-intensive production techniques.

The health care industry in several parts of the world has witnessed significant changes in regulation and competitive environment since the mid-1980s. For example, in many countries including Canada, Germany, Norway, and the U.S., reimbursement has shifted from cost-plus to fixed price for hospital services and drugs, especially for patients supported by public programs. Economists suggest that cost-based reimbursement encourages quality competition, whereas fixed-price regulation encourages cost-competition and efficiency (Bajari & Tadelis, 2001;

Shleifer, 1985). Empirical results support this suggestion (Krishnan, 2005). The change in regulation from cost-plus to fixed-price reimbursement in many health markets has altered the basis of competition from quality to cost (Keeler et al., 1999; Robinson & Luft, 1985, 1988). This shift has implications for hospital behavior with respect to accounting systems, budgeting, contracting, and capital structure. These types of changes in regulation and competition provide accounting researchers opportunities to empirically test industrial economics theories related to firm behavior in competitive and regulated markets.

Managerial accounting in recent years has placed considerable emphasis on performance measurement and contracting (Feltham & Xie, 1994; Holmstrom & Milgrom, 1991). Researchers have developed agency models to determine the optimal weights to place on performance measures used in compensation contracts (e.g., Banker & Datar, 1989; Datar et al., 2001; Feltham & Xie, 1994; Holmstrom, 1979). The hospital manager's task provides a good context in which to examine performance measurement and contracting questions because of its complexity and the number of task dimensions that need coordination to promote successful outcomes. Managerial accounting researchers have capitalized on these opportunities to explore performance measurement and contracting issues in the health care sector.

Another feature of the health care industry is the prevalence of organizations with different ownership types such as nonprofit, for-profit, and public (government) hospitals and clinics. Economic theory predicts that for-profit firms have different objectives and behave differently from nonprofit firms, and that for-profit firms focus on profit maximization, whereas nonprofit firms focus on additional objectives such as quality, quantity, and charity care (Dranove, 1988; Hoerger, 1991; Newhouse, 1970; Pauly & Redisch, 1973). Because they receive tax subsidization and are part of a bureaucratic reporting system, government organizations are different from both for-profit and nonprofit firms. Specifically, government firms face more constraints on both behavior and governance, but do not face the same pressures to produce a positive income or surplus. The different incentive structures and managerial motivations in for-profit, nonprofit, and government hospitals provide a rich setting for comparisons in accounting and contractual decision-making behaviors.

Two caveats about our chapter are to be noted. First, we have excluded research that does not fit into the perspectives that we use in our analysis and thus do not include the entire population of articles that have been published in the health care accounting literature. Second, in locating the articles, we conducted a comprehensive search using the *Proquest* and *Google* search engines. We also searched each issue of the following journals: *Abacus*, *Accounting and Business Research*, *Accounting and Finance*, *Accounting, Organizations and Society*, *Australian Accounting Review*, *Contemporary Accounting Research*, *Journal of Accounting and Economics*, *Journal of Accounting Research*, *Journal of Accounting, Auditing, and Finance*, *Journal of Accounting and Public Policy*, *Journal of Management Accounting Research*, and *Scandinavian Journal of Management*. We found that most of the articles using economic-based theories and archival methods use data from the U.S. and Canada. As a result, although this chapter has a substantial representation from North America, this limitation is not intentional. As stated earlier, many of the regulatory and competitive changes that have occurred in the health care sector are relevant to several countries; therefore regardless of the country from which data are obtained, the conclusions from most of these studies have broad applicability.

We classify the managerial accounting research in health care research into three broad economic perspectives: (1) production cost economics; (2) agency theory; and (3) industrial economics. Appendix A provides a summary of some of the articles discussed in this chapter.

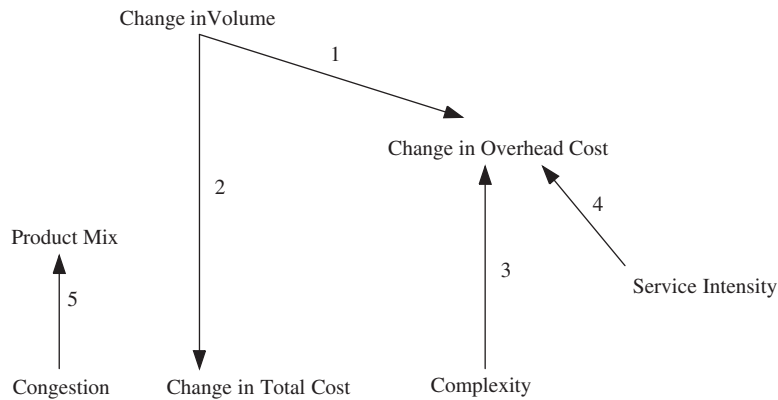
## 2. Production Economics Perspective

The production economics perspective has enjoyed considerable popularity in managerial accounting research (Christensen & Demski, 1995). The primary focus of this research is the interaction between management accounting system design and production and cost functions. Examples of research in this area include studies that examine the structure and behavior of costs (including separability, linearity, and independence), cost drivers in various manufacturing or service environments (volume versus other drivers), design of cost allocation systems to improve decision making (traditional versus activity-based costing (ABC)), and appropriate aggregation of costs. The emphasis of this stream of research is on the *specification* of costs rather than intentional managerial behavior related to the *management* of costs, such as cost shifting and budget biasing to maximize revenues or other firm and managerial outcomes. The latter is related to managerial incentives and thus uses an agency approach.

Two features make health care a popular context for examining cost structure, cost drivers, and cost behavior. First, researchers can draw upon the health economics literature that includes comprehensive theoretical and empirical investigations into hospital cost functions and cost behavior. Second, hospital regulatory databases provide a wealth of cost accounting data for empirical analysis. Details about some of specific studies in this area are summarized next. Figure 1 provides an overview of the links among the variables that have been explored in the literature. One note about the figures is that they summarize the association between constructs and are not reflective of the empirical methods, unlike Luft & Shields (2003) who use figures that explicitly specify the causal model forms.

### 2.1. Cost Structure and Behavior

The estimation of hospital cost functions has a long history in health economics research and several reviews of this literature over different time periods are available (see, for example, Cowing et al., 1983; Feldstein, 1974; Hefty, 1969; Mann & Yett, 1968). Driven by concerns over the high cost of health care in most developed nations, economists, regulators, and policy makers have sought to better understand the behavior of hospital costs to determine strategies to control costs without jeopardizing the quality of care. A question that has received attention by economists that also has implications for accountants is whether hospital cost functions exhibit economies of scale. For example, Yafchak (2000) uses a Cobb–Douglas production function to determine whether larger hospitals



*Prior Research: Legend to Links*

1. Noreen & Soderstrom (1994, 1997), Balakrishnan *et al* (1996), Maher & Marais (1998), Balakrishnan *et al* (2004)
2. Kallapur & Eldenburg (2005)
3. Balakrishnan *et al* (1996), MacArthur & Stanahan (1998)
4. MacArthur & Stanahan (1998)
5. Balakrishnan & Soderstrom (2000)

*Map Notation*

—————▶ Directional Relation

*Figure 1.* Production economics perspective.

have lower long-run average costs per bed than smaller hospitals. The study employs Medicare Cost Report data from years 1989 to 1997 to analyze production functions. Yafchak's results suggest that hospitals experienced increasing economies of scale. However, while adding beds reduces average cost per bed, because the industry has significant excess capacity, these additional beds have a very little impact on total costs and do not seem to add to revenues. One of the implications of his study is that accounting researchers need to incorporate the interaction between economies of scale and capacity utilization, and in addition, be cognizant of nonlinearities while estimating cost functions and determining cost drivers.

Indeed, accounting researchers have acknowledged the presence of nonlinearities in cost functions and have explored their implications for the design of management accounting systems. Hospital data are particularly useful for these types of studies because the Chart of Accounts includes specific information

about the types of costs in each service department (overhead) account and a required allocation base for that account. These allocation bases often reflect the activities taking place in the department, and therefore could be used as cost drivers. For example, the standard unit of measure for the account devoted to printing and duplicating is reams of paper, for laundry, the standard measure is pounds of laundry processed, and so on. Such rich detail from firms in other industries is rarely available to researchers.

One of the earliest papers in management accounting research to explore hospital cost structures is by Noreen & Soderstrom (1994). This research challenges the traditional ABC assumption that costs are proportional to activities in the short term (Fig. 1, Link 1). Using Washington State hospital data, the authors develop a cost function consistent with the generalized Cobb–Douglas production and find that the ratio of marginal cost to average cost (the coefficient on activity levels) is less than 1, indicating that

there are increasing returns to scale. In a later study, Noreen & Soderstrom (1997) analyze hospital cost structure across time using a proportional cost (ABC) model and find that only about 20 percent of the overhead costs are variable. In a related study, Balakrishnan et al. (2004) show that capacity utilization influences whether costs change proportionately with changes in activities. While the focus of the study is whether costs are sticky (i.e., the proportionality of cost to activity levels differs for increases versus decreases in activity), they also find that the proportionality of cost to changes in activity levels is different for hospitals experiencing excess, normal, or strained capacity utilization.

These three studies provide evidence that a relatively high proportion of hospital costs appear to be fixed, and therefore do not change as activities change, and highlight the importance of recognizing and incorporating nonlinearities in cost functions. Maher & Marais (1998) extend this literature and demonstrate that nonlinear relations between total costs and activities also arise when activities are joint and indivisible. The authors use field data from an outpatient surgery facility in a nonprofit teaching hospital and contrast three types of models: a volume-based single-pool allocation system, linear activity-based costing, and integer programming. Their results indicate that linear-activity-based costing performs poorly when changes in user demands do not translate directly to changes in resource demands, because services are provided concurrently to multiple users. Thus, both conventional volume-based costing and linear-activity-based costing do not provide good quality information for decision making, especially when resources are provided on a joint or indivisible basis.

Kallapur & Eldenburg (2005) add to the cost structure literature by examining changes in the structure of total cost within a real options framework (Fig. 1, Link 2). Real options theory suggests that uncertainty leads firms to prefer technologies with low fixed and high variable costs. When reimbursement regulation changes from cost-plus to fixed price, revenues became a function of volume rather than cost. In response to this increase in uncertainty, the authors predict and empirically show that hospital managers will increase the proportion of variable costs relative to fixed costs in their cost functions. This study implies that firms facing adverse regulatory change, as well as competitive and financial pressures, make decisions that alter the composition of costs. Accounting and cost allocation systems therefore need to be dynamic to incorporate the changes in cost behavior patterns.

In summary, the cost structure and behavior literature has several implications for management accounting teaching and research. First, significant nonlinearities are present in firms' cost functions and hence, conventional volume-based or linear activity-based cost accounting systems will often lead to inaccurate information for decision making. Second, firms often change the composition of their cost structures with respect to fixed and variable costs, and as a result, cost accounting and allocation systems need to be periodically updated to reflect any changes in structure and behavior. Future research in this area should explore time-series models that help researchers understand the temporal changes in cost behaviors and the effects of exogenous factors such as regulation and competition on decisions that influence firms' cost behaviors.

## 2.2. Cost Drivers

Research on cost drivers has had lengthy tenure in management accounting. Early research focused on production volume as a cost driver (Foster & Gupta, 1990). In attempting to identify more refined costing systems, accounting researchers analyzed several types of potential cost drivers such as product diversity and production process complexity (Banker & Johnston, 1993), manufacturing transactions (Banker et al., 1995), and product-mix heterogeneity (Anderson, 1995). Researchers have also explored the interdependencies among cost drivers (Datar et al., 1993). In addition, investigations have been conducted on the assumptions underlying traditional volume-based costing methods and ABC.

Hospital data have been used to determine nontraditional drivers of overhead costs. Balakrishnan et al. (1996) develop a model representing hospitals as sets of concentric, interrelated services that are organized around the core mission of providing patient care. The authors predict the complexity of operations as well as volume drive costs in this type of system (Fig. 1, Links 1 and 3). Using 1986 data from 165 acute-care Canadian hospitals, they analyze cost behavior in 18 different department-level cost pools, including patient care, ancillary, and support departments. For each cost pool, they estimate six linear cost models using the following combination of cost drivers: (1) volume alone, (2) volume weighted by measures of complexity, (3) volume and volume weighted by measures of complexity, (4) volume and volume squared (to reflect economies of scale), (5) volume and complexity as independent, additive explanatory variables, and (6) complexity alone. Their results suggest that adding a measure of complexity to the volume measure significantly improves explanatory power. The authors

estimate that 42–50 percent of hospital-operating costs are affected by complexity of care. In addition, the relation between complexity of operations and costs varies by department. Moreover, volume and complexity are interdependent, and cost drivers therefore need to incorporate interdependencies. MacAurthur & Stranahan (1998) extend this line of research and examine two types of complexity: the number of services (breadth) and the intensity of individual of services (depth). The authors obtain data for 5,306 acute-care hospitals from all regions of the U.S. from the Health Care Financing Administration (HCFA) and find that volume and both types of complexity variables are significant drivers of overhead costs (Fig. 1, Links 3 and 4).

Another cost driver that has been examined in the health care sector is system congestion (Fig. 1, Link 5). Balakrishnan & Soderstrom (2000) examine the effect of labor and delivery ward (LDW) congestion on operating cost using data from 225,473 maternity admissions at 30 Washington hospitals. They use the C-section rate as a proxy for the cost of congestion, because a patient undergoing C-section is moved to a surgical ward, which relieves the congestion in the LDW. Their results suggest that the C-section rate is higher for congested days for at-risk groups, even after controlling for other factors that influence the probability of a C-section.

### 2.3. Summary of Production Cost Economics Perspective

In summary, the cost driver literature has recognized the importance of incorporating cost drivers other than volume, such as complexity, and congestion, as shown in Fig. 1. Perusal of this figure reveals several gaps in the existing literature, and topics that are likely to be fruitful for future research. For example, the only cost drivers that have been comprehensively examined are volume, service intensity, complexity, and congestion. Future research could explore other factors that influence costs including patient-mix, governance, severity of illness, and technology.

In the hospital industry, considerable interdependencies exist among departments although at the same time, departments are usually structured as cost centers. This gives rise to transfer pricing issues that can be explored by accounting researchers. It would also be useful to further explore the interdependencies among various categories of costs and cost drivers such as the types of analysis conducted by Balakrishnan et al. (1996) and MacAurthur & Stranahan (1998). While economic theory has a rich literature in various types of flexible cost functions (such as translog), which recognize and explicitly model interdependencies and nonlinearities among

various types of costs and the effects on these interdependencies of other endogenous and exogenous factors such as volume and regulation, accounting researchers have not adequately tapped this extensive body of literature. Future research could make use of the cost function literature to model and then empirically analyze the interactions among cost drivers such as inpatient- and outpatient-mix, severity of illness, service-mix, technology, regulation, insured and uninsured patient-mix, and outsourcing.

Another potential research area concerns the tradeoffs among various types of errors such as specification and disaggregation errors versus measurement errors. For example, Datar & Gupta (1994) find that reductions in specification and aggregation errors through use of more disaggregated and better-specified costing systems may actually increase measurement error and may thus increase errors in product costs. Performance measures in the health care industry are difficult to define and specify, for example, there is no consensus in the health economics literature about what constitutes quality (Brickley & Van Horn, 2002). Under these circumstances, better-specified costing systems may not result in fewer errors in total cost; the benefits and costs of new systems need to be empirically analyzed.

### 3. Agency Perspective

Agency theory focuses on the design of employment contracts that maximize organizational performance in the presence of motivational and informational problems. These problems arise because in decentralized firms, operating decisions are made by professional managers (agents), whose interests are not identical to those of the residual claimants (principal) (Jensen & Meckling, 1976). The first information-based problem arises from the inability of principals to observe the input supplied by effort-averse agents, which may encourage agents to shirk (the moral hazard problem). The second problem (the information asymmetry problem) arises because managers typically have better information about the operating environment compared to owners, and can misrepresent their private information to maximize self-interest rather than firm profits (Baiman, 1982, 1990). Agency theory describes the types of information problems that arise in inter and intrafirm relations and provides guidance for contract designs that encourage managers to exert effort and not misrepresent private information.

In this section, the extant literature on managerial incentives, information biasing, performance measurement, and contracting in health care organizations is



summarized and opportunities for future research are discussed.

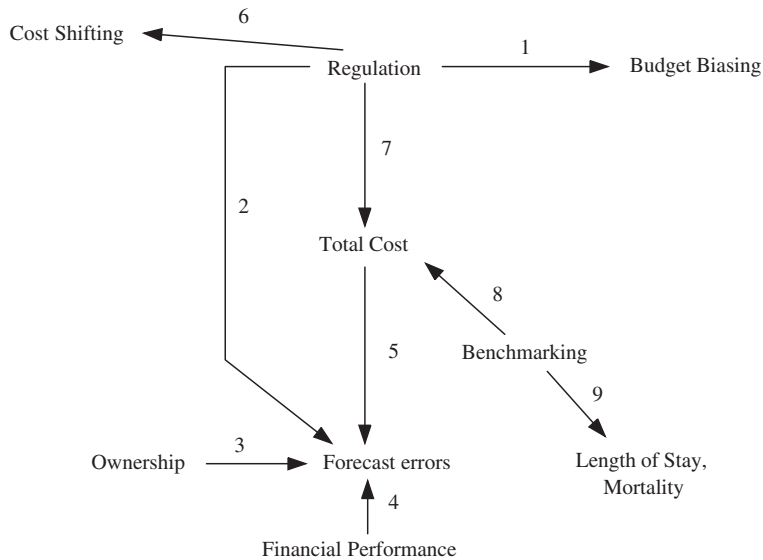
3.1. Managerial Incentives and Information Biasing

This section discusses managerial reporting behaviors that arise in the presence of certain types of regulation, cost controls, and benchmarking. Figure 2, Panel A summarizes the links among these studies.

3.1.1. Budget Biasing

Several accounting studies focus on agency problems in the regulator–regulatee relationship and examine information biasing behavior in the form of budget biasing. One of the earlier studies in this area is by Blanchard et al. (1986) who analyze hospital

managers’ budgeting behavior to determine whether budgeted volumes and costs are biased to increase revenues under rate-setting regulation (Fig. 2, Panel A, Link 1). The authors examine Washington State hospitals operating under regulation that limits hospital profits based on a volume-adjusted budget. If actual revenues are greater than the volume-adjusted budget, then the hospital is considered out-of-conformance with state regulations and must reduce patient charges (prices) in the next period. The authors develop analytical models that examine budgeting incentives under scenarios of increasing and decreasing volumes. The results from these models suggest that when hospitals budget for an increase (decrease) in volume in the next period, they have incentives to



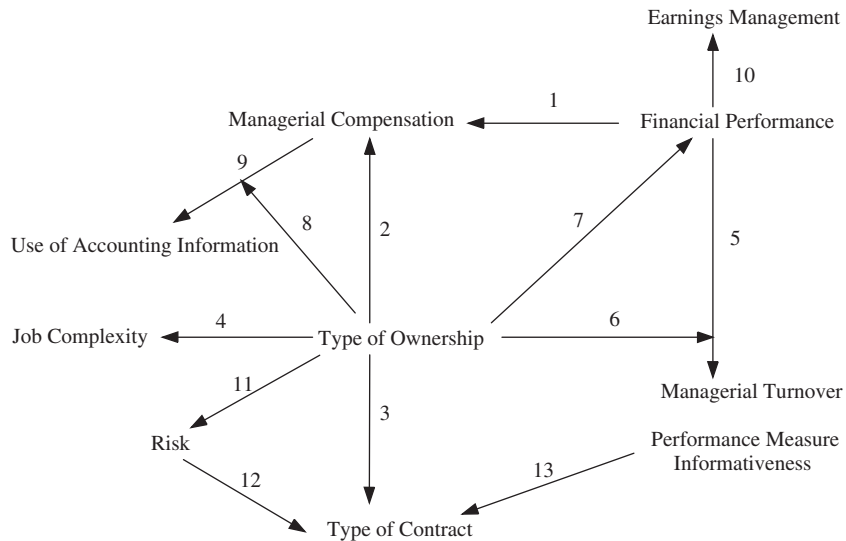
Prior Research: Legend to Links

- 1. Blanchard et al (1986)
- 2. Soderstrom (1993), Eldenburg & Soderstrom (1996)
- 3. Soderstrom (1993)
- 4. Soderstrom (1993)
- 5. Soderstrom (1993)
- 6. Eldenburg & Soderstrom (1996), Eldenburg & Kallapur (1997)
- 7. Eldenburg & Kallapur (2000)
- 8. Eldenburg (1994), Evans et al (2001)
- 9. Evans et al (1997), Evans et al (2001)

Map Notation

—————> Directional Relation

Figure 2. Agency perspective. Panel A: Managerial incentives and information biasing. Panel B: Contracting, performance measure, and compensation.



*Prior Research: Legend to Links*

1. Lambert & Larcker (1995), Brickley & Van Horn (2002)
2. Lambert & Larcker (1995), Roomkin & Weisbrod (1999), Eldenburg & Krishnan (2003)
3. Lambert & Larcker (1995), Roomkin & Weisbrod (1999), Leone (2002)
4. Roomkin & Weisbrod (1999)
5. Brickley & Van Horn (2002)
6. Brickley & Van Horn (2002)
7. Eldenburg & Krishnan (2003)
8. Eldenburg & Krishnan (2005)
9. Eldenburg & Krishnan (2005)
10. Leone & Van Horn (2005)
11. Leone (2002)
12. Evans *et al* (2005)
13. Ittner *et al* (2003)

*Map Notation*


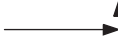
-  Directional Relation  
 Moderator Variable Interaction

Figure 2. (Continued)

inflate (deflate) the impact of the volume increase (decrease) on hospital costs. Using data from 116 hospitals over the period 1976 to 1983, the authors find higher unit variable costs when volume is increasing than when it is decreasing. Further, they find that volume forecasts are biased upwards when volume increases are expected and unit variable costs are inflated, and vice versa when volume decreases are anticipated in the next period.

Eldenburg & Soderstrom (1996) extend Blanchard *et al.* (1986), and also examine budgeting and cost shifting behavior after deregulation in Washington State and in response to a change in Medicare reimbursement. Their study explores in more detail the manner in which hospital managers manipulate budgets and shift costs to increase revenues under

rate-setting regulation. The authors use the forecast errors (actual minus budgeted) for contractual adjustments (the difference between charges and actual reimbursement) as the dependent variable in their analyses. Their results suggest that all ownership types exhibit positive and significant forecast errors, and these errors increase significantly after deregulation (Fig. 2, Panel A, Links 1, 2, and 6). Further, hospitals with higher contractual adjustments (and therefore more opportunity to shift costs) have higher forecast errors. The authors use a method similar to Blanchard *et al.* (1986) with similar findings: hospitals with increasing volumes tended to overestimate both costs and volumes for the coming periods, while those hospitals with decreasing volumes tended to underestimate volumes and their impact on costs.

Research also examines the relation between regulation and hospital information biasing strategies. Soderstrom (1993) empirically demonstrates two strategies that hospitals used in response to adverse change in regulatory environment to increase revenues. First, hospitals could change admission policies and admit patients who could be effectively treated on an outpatient basis. Second, hospitals could report that patients are more severely ill than the actual principal diagnosis. She analyzes government and nonprofit hospitals, and finds significant results for the government hospitals, but not for nonprofits. Her results suggest that hospitals are likely to follow both types of reporting strategies. Further, hospitals in better financial condition have fewer admission and reporting errors, whereas hospitals with greater costs have greater admission and reporting errors (Fig. 2, Panel A, Links 2, 3, 4, and 5).

### 3.1.2. Cost Shifting

When companies have some revenue streams that offer limited flexibility to influence prices (e.g., when the market is highly competitive, or when reimbursement is based on a fixed price) and other revenue streams that offer more leverage over prices (e.g., highly concentrated markets, or when reimbursement is cost-plus), managers are likely to resort to cost shifting to enhance financial performance. Because hospitals have multiple types of revenue streams that fall into these categories and hospital data include cost report information, this setting provides an opportunity to document cost shifting in response to cost-plus government contracts. For example, Eldenburg & Kallapur (1997) examine a setting where hospitals faced a change in reimbursement from cost-based to flat-fee per diagnosis for inpatients, while outpatient reimbursement remained cost based. Using data from 68 Washington State hospitals over the period 1977–1991 to construct cost functions, the authors find that hospitals use strategic cost allocations to shift costs from inpatient services to outpatient services, and that the patient-mix also shifted toward outpatients (Fig. 2, Panel A, Link 6). In a follow-up study, Eldenburg & Kallapur (2000) find that the magnitude of the allocation changes from inpatient to outpatient operations was large enough to give the impression of cost containment within inpatient operations (Fig. 2, Panel A, Link 7). Thus, managers were able to increase their slack without achieving real increases in efficiency.

### 3.1.3. Benchmarks and Cost Containment

Financial accounting research has extensively focused on the economic consequences of financial disclosures,

such as cost of capital (Richardson & Welker, 2001) and stock prices (Gigler & Hemmer, 1998). Researchers in management accounting have extended the study of disclosure consequences to internal financial and non-financial accounting information. For example, Evans et al. (2001) examine one hospital's attempts to reduce length of stay as a cost containment measure. The hospital began profiling the average length of stay for each physician with the expectation that length of stay would be reduced and costs would be contained. The findings suggest that length of stay did drop, but overall costs did not change because physicians increased patient procedures per day (Fig. 2, Panel A, Links 8 and 9). Another study that examines the effects of benchmarking is by Eldenburg (1994) in which an analytical model is developed to show that providing physicians with finer sets of cost information should increase the probability that overtreatment behavior by physicians will be detected as the quantity of services per patient increases. This benchmarking information should then also lead to peer pressure to reduce treatment costs. The empirical results suggest that hospitals providing benchmarking information do exhibit lower average charges (Fig. 2, Panel A, Link 8).

Evans et al. (1997) extend this literature to the public dissemination of financial and nonfinancial information. Examining performance measures in a sample of Pennsylvania hospitals before and after a new state regulation requiring information disclosure, the authors find that hospitals performing poorly on patient quality of care (mortality outcomes) made significant improvement in their outcomes, especially those hospitals in competitive environments and those that ranked higher in financial condition during the year of disclosure (Fig. 1, Panel A, Link 9).

## 3.2. Contracting, Performance Measure, and Compensation

The following two sections discuss agency theory research about contracting, performance measurement, and compensation in two different research settings: in hospitals and in physician and managed care organizations.

### 3.2.1. Contracting and Performance Measurement in Hospitals

Several empirical researchers in managerial accounting have used data from the health care sector to examine contracting issues. Three characteristics of the health care sector make it an excellent setting in which to examine contracting and performance measurement issues. First, several countries have experienced changes in reimbursement from cost-plus to

fixed price, providing a natural experiment through which researchers can examine firm responses to regulatory changes. Second, for-profit, government, and nonprofit governance structures provide variation in stakeholders, objective functions, and agency conflicts. Third, a broad cross-section of contracts exists with stakeholders, such as physician firms, insurance companies, and individuals, who differ in their objective functions and ability to bear risk. Fig. 2, Panel B, summarizes the links that have been explored in this area of literature.

The changes in regulation and their implications for contracting and performance measurement have been explored by accounting researchers, especially using data from the U.S., where prior to 1983, hospitals with costs higher than the national average were protected from losing their financial viability because reimbursement was cost based. After 1983, however, each hospital received reimbursement for their Medicare patients based on the national average cost for that service. Thus, after 1983, hospitals with higher costs than the national average lost money, whereas those with lower costs were able to profit. Lambert & Larcker (1995) use an agency framework to examine whether the use of bonus-based compensation contracts increased in response to this increase in risk in the hospitals' operating environments. The authors propose that after 1983, inefficient hospitals would have more high-powered compensation contracts for their administrators, that is, include larger bonuses as a percentage of base salary.

Lambert & Larcker (1995) test their predictions using proprietary data from a hospital compensation survey from 1,078 hospitals for the year 1986. The authors conduct a comprehensive measure of hospital efficiency using a nonparametric frontier production cost function. This technique estimates the average production efficiency, and then assesses the level of inefficiency for each hospital by comparing it to the mean efficiency. The authors conduct statistical tests using a cross-sectional latent variable regression model, which explicitly recognizes the imperfections in the measurement of constructs from survey questions. Their results show that hospitals that were more inefficient prior to 1983 tended to use bonus-based compensation contracts after 1983 to a greater extent than did other hospitals, consistent with their hypothesis (Fig. 2, Panel B, Link 1).

Regarding ownership differences, prior literature in economics has extensively discussed the differences in objective functions of nonprofit and for-profit organizations (Arrow, 1963; Dranove, 1988; Fama & Jensen, 1983; Hansmann, 1996; Hoerger, 1991; Newhouse, 1970; Pauly & Redisch, 1973). Drawing on this

literature, Lambert & Larcker (1995) argue that for-profit hospitals place more importance on profits in their objective functions and hence would be more likely to use bonus contracts. Their results suggest that there are differences in performance measurement and compensation contracts in nonprofit hospitals versus for-profit hospitals (Fig. 2, Panel B, Links 2 and 3). Contracts in for-profit hospitals include a greater weight on bonus, and the bonus is positively associated with hospital complexity. They also find that hospitals are less likely to use bonuses when boards of directors and state regulatory bodies closely monitor activities, as in the case of government hospitals (Fig. 2, Panel B, Link 3). Their results extend the agency theory notion to nonprofit hospitals and show that while nonprofits also use incentives to align interests of the managers and the firm, these incentives are more muted compared to for-profit hospitals. Their results also suggest that government hospitals are more likely to use monitoring as a substitute for incentive compensation.

Two additional studies that provide a comprehensive treatment of the differences between nonprofit and for-profit hospitals include Roomkin & Weisbrod (1999) and Brickley & Van Horn (2002). Roomkin & Weisbrod (1999) examine the differences between nonprofit and for-profit hospitals in their use of bonus-based performance contracts. The authors discuss four factors that are likely to drive differences in compensation structure (base salary versus bonus) in for-profit and nonprofit hospitals. These include: (1) differences in objective functions, (2) the type of work environment that managers face in terms of the demands placed on them, (3) differences in the quality of the manager in terms of human capital, and (4) differential responsibilities.

Drawing on this literature, Roomkin & Weisbrod (1999) argue that nonprofit objective functions are likely to include provision of public goods such as basic research, community services, and charity care, whereas for-profit hospitals primarily focus on profit maximization. To the extent these nonfinancial objectives are poorly measured, nonprofits are less likely to use performance-based bonus contracts for their executives. However, if nonprofits have objective functions that are similar to for-profits, then they would use bonus contracts to a greater extent.

To rule out other factors that may drive differences in performance-based compensation contracts (work environment, quality, and job differentials), the authors use a job evaluation model developed by Hay Consultants and control for differences in job complexity. The authors use data from the 1992 Hospital Compensation Survey conducted by Hay Management

Associates, including data from 1,268 hospitals in the U.S. After controlling for specialty hospitals, size, and location, the authors find that job complexity is significantly higher for nonprofit CEOs (Fig. 2, Panel B, Link 4). In addition, they find that total CEO and COO compensation is significantly higher in for-profit hospitals, even after controlling for job demands, size, and location (Fig. 2, Panel B, Link 2). They also find differences in the composition of total compensation; for-profits pay higher bonuses, whereas base pay is higher in nonprofits (Fig. 2, Panel B, Link 3). The authors conclude that these differences arise because of variation in the objective functions of the two ownership types. Nonprofits pursue objectives other than profit maximization. Measuring progress toward these types of performance objectives is difficult, making bonus determination problematic.

Extending this literature, Brickley & Van Horn (2002) examine the factors driving turnover and compensation of CEOs in nonprofit hospitals. They agree with Roomkin & Weisbrod (1999) that objective functions of nonprofit organizations could include altruistic activities, in which case, the pay-performance sensitivity in nonprofits would be less emphasized compared to for-profit organizations. They also examine the relation between CEO turnover and financial performance. The results from a logistic regression model suggest that in both for-profit and nonprofit hospitals, the probability of CEO turnover increases with poorer performance (Fig. 2, Panel B, Link 5), and the relation is stronger in nonprofit hospitals compared to for-profit hospitals (Fig. 2, Panel B, Link 6). Next, Brickley & Van Horn incorporate altruistic performance measures to determine their effects and find that after controlling for financial performance, none of the altruism variables are statistically significant predictors of turnover. They also find that contemporaneous return on assets (ROA) is positively associated with CEO compensation, suggesting that nonprofit boards reward their CEOs for financial performance (Fig. 2, Panel B, Link 1). The authors conclude that CEOs of nonprofit and for-profit hospitals face similar incentives to focus on financial performance.

While Roomkin & Weisbrod (1999) and Brickley & Van Horn (2002) focus on the differences between for-profit and nonprofit organizations, Eldenburg & Krishnan (2003) focus on differences in CEO compensation and the resulting implications for organizational performance within two different types of nonprofit organizations, that is, public nonprofit hospitals and private nonprofits. The public hospitals they examine (known as district hospitals) have governance structures very different from the private

nonprofit hospitals. First, district hospitals are governed by publicly elected boards of directors, while nonprofit boards are appointed. Second, district hospital board meetings are public, while nonprofit board meetings are private. Third, district hospitals are granted authority to levy property taxes and to use these funds for operations. District board members face pressure in public meetings and face the risk of not being reelected. During elections, the most common political platform for board candidates is cost containment at the hospital and reducing administrative costs is often a primary focus. Based on these governance differences, the authors predict that political pressures lead to lower compensation for district hospital CEOs compared to other similar private nonprofit hospitals. In addition, district boards are likely to perceive micromanagement as a substitute for incentive contracting. When district hospital CEOs are paid less than CEOs in comparable privately owned nonprofit hospitals, selection and incentive problems arise that hamper firm performance, especially when the environment becomes more challenging.

Empirical results indicate that district hospital CEOs indeed receive lower compensation than nonprofit CEOs (Fig. 2, Panel B, Link 2). Further, operating margins are significantly lower in district hospitals than in the matched sample of nonprofit hospitals (Fig. 2, Panel B, Link 7). Longitudinal analysis suggests that district hospital-operating margins and excess income margins deteriorated to a greater extent compared to nonprofit hospitals after 1989, when the operating environment became more risky as a result of changes in reimbursement mechanisms. The authors rule out a number of alternative explanations for these differences in performance such as selection, service-mix, and quality and charity care and finally attribute the results to differences in governance.

Research in accounting has also used the agency framework to analyze the effects of ownership on the uses of accounting information for contracting and monitoring. An example of a study in this area is Eldenburg & Krishnan (2005) who predict that for-profit and nongovernmental nonprofit organizations have governance structures that increase the likelihood of their using accounting-based performance measures in managerial contracts (Fig. 2, Panel B, Links 8 and 9). Accounting information thus plays a complementary (or supporting) role to incentive contracting and managerial pay decisions in for-profit and nongovernmental nonprofit organizations.

Government organizations, on the other hand, receive tax subsidization and report to other agencies or a county board of supervisors or city council. Because

these hospitals are considered government agencies, constraints exist on the use of high-powered incentives for their managers. Therefore, government organizations are less likely to use higher levels of pay or pay-for-performance contracts to motivate performance. Accordingly, managers are less concerned about performance, but more concerned about justifying cost overruns and budget requests to supporting agencies. These managers then invest in elaborate accounting systems to maintain legitimacy with stakeholders. Empirical results are consistent with the authors' predictions.

Another topic that has been examined by accounting researchers is earnings management behavior by nonprofit hospitals. It is well documented that managers of for-profit firms have incentives to smooth earnings, show steadily increasing earning patterns, and to manage earnings to avoid small losses (Burgstahler & Dichev, 1997). Leone & Van Horn (2005) argue that nonprofit managers also have incentives to manage earnings to avoid losses. However, the primary difference in nonprofit versus for-profit hospitals is that while the for-profit hospitals have incentives to show a constant pattern of growth (which is rewarded by the stock market), nonprofit hospitals have incentives to manage earnings around a fixed point above zero. This behavior is driven by nonprofit hospitals' objective functions, which include a long-run zero-profit constraint that allows them to spend available resources to pursue social objectives such as charity care without compromising financial solvency. Leone & Van Horn (2005) empirically test their predictions using a sample of 1,204 hospitals. Their results support their predictions that nonprofits with earnings above zero manage earnings toward zero and nonprofits with earnings just below zero manage earnings to just above zero to avoid showing losses (Fig. 2, Panel B, Link 10).

### 3.2.2. Contracting and Performance Measurement in Physician and Managed Care Organizations

Accounting research has also explored contracting and performance measurement issues in managed care organizations. This is an interesting area for managerial accountants because contracts between insurers/health maintenance organizations (HMOs) and health care providers (physicians and hospitals) pose agency problems. The potential for agency problems between payers (such as insurance companies and HMOs) and providers arises because the risk-averse physician (the agent) has private information about the patient's severity of illness and the type of care needed, which the payer (the principal)

cannot observe. Other things being equal, the risk-averse physician prefers to provide more services to reduce risk, while the payer prefers that the provider exert effort to provide cost-effective care. Two primary types of contracts are prevalent between HMOs and physicians: *fee-for-service*, whereby the HMO pays physicians for every service that they perform, and, *capitation*, whereby the HMO pays the physician a fixed monthly fee for each enrollee regardless of the extent of services provided. Prior research shows that physicians paid based on fee-for-service tend to overprovide services, but the quality of care provided is higher (e.g. Feldman & Sloan, 1988). However, in capitation plans, each time the physician has a patient encounter, additional costs but no additional revenues are generated, reducing incentives to overprovide services.

Leone (2002) examines contracts between HMOs and primary care physicians (PCPs) to explore whether HMOs design contracts to minimize agency costs. He tests three predictions. First, HMOs that are organized as independent practice association (IPA) models where HMOs contract with individual physicians are more likely to use fee-for-service contracts compared to HMOs organized as group or network models that contract with large groups of physicians. The logic is that less risk diversification occurs when HMOs contract with individual physicians, compared to contracting with a larger group of physicians (Fig. 2, Panel B, Link 11). Second, national HMOs face greater monitoring costs compared to local HMOs and are hence more likely to use capitation contracts (Fig. 2, Panel B, Link 3). Finally, national HMOs that are nonprofit are more likely to use capitation contracts because quality is probably a part of their objective functions. Using data from 251 HMOs, Leone (2002) finds support for all the three hypotheses. He also finds that HMOs with a greater proportion of Medicare patients are more likely to contract on a capitation basis.

Agency theory suggests that as the noise in a performance measure increases, less weight is placed on it to reduce the agent's risk. When uncertainty in the business environment increases, performance measures become noisier and therefore measure performance less accurately for incentive purposes. Evans et al. (2005) use data from compensation contracts between HMOs and physicians to explore the effects of uncertainty and risk on compensation contracts. First they develop an analytical model predicting that physicians facing less task uncertainty (PCPs) bear more cost risk (more capitated contracts) than specialists who face more uncertainty in the costs of treating their patients (Fig. 2, Panel B, Link 12).

The authors use data from a national survey of physicians and use a measure of each state's malpractice liability provisions to proxy for environmental risk. They find that primary care physician reimbursement contracts include more capitation than contracts for specialists because of the greater exogenous risk faced by specialists. In addition, when the legal environment offers more protection from malpractice suits, capitated contracts are used more frequently to shift cost risk to physicians. The empirical results are consistent with agency theory, particularly moral hazard arguments.

Ittner et al. (2003) also examine the use of performance-based compensation contracts for physicians in medical group practices. They examine two types of medical group practices, that is, physician-owned practices, and those owned by other outside organizations, such as health systems, hospitals, and HMOs. They hypothesize that the extent of performance-based pay will be negatively associated with the percentage of group revenue received from capitation plans because capitation plans reduce the incentive to overprovide services, which reduces the need for performance-based pay. They also hypothesize that consistent with the informativeness principle in Holmstrom (1979), physician practices will use performance-based compensation to a lesser extent when standard clinical productivity measures are less informative (Fig. 2, Panel B, Link 13). In addition, Ittner et al. (2003) posit that performance-based pay will be inversely related to the ability of members or other parties to directly monitor patients because when direct monitoring is possible, there is less need to use incentive compensation to motivate agents' behaviors. Their final hypothesis is that use of common compensation plans (such as the same mix of salary or bonus, or arrangements using equal shares) is negatively associated with the degree of intrafirm variation in monitoring ability and performance measure informativeness. Using a sample of 16,659 individual physicians in 778 practices, the empirical results are consistent with their predictions.

### 3.3. Summary of Agency Research in Health Care

In Fig. 2, Panels A and B summarize the agency research in health care. Although it appears that the research exploring managerial contracts and performance evaluation is large, there is scope for studies that tie together the impact of governance and ownership on contracting. Agency theory provides insights into the complex problems that arise while designing compensation contracts, such as determining the relative weights to place performance measures. While rigorous analytical models exist to help

explain the characteristics that determine the performance-measures' weights in compensation contracts (e.g., Banker & Datar, 1989; Datar et al., 2001; Feltham & Xie, 1994; Holmstrom, 1979), empirical research has not fully exploited these models. For example, the rich set of performance measures that are available in the health care sector could be used by researchers to examine factors that drive noise in performance measures, and the relations among measures.

## 4. Industrial Economics Perspective

Industrial economics concerns the determinants and impacts of market structure on market conduct and performance (Schmalensee, 1989). Market *structure* encompasses competition intensity, regulation, product differentiation, barriers to entry, cost structures, and vertical and horizontal integration. Market *conduct* deals with the behavior of firms with respect to pricing, product strategy, research and innovation, advertising, and legal tactics. *Performance* includes firm and market performance, total welfare, and allocative efficiency. Figure 3 summarizes the links that have been explored using the industrial economics perspective.

Health care settings provide a good context for examining firm behavior from an industrial economics perspective for several reasons, including (1) the simultaneous presence of regulated and unregulated product lines; (2) markets that include firms with a variety of ownership types; and (3) a significant presence of merger and consolidation activity. An example is Krishnan (2005), who examines the relation between regulation, competition intensity, and demand for accounting information. While accounting textbooks and practitioner articles predict a simple linear relation between competition and firm decisions such as investments in accounting information, empirical results in this area have been mixed because prior studies neglected to account for the role of regulation.

Krishnan (2005) examines whether the *type* of competition (i.e., the parameters that firms compete on such as price, quality, or product variety) influences the association between the *intensity* of competition (i.e., number of firms in a market and their relative sizes) and demand for accounting information. Her empirical results show that when regulation is cost-based, firms tend to compete on nonprice attributes such as quality, whereas when regulation is based on fixed price, firms compete on price. She also finds a significantly positive association between the intensity of competition and the demand for accounting information during the price-based competition period and suggests that it arises from hospitals' incentives to invest in superior accounting information to lower costs.

However, she finds no association between competition intensity and the demand for accounting information during cost-plus regulation when competition was based on quality (Fig. 3, Link 1). These results contribute to our understanding of the reasons for the mixed evidence in prior literature on the relation between competition and the demand for accounting information. In addition, Krishnan (2005) finds that regulation has an independent effect on the demand for accounting information (Fig. 3, Link 2). Hill (2000) also finds that regulation influences hospitals' adoption of more refined costing systems.

Related to hospital strategies to influence revenue drivers, Krishnan (2001) empirically examines the effects of hospital mergers on prices and quantities at the individual diagnosis and total market welfare levels. The results from her study demonstrate that not only do merging hospitals improve their revenue positions relative to nonmerging hospitals, but they improve their margins as well, suggesting that hospital mergers are often driven by hospitals' motives to exercise market power (Fig. 3, Link 3). Krishnan & Krishnan (2003) extend these results to the hospital level and show that the effects of market power in individual services also translate to higher revenue for the hospital as a whole, but do not reduce costs (Fig. 3, Link 4). Research by Krishnan et al. (2004) has also examined the influence of competition on hospital strategies related to another important revenue driver, that is, product-mix using the structure-conduct-performance framework and find that hospitals use mergers as a strategic tool to reconfigure their product-mix toward high-profit products (Fig. 3, Links 5 and 6).

Other studies that explore the link between competition and accounting systems include Lambert & Larcker (1995) who use competition as a control variable in their examination of the determinants of hospital bonus contracts. Their results suggest that competition promotes hospital efficiency, that is, encourages discipline among hospital administrators (Fig. 1, Link 7). Similarly, when Pizzini (2005) examines the relation between characteristics of managers' beliefs about the relevance and usefulness of cost data and actual financial performance, she uses competition as a control variable and finds a negative relation between competition and administrative costs. Similar results were found by Carter et al. (1997): administrative expenses decline in areas where competition is more acute. Carter et al. (1997) also find that ownership influences efficiency and that administrative expenses are greater in for-profit hospitals than in nonprofit hospitals (Fig. 3, Link 8).

In addition to the previous studies that investigate regulation related to the operating revenue and

operating cost streams, research has also examined the influence of regulation on firms' capital expenditures. Lynch (2003) finds that hospitals decrease the use of long-term debt after a change in regulation for capital expenditures from cost-plus to a flat fee per patient (Fig. 3, Link 9). She also finds that the decreases are positively associated with hospitals' percentage of business from the fixed-price capital streams. Her results suggest that high-cost hospitals are more likely to decrease long-term debt compared to low-cost hospitals.

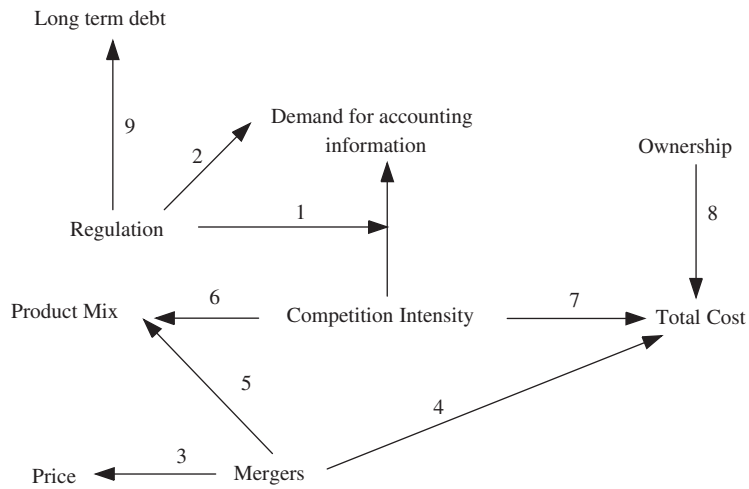
Figure 3 summarizes the paths that have been explored by existing research. As can be seen, the graph is sparse and a large number of relations are yet to be explored, providing many opportunities for future research. There are rich insights that can be drawn from industrial economics and applied to the realm of accounting. One example of such a theory is Shleifer (1985), who describes the current regulatory environment in the US hospital industry as using "yardstick competition" in simultaneous regulation of similar firms. This type of regulation is present when the surplus of a firm depends on its performance compared to a shadow firm, where this shadow firm represents the average choice of other firms in the market. A firm will profit when its cost is lower than the shadow firm's cost, and vice versa. Shleifer (1985) shows that yardstick competition outperforms cost-plus regulation in terms of economic efficiency because the regulator does not need to monitor the firm's expenditures on cost reduction: the firm has incentives to reduce costs regardless of whether it is monitored. However, yardstick competition depends on reported accounting costs being a true representation of costs, and hence provides incentives for firms to collude and report strategically to increase the shadow firm's costs. Management accounting research could explore the implications of strategic reporting both for firm profitability and public policy.

There are also only a few studies examining revenue drivers such as price and product-mix, how hospitals may influence these drivers via strategic behaviors, and the role of accounting information in such decision making. Similarly, research could explore changes in hospital accounting systems in response to changes in regulation and competition. There have been a large number of hospital mergers and acquisitions, and the evolution and design of accounting systems in merged firms is also an area for future research.

## 5. Conclusions and Opportunities for Future Research

Because of the rich multiproduct production functions, the existence of a large variety of contracts with physicians, employees, and insurers, and the presence of organizations of different ownership types, the





*Prior Research: Legend to Links*

1. Krishnan(2005)
2. Hill (2000), Krishnan (2005)
3. Krishnan (2001)
4. Krishnan & Krishnan (2003)
5. Krishnan *et al* (2004)
6. Krishnan *et al* (2004)
7. Lambert & Larcker (1995), Carter *et al* (1997), Pizzini (2005)
8. Carter *et al* (1997)
9. Lynch (2003)

*Map Notation*

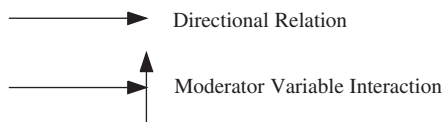


Figure 3. Industrial economics perspective.

health care industry is an excellent setting in which to examine several questions of interest to accounting researchers. In the previous sections, several fruitful areas have already been suggested for future research within each theoretical perspective. Next, we focus on three additional areas that future research can explore. These include the implications for accountants and accounting and control systems of (1) the role of technology in altering production functions and access to information; (2) outsourcing of hospital services; and (3) public policy changes such as government support for health care.

*5.1. Role of Technology*

To reduce uncertainties in diagnosis and treatment decisions, the health care industry has become quite technology intensive. Information technologies that help physicians in choosing appropriate treatment options decrease treatment risk and can also reduce treatment cost. In addition, because physicians often have incentives to overprovide care to reduce their outcome risk (defensive medicine), hospital technology that helps trace costs and revenues accurately enables hospitals to develop performance measures that are less noisy and that can be used in physician

and managerial contracts to align incentives of the various parties. Consistent with this, Borzekowski (2002) uses a proprietary 8-year panel dataset spanning the period 1987–1994 for 3,000 hospitals with more than 100 beds, and finds that both financial/administrative and clinical IT systems are associated with declining hospital-operating costs 3 and 5 years after adoption. Borzekowski (2002) mentions that an interesting future research area is the role of IT in altering production functions of hospitals, its impact on marginal factor returns and the mix of hospital inputs, capital intensity, and cost behavior. An additional area for future research is the impact of technology on performance measurement and contracting. For example, do hospitals with superior technology incorporate less noisy performance measures in contracts? Does the mix of financial and non-financial measures used in managerial contracts vary for more technology-intensive versus less technology-intensive hospitals?

### 5.2. Outsourcing of Hospital Services and Its Implications for Accounting

Hospitals are increasingly outsourcing administrative, general, and medical operations to external suppliers. A survey of 234 hospitals conducted by the *Hospital and Health Networks* reveals that all of the responding hospitals acknowledged that they were outsourcing several hospital functions. The percentage of hospitals outsourcing business support function ranged from 80.6 percent for waste disposal to 0.6 percent for human resource recruitment and employee training. In the clinical functions, 45 percent of hospitals responded that they were outsourcing their emergency medicine services, while 4 percent were outsourcing critical care (*Hospital and Health Networks*, 2001).

Extant economic research suggests that several factors influence outsourcing decisions such as transaction costs and asset specificity, task uncertainty, and measurement difficulties (Coles & Hesterly, 1998). Future research can examine these issues from an accounting, contracting, and monitoring perspective. For example, accounting research could explore differences in performance measures that are used with managers when a service is kept in-house versus outsourced to a vendor firm.

### 5.3. Public Policy Changes and their Implications for Accounting

In 1998, Taiwan implemented a global budgeting system for dental care and expanded that global budgeting system to hospitals in 2002. The global budgeting system sets a cap on hospital expenditures

by the government (the largest and almost exclusive insurer) and allocates funds across hospitals while keeping expenditures at or below the budget cap. In the last several years, a number of Taiwanese hospitals have struggled to remain financially viable. Accounting researchers could focus on hospital characteristics such as size and ownership, and accounting and management strategies that differentiate the successful from the failing hospitals.

Currently, regulators are concerned that nonprofit hospitals do not provide enough public benefit to compensate for their tax-exempt status. Some states have established regulations requiring minimum levels of community benefits and have taken hospitals to court to eliminate their tax-exempt status (Ponton, 2005; Taylor, 2004). In addition, the collections and pricing practices of nonprofit hospitals are coming under national scrutiny (Lagnado, 2004). Researchers need to continue to analyze the effects of differences in ownership and governance on the costs and benefits of these differences.

Over the last several years, hospitals have focused on their revenue cycles to increase revenues from denied claims, bad debt, and discounted prices. Analysis of the use of accounting systems and accounting information to improve operations through increased revenue generation has received limited attention in accounting research. A study in this area would increase academics' understanding of the links between accounting system use and performance improvements, and also aid practitioners in improving hospital performance.

From a public policy perspective, research about the incentives and effectiveness of various types of medical plans could guide policy. In addition, there is very little research on the total economic costs that arise from the large numbers of uninsured that exist in many societies. These costs arise from several factors. In the U.S., people are reticent to change jobs because they may lose health care benefits and may perform poorly because they feel "stuck" in a job that they deem as a poor fit. In addition, some parents do not work so that their children's health care costs are covered by public programs; private insurers refuse to provide coverage for certain types of maladies. Similarly, people on disability cannot work because they cannot get healthcare coverage through employers if they have preexisting conditions, so they remain on disability. Further, patients wait until they are extremely ill before seeking treatment because they have no insurance. Finally, because emergency departments must treat patients, regardless of their ability to pay, large amounts of care are provided with these expensive resources rather than in doctors' offices where patients may be turned away because they lack

insurance. Medical researchers have estimated that over half of bankruptcies are related to unexpected medical bills (Pryor, 2005). Accounting researchers could shed light on the total cost of the lack of universal coverage to healthcare organizations and their

employers and suggest potential solutions for the problem such as better performance measurement and identification of cost drivers. There are a rich variety of potential accounting-related policy questions available to researchers in the health care sector.

## Appendix A

Table A1. Summary of Economics-Based Research in Health Care.

Topic/Authors	Dependent variable(s)	Independent variable(s)	Data	Results
<i>Panel A. Production economics perspective</i>				
<i>Cost structure and behavior</i>				
Noreen & Soderstrom (1994)	Cost	Volume (activities)	100 hospitals in Washington State	Overhead cost pools exhibit statistically and economically significant returns to scale
Noreen & Soderstrom (1997)	Cost	Volume (activities)	Department-level data from 100 hospitals in Washington	Overhead costs are not strictly proportional to activity; only 30 percent of departmental costs are variable; costs change more readily with increases in activity than decreases
Maher & Marais (1998)	Cost	Activity	49 outpatient surgery cases from a teaching hospital	The assumption of linearity of costs under ABC yields poor cost estimates when resources are joint and indivisible
Kallapur & Eldenburg (2005)	Cost	Volume and dummy variable for after 1983 (increased business risk)	831 departments in 59 Washington State hospitals from 1977 to 1994	The proportion of variable costs increases when the business environment becomes more risky
<i>Cost drivers</i>				
Balakrishnan et al. (1996)	Cost	Inpatient days and various department-specific activities	1986 data from 165 acute care Canadian hospitals	Department-specific activities explain more variation in cost than aggregate measures; complexity also explains about 45 percent of hospital costs
McArthur & Stanahan (1998)	Simultaneous estimation of overhead cost, number of services, intensity of services	Geographic region, ownership, patient-mix, malpractice insurance, state regulation	5,352 US hospitals, data from HCFA	Hospital complexity and intensity of services positively drives overhead costs
Balakrishnan & Soderstrom (2000)	Probability of C-section	Congestion, patient characteristics, hospital characteristics, payor characteristics	225,473 maternity admissions from 30 Washington hospitals	Congestion increases C-section rates for at-risk patients

Table A1. (continued).

Topic/Authors	Dependent variable(s)	Independent variable(s)	Data	Results
Panel B. Agency perspective				
<i>Managerial incentives and informational biasing</i>				
Budget biasing				
Blanchard et al. (1986)	Change in hospital total budgeted cost	Change in budgeted volume when (1) the variable cost ratio (vcr) = 0.20 and (2) vcr = 0.20 and volume is increasing	116 hospitals in Washington State	Budget volume forecasts are biased upwards when volume increases are expected and unit variable costs are inflated, and vice versa when volume decreases are anticipated
Eldenburg & Soderstrom (1996)	Forecast error for contractual adjustments	Regulatory period dummy variables and controls	108 Washington State hospitals	Budget forecasts were more accurate after hospital rate-setting regulation was no longer in force
Cost shifting				
Soderstrom (1993)	(1) Admission errors (2) Reporting errors	Long-run solvency, liquidity, personnel cost, other costs, utilization; separate estimations by ownership	100 largest hospitals in California, data from OSHPD	Government hospitals in poor financial condition and/or higher marginal costs have more admission and reporting errors than hospitals in good financial condition and/or lower marginal costs
Eldenburg & Kallapur (1997)	Cost	Quantity (hospital charges) and a dummy for the period after 1983	68 Washington State hospitals	Patient-mix and costs shifted from inpatient to outpatient services after the 1983 change in Medicare reimbursement to a flat-fee for inpatients while outpatient reimbursement remained cost plus
Eldenburg & Kallapur (2000)	Inpatient dept. level full costs	Inpatient volumes and dummy for after 1983	68 Washington State hospitals	Cost allocation changes were large enough so that inpatient full costs appeared to be contained; however inpatient direct costs increased after 1983
<i>Benchmarks and cost containment</i>				
Eldenburg (1994)	Hospital average charge per DRG	Level of cost information provided and control variables	87 Washington State hospitals	When physicians receive information about their own cases and some average as a benchmark, they use fewer resources, on average

Evans et al. (1997)	(1) Change in mortality residual, change in morbidity residual, (2) change in LOS, change in cost, (3) change in market share	(1) Mortality residual; morbidity residual; dummies for poor mortality, poor morbidity, poor operating margins; economic impact of DRG, controls, (2) average LOS, average cost, dummies for poor LOS, poor cost, poor mortality, morbidity, controls, (3) relative ranking for mortality, morbidity, controls	5,024 service-level observations for 134 Pennsylvania hospitals	Hospitals that performed poorly on quality made significant improvements to mortality and morbidity; LOS also reduced; improvements were more marked for services in more competitive environments
<i>Contracting, performance measurement, and compensation</i>				
Lambert & Larcker (1995)	Bonus as percentage of salary to top administrator, and top five administrators	Hospital inefficiency prior to 1983, profit status, sensitivity, competition, other monitoring devices	Survey of 1,078 hospitals	Hospital inefficiency prior to 1983, for-profit hospitals, complexity, positively associated with use of bonus contracts; monitoring by regulatory agencies negatively associated
Roomkin & Weisbrod (1999)	(1) Job complexity (2) Salary, bonus, and total compensation	(1) Nonprofit dummy, hospital specialty, size, location (2) Job complexity, hospital specialty, size, location, profit status	1,268 hospitals from the Hay survey	(1) Job complexity of CEO higher in nonprofits; (2a) Total CEO and COO compensation is significantly higher in for-profit hospitals; (2b) Composition of total compensation is different among nonprofits and for-profits; nonprofits pay higher base pay and lower bonus, while for-profits pay higher bonus and lower base pay
Brickley & Van Horn (2002)	(1) CEO turnover (2) CEO compensation	ROA, size, geographic region, year	2,134 nonprofit hospitals from the IRS 990 survey	(1) Probability of CEO turnover increases with poor performance, (2) association between CEO turnover and poor performance is stronger in nonprofit hospitals, (3) positive association between contemporaneous ROA and CEO compensation

Table A1. (continued).

Topic/Authors	Dependent variable(s)	Independent variable(s)	Data	Results
Eldenburg & Krishnan (2003)	(1) CEO compensation (2) Performance (Operating margins, excess income margins, change in operating margins and excess income margins)	(1) District hospital dummy, size, LOS, services (2) District hospital dummy	(1) 14 district hospitals and 30 nonprofit hospitals from a survey and IRS 990; (2) 1,800 hospital-year observations; (3) Demographic data from the Area Resource File	(1) District hospital CEOs receive lower compensation than nonprofit CEOs; (2) District performance deteriorates after the change in reimbursement environment, which imposed more risk on the hospitals
Eldenburg & Krishnan (2005)	(1) Change in managerial pay; (2) Demand for accounting information	(1) Change in accounting profits, ownership type, size, patient-mix, competition; (2) Pay-performance sensitivity, ownership type, size, patient-mix, competition	1,466 hospital-year observations from California hospitals, from the OSHPD data	(1) Positive association between change in managerial pay and change in accounting profits for for-profit and nonprofit hospitals, but not for district and government hospitals; (2) Positive association between demand for accounting information and managerial pay in nonprofit and for-profit hospitals
Leone & Van Horn (2005)	(1) Discretionary accruals (2) Histograms of performance and normality around zero	Earnings before discretionary accruals, prior period income, prior period discretionary accruals	8,179 nonprofit US hospitals for the period 1990–2002, from the Van Kampen Merritt database	(1) Nonprofit managers manage earnings to meet a zero-profit goal; (2) Distribution of earnings surrounding zero is nonnormal just below zero
<i>Contracting in physician and managed care firms</i>				
Leone (2002)	Likelihood that an HMO contracts with physicians on a fee-for-service (FFS) basis	HMO part of national chain, profit status, Medicare enrollees, IPA model HMO, income per capita in the region, number of MDs per capita, beds per capita, market power, HMO age, HMO enrollees, location	251 HMOs from InterStudy Competitive Edge HMO directory	IPA model HMOs are more likely to contract on a FFS basis; national for-profit HMOs and HMOs that contract for Medicare enrollment are more likely to contract on a capitated basis

Ittner et al. (2003)	(1) Performance-based compensation as a percentage of total pay (2) Intrafirm variation in the use of salary and bonus (3) Team-based versus individual-based compensation	Goal congruence (capitation), informativeness (staffing, physician experience, FTEs devoted to nonclinical work), monitoring ability (size, specialty, similarity, use of professional management companies, physician executive, outside ownership)	Survey of 16,659 physicians from 778 practices	Positive association between informativeness of measure and use in compensation; mutual monitoring substitutes for performance-based compensation in member-owned firms; negative association between performance-based pay when greater proportion of revenue is from capitation
Evans et al. (2005)	Percentage of revenue paid on capitated basis	Malpractice cost, physician specialty, practice guidelines, state malpractice provisions	Survey of 37,238 physicians, conducted by Gallup	PCPs bear more cost risk than specialists because physicians face less exogenous risk; as the association between task uncertainty and legal liability increases, physicians face less cost risk
Panel C. Industrial economics perspective Krishnan (2001)	(1) Service-level Price (2) Quantity of services	Merging versus nonmerging hospitals, competition, size, patient-mix, LOS	110 hospitals in Ohio for 23 services (1,620 observations), 108 California hospitals (1,597 observations); data from Ohio Department of Health, and OSHPD	Service-level prices increase in merging hospitals (market power); hospital-level revenues increase in merging hospitals; quantity supplied does not decrease
Krishnan & Krishnan (2003)	(1) Hospital revenues (2) Operating margin (3) Operating costs	Acquired hospitals versus nonacquired hospitals, size, LOS, patient-mix, competition	113 California hospitals (OSHPD)	Revenue per patient increases for acquired hospitals; operating margins increase for acquired hospitals; operating costs do not change
Krishnan et al. (2004)	Change in product-mix	Merging versus nonmerging hospitals	5,335 service-level observations from 105 nonprofit Ohio hospitals data from Healthcare Cost and Utilization Project (HCUP), and Ohio Department of Health	Merging hospitals increased market share of profitable services; merging hospitals did not decrease market share of unprofitable services



Table A1. (continued).

Topic/Authors	Dependent variable(s)	Independent variable(s)	Data	Results
Krishnan (2005)	Demand for accounting information	Intensity of competition, fixed price versus cost-plus regulation	1,578 hospital-year observations for California hospitals (OSHDP)	No association between intensity of compensation and demand for accounting information during cost-plus regulation; positive relation during fixed-price regulation
Lynch (2003)	Ratio of long-term debt to gross patient revenue	Ownership status, percentage of Medicare, change in capital expenditures, interest, occupancy rate, profitability, bankruptcy risk, asset value	2,511 hospital-year data from OSHDP	Hospitals decrease the use of long-term debt after Medicare change; decline is greater for high-cost hospitals

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# Accounting in an Interorganizational Setting

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**Abstract:** This chapter reviews the interorganizational accounting literature. There are two different types of interorganizational settings that have been covered within the literature: dyadic relationships between two collaborating companies and networks where a relationship is seen as embedded in a set of relationships. The emphasis on intensive and long-term relationships can be associated with a number of interorganizational accounting practices, such as open-book accounting, target costing, interorganizational cost management, value-chain accounting, integrated information systems, total cost of ownership, nonfinancial measurement, and informal control mechanisms. Published papers within the literature have applied a mixture of theoretical models, such as transaction cost economics, agency theory, actor network theory, and the industrial-network approach.

## 1. Introduction

There is an interesting similarity between “accounting” and “interorganizational setting.” Both are quite complex phenomena that have developed in a process where experience from companies in action has been combined with theoretical interpretations and normative models.

Accounting encompasses a rather complex set of techniques, methods, and rules that, together, constitute the practice applied by companies. This set of techniques, methods, and rules has evolved gradually over a long period of time in response to the practice of all those involved in using accountancy, and also through the application of some theoretical models. The experience that has led to the evolution has not only been gained within companies, but also in the interaction between individual companies and other organizations (such as other companies, banks, stock exchanges, and government bodies) with their specific interests. Accounting has also been highly influenced by legislation, where the broader society has tried to formulate the roles and the position of companies within a broader context. Finally, accounting has been affected by its role within the company, where it has been used to control and manage the company.

Alongside the growth of experience of those engaged in business, scientific theories and models have been developed addressing the way in which companies

function and work. On the whole, this theoretical development did not originate from specific accounting problems, but rather, it had its roots in general types of economic problems. Some of these have been on a more aggregated level, where, for example, one issue has been the need to influence or control the overall economic structure of societies. However, the resulting models have influenced developments in accounting practice because they have been valuable when formulating the logic when different accounting principles, techniques, and methods have been described, analyzed, and assessed in scientific studies. In turn, the logic constructions derived in this exercise have been used to help the companies to design accounting systems, and public bodies to design legal systems. Thus, accounting as it is applied today is the result of a mixture of companies’ experiences and normative advice and models originating from scientific studies.

The “interorganizational setting” too has arisen from a combination of experience and theoretical models. The actual setting—how companies relate to each other today—is a result of the experiences had by all companies and by other organizations that have had dealings with companies over the last few centuries. Over the years companies have tried out different ways to relate to each other. This has had two effects. One is that it has affected the world they are living in through the remaining structural effects

of earlier actions. The other is practice, in terms of the ways of interaction that have developed.

In addition to these, there are regulating bodies (e.g., antitrust authorities) who have been involved in trying to control how the interactions between companies develop; sometimes these bodies have intervened to alter the structure.

From a theoretical point of view, a number of models exist that have been developed to gain an understanding of how the interorganizational setting is functioning or how, in a normative way, it should be designed. The intervening bodies described earlier and the companies themselves have, at least occasionally, used such models to examine their likely course of action. Thus, both descriptive and normative models of interorganizational behavior can be found.

The above-mentioned complexities, arising from the mixed influences of practice and science, will affect our task, which is to try to analyze the connections between “accounting” and the “interorganizational setting” in a systematic manner. All the aspects identified are important, and we have chosen to deal with them one by one. We will use the results from empirical studies of the existing practice of interorganizational solutions as a starting point. This gives us a basis from which we can discuss different theoretical approaches that have been taken to model this practice. Given the interorganizational context described in these two dimensions, we can then discuss how the existing practice of accounting fits into the picture and the theoretical models used for the latter.

## 2. Interorganizational Setting—The Existing Practice

Companies and their way of relating to important counterparts seem to have changed during recent decades. At least, there are several indicators that a major change has taken place. In the most general way, the development can be characterized as a growing awareness and consciousness of how they interact with each other among companies of importance. One result is the greater variety in the ways they approach each other, and another is that some new forms of interaction have appeared. A typical way to depict these new structures is with the word “networks” (Castells, 2000; Ford et al., 2003; Håkansson, 1987; Powell, 1990). Two different indicators of this change are empirical descriptions in scientific studies and the development of special managerial tools.

A number of research studies have all come up with descriptions of a more organized interplay between companies than that existing previously. These investigations have covered diverse industries and different countries or regions. High tech areas, such as the biotechnology industry (Powell, 1998; Powell et al., 1996)

and the electronics industry (Laage-Hellman, 1997; Rogers & Larsen, 1984; Saxenian, 1991), have been examined, as have more production-oriented industries, such as the automotive industry (Von Corswant, 2003; Womack et al., 1990). Studies have included raw-material-based industries, such as the forest industry (Håkansson & Waluszewski, 2002; Henders, 1992; Waluszewski, 1990), and more service-oriented industries such as retailing (Anderson & Narus, 1990; Baraldi, 2003) and financial industries (Podolny, 1994). Furthermore, the above-listed studies also include all major geographical regions of the economic world—Asia, Australia, Europe, and US.

A second type of indicator is the popularity and use of specific managerial tools that are closely related to the development of the interorganizational setting of companies (Ford et al., 2003; Gadde and Håkansson, 2001). General methods include the just-in-time (JIT) method, where companies foster closer relationships with the aim of eliminating costly time in production chains, time-based management (TBM) where it is not just production, but also development schedules involving several companies that are affected, and total quality control (TQC), where the intention is to increase the total quality by applying the same standard to all different production stages, again involving several companies in the chain producing a product. Much more specific managerial tools have also been developed, especially within marketing and purchasing, including customer relationship management (CRM), supply chain models, and key account managers, all of which are intended to exploit new ways to relate to counterparts.

In summary, there are ample empirical observations indicating an important change in the interorganizational setting of companies. Within this development, including an increased use of network structures, two different patterns of change can be identified. One is the development of more extensive business relationships between companies buying and selling to or from each other, or cooperating in any other way. This kind of development relationship has probably always existed, but has become more accentuated in recent decades or, as Freeman (1991, p. 510) puts it, “networking for innovation is in itself an old phenomenon and networks of suppliers are as old as industrialized economies.” These relationships are either initiated by the seller’s wish to create more value for its customers and/or more loyal customers (Ford et al., 2003) or by buyers wanting to create efficient and innovative supply chains (Gadde et al., 2002; Von Hippel, 1998; Wynstra, 1998).

The other major trend, which is almost the opposite, is a break-up of large hierarchically controlled

companies into constellations of much more independent units that are supposed to find efficient ways to relate to each other (Forsgren et al., 1992; Gadde & Håkansson, 2001; Pyke, 1990; Saxenian, 1991; Storper, 1997). In some cases this has been combined with extensive outsourcing of production.

There is no general consensus on what the main drivers behind this development toward network structures are. Some argumentation exists for certain very specific conditions such as the development of more advanced information technologies or general globalization (Castells, 2000). Other researchers, however, give more “complex” explanations where changes in the use of technologies are related to increased specialization and internationalization of companies (Håkansson & Waluszewski, 2002; Storper, 1997).

Independent of the reasons for the development, the introduction of networks has accentuated and changed some specific issues that are important in relation to accounting. These changes affect what should be included in the accounting (type of data as well as data sources) and by whom and how the accounting is to be used (Otley, 1994; Shields, 1997). The most significant changes are summarized below. In order to make an assessment regarding the efficiency and effectiveness of operations managers within the company needs not only data concerning how activities and resources within the company are performed and used, but also how the performance and usage is related to activities and resources situated within other companies, i.e. across company borders (Berry, 1994; Hopwood, 1996; Otley et al., 1995).

In a network structure all activities and resources become much more relative to each other and, therefore, they have to be assessed in a manner that takes this interconnection into consideration (Tomkins, 2001). The boundary between the company and the counterpart/environment was previously regarded as marker distinguishing between what could be influenced and what was given; now, it has evolved to become what is referred to an integrating interface. One consequence of this is that, from an efficiency as well as from a control point of view, activities performed and resources used outside the previously identified boundary have to be included to obtain a representative assessment of a company (Berry, 1994; Hopwood, 1996; Otley et al., 1995). Furthermore, they have to be considered in relation to relevant activities and resources within the focal company. Naturally, counterparts, such as buyers and suppliers, are in the opposite position: They need to know how the focal company is using its own activities and resources to conduct its activities and produce its products. Finally, it is apparent that anyone wanting to

assess any of the companies involved requires access to the same type of information.

### **3. Interorganizational Setting—Theoretical Models**

The development discussed above has been described and analyzed using different theoretical tools. Theoretical models such as transaction cost economics (TCE) (Williamson, 1985; Williamson & Masten, 1999), agency theory (Eisenhardt, 1989; Jensen & Meckling, 1976), resource-based models (Barney, 1991; Loasby, 1999), actor network theory (Callon, 1991; Latour, 1987), and the industrial-network approach (Håkansson & Snehota, 1995; Håkansson & Waluszewski, 2002) are some examples. The choice of model is important as the design of the theoretical tool will affect and even determine how the problems are formulated, which alternatives are identified, and what solutions are suggested (Galison, 1997; Latour, 1987; Shapin & Schaffer, 1985). Thus, how the empirical problems are formulated is not neutral from a theoretical point of view. Here we will simplify our discussion by grouping the different approaches into just two categories to illustrate the variety, and thereby also the importance, of the tools. One such tool—the market-based approach—includes the most used theoretical approaches and has a distinct structure. The other one—the organized structure approach—is more heterogeneous and one similarity between the theoretical approaches within the group is that these approaches are building on quite other assumptions than the market-based approach.

When conceptualizing business relationships in a certain theoretical model it is positioned in relation to other key concepts. In models built on the classical micro-economic theory of the market, two such concepts are firm and market. The distinction between the firm and the market, in which it is assumed that the firm is an economic unit with clear boundaries interacting with other firms in a market, has been the classical starting point for most economic models. In such a world, business relationships are something new and different, and also disturbing. The relationships could either be seen as something totally negative, an element that disturbs the market and that should be eliminated, or they could be seen to serve a purpose in specific situations because of problems with the way a market or a firm functions. This can be exemplified through the transaction-cost approach. TCE started out with analyzing the “market failure” problem and TCE was at least when it was first formulated an explanation of the need for hierarchical coordination (the existence of large firms is difficult to explain from a market point of view) (Williamson, 1975). In its later applications, TCE has



been used to try to explain the use of three forms of coordination: market, bilateral governance, and hierarchy, and the corresponding mechanisms of price, trust, and authority.

The basic starting point is to explain differences in transactions, i.e., to identify important transactional properties: asset specificity, uncertainty, and frequency (Rindfleisch & Heide, 1997; Williamson, 1985; Williamson & Masten, 1999). The basic logic is that increased uncertainty and asset specificity need more complex and expensive governance mechanisms. Frequency is important, since complex governance mechanisms may incur large costs, which must be recovered over subsequent transactions. In this way, transaction cost theory matches the characteristics of the transaction situation with the most economic form of governance. The starting point is the market exchange as it has the lowest transaction cost when there is low uncertainty and no asset specificity. Transaction problems associated with uncertainty or asset specificity are solved by introducing more costly forms of governance, because these are cheaper than performing market transactions as the cost of market transactions increases more steeply in such situations. Thus, in the transaction-cost approach, the basic problem is seen as finding the right governance mode. There is a certain cost to getting protection, and this cost increases when the uncertainty and asset specificity increase. Accounting will, as we will discuss later on, be seen in relation to concepts associated with these transaction costs.

An alternative approach adopted in research is to assume that economic organizations are always featured by existing relationships, i.e., it is assumed that the firm is not an isolated island (that it is not a free and independent unit), but part of the mainland (Håkansson & Snehota, 1989). Thus, in such an approach, business relationships are as fundamental as the organizations themselves and, consequently, they must be perceived to be an integrated part of the latter, but an organizing device, making the individual organizational units part of something larger (Håkansson, 1997; Håkansson & Johanson, 1987, 1993; Johanson & Mattsson, 1986).

The underlying logic for the existence of a much more organized structure can be traced back to two partly related factors. First, the existence of technological (or other) systems implies that interdependencies between organizations are a key factor (Dubois, 1998; Håkansson & Waluszewski, 2002; Hughes, 1983; Latour, 1987). These systemic interdependencies can provide very useful starting points for different types of development projects across company boundaries (Bengtson, 2003; Forbord, 2003; Gressetvold, 2004;

Hjelmgren, 2005; Holmen, 2001). These interdependencies will be of different types depending on the characteristics of the system—one used typology includes pooled, sequential, and reciprocal interdependencies, which, in turn, can be connected to three types of mediating, long-linked, and intensive technologies (Forsström, 2005; Stabell & Fjeldstad, 1998; Thompson, 1967).

The second factor indicating a more organized structure has to do with the characteristics of the resources involved. These can be assumed to be more or less homogeneous from an economic point of view. This characterization has been used by Alchian & Demsetz (1972) to discuss the need to control resources in a hierarchical way. If a resource is heterogeneous, the value gained from its use is dependent on what other resources it is combined with (the existence of team effects), which makes hierarchical control fruitful. Penrose (1959) has used the same concept to point out that it is the services produced by the resources or by combination of resources that is essential. This has been further elaborated in the resource-based approach (Loasby, 1999). However, the same logic can also be applied to the combining of resources across firm boundaries (Gadde et al., 2002; Håkansson, 1994; Håkansson et al., 2001; Wedin, 2001). Thus, through relationships, a firm can utilize the heterogeneity existing in resources controlled by another company.

In relation to interdependencies or to the existence of, what are, for the company, heterogeneous resources situated within counterparts, business relationships will have a much more intricate function than that of a simple coordination mechanism. In the first case, the business relationships are part of the “technology,” and in the second it must be looked upon as a “resource” in a larger constellation of resources (Håkansson & Waluszewski, 2002; Loasby, 1999).

The two groupings of approaches discussed above can either be seen as alternatives or as complements (Huemer, 1998). They are alternatives in the sense that they picture two different economic worlds—one where the main problem in relation to others is to protect one’s own company given an effective allocation of resources and one where the interaction with others provides a way to create and utilize resources in a better way. However, they can also be seen as complements as they focus on two different aspects of one and the same world. In both cases, they indicate that there are problems in the interorganizational setting, albeit different ones, and furthermore, and critical here, they put different demands on accounting.

#### 4. Interorganizational Accounting—Existing Practice

Interorganizational accounting is a topic that has received increased attention in practice during the last decade. This has been documented in a number of empirical studies within different industries and for numerous countries. These have covered a broad range of industries, such as the automotive industry (Carr & Ng, 1995; Gietzmann, 1996), the computer industry (Seal et al., 2004), the construction industry (Nicolini et al., 2000), the IT service industry (Langfield-Smith & Smith, 2003), the electrical installation industry (Mouritsen & Thrane, 2005), the industrial maintenance industry (Van der Meer-Kooistra & Vosselman, 2000), the mechanical engineering industry (Seal et al., 1999), the plastic industry (Munday, 1992), the public sector (Jones, 1999; Roodhooft & Warlop, 1999; Seal & Vincent-Jones, 1997), the retail industry (Dekker, 2003; Frances & Garnsey, 1996; Kulp, 2002), the service industry (Widener & Selto, 1999), and the telecommunications industry (Håkansson & Lind, 2004; Mahama & Chua, 2005). The countries in which these studies have been conducted include Australia (Langfield-Smith & Smith, 2003), China (Chalos & O'Connor, 2004), Denmark (Mouritsen et al., 2001; Mouritsen & Thrane, 2005), Finland (Kajüter & Kulmala, 2005), Germany (Kajüter & Kulmala, 2005), Japan (Cooper, 1996; Cooper & Slagmulder, 2004), the Netherlands (Dekker, 2004), South Africa (Sartorius & Kirsten, 2005), Sweden (Håkansson & Lind, 2004), the UK (Munday, 1992; Seal et al., 1999, 2004), and the US (Anderson et al., 2000).

One important result of these empirical studies is the identification of a broad range of accounting techniques, methods, and control mechanisms that have been used for interorganizational accounting (Dekker, 2003, 2004; Langfield-Smith & Smith, 2003; Mouritsen et al., 2001; Seal et al., 2004). The interorganizational accounting practice identified is based on both financial and nonfinancial information. It is characterized by being quantitative as well as nonquantitative and it comprises both formal and informal methods. The interorganizational accounting practice identified is primarily directed toward the linking of internal activities and resources of one company to those belonging to customers or suppliers of that company. It is adopted for control of interorganizational operations and to improve interorganizational efficiency and effectiveness.

There are two different types of interorganizational setting that have been covered. The first type consists of dyadic relationships between two collaborating companies (Gietzmann, 1996; Ittner et al., 1999; Kulp, 2002; Langfield-Smith & Smith, 2003). The second involves

the simultaneous handling of a set of relationships, i.e., networks of organizational units (Håkansson & Lind, 2004; Kajüter & Kulmala, 2005; Mouritsen & Thrane, 2005). Let us have a closer look at each of these settings.

##### 4.1. Dyadic Relationships

The interorganizational accounting literature has primarily focused on dyadic relationships such as vertical relationships within the supply chain and horizontal relationships between companies targeting the same customers (Chalos & O'Connor, 2004; Groot & Merchant, 2000; Lind & Thrane, 2005). Ongoing vertical relationships or business relationships between companies buying and selling from each other are the most common dyadic relationships within the interorganizational accounting literature. However, they are not the sole area of interest, and several empirical studies have been dedicated to the study of newly established alliances or newly established outsourcing relationships (Dekker, 2004; Langfield-Smith & Smith, 2003; Mouritsen et al., 2001; Seal et al., 1999; Van der Meer-Kooistra & Vosselman, 2000). Dekker (2004) even started his data collection two weeks before the partners concerned signed an alliance contract. In some studies, the researchers have been actively involved through action research (Nicolini et al., 2000; Seal et al., 1999).

The emphasis on intensive and long-term collaborations with customers or suppliers can be associated with a number of interorganizational accounting practices, of which open-book accounting, target costing, interorganizational cost management, value-chain accounting, integrated information systems, total cost of ownership, nonfinancial measurement, and informal control mechanisms will be described more in detail in the following.

##### 4.1.1. Open-Book Accounting

Open-book accounting is an accounting technique where a company discloses detailed cost data to a particular counterpart (Carr & Ng, 1995). One of the more detailed descriptions of cost data disclosure is given by Kajüter & Kulmala (2005). They show how a first tier supplier to a German car manufacturer specified the cost elements as follows: raw materials, direct and indirect labor, manufacturing overheads, corporate overheads, packaging, transportation, warranty, research and development, and profit. The first tier supplier disclosed the overhead costs in even greater detail by breaking it down into elements such as in-process scrap, utilities, depreciation, floor space, and insurance. Degree of capacity utilization and the operation pattern were complementary information that the supplier disclosed to the car manufacturer.

The description given by Kajüter & Kulmala (2005) is typical in the sense that it is a strong customer who requires its suppliers to open up their books. Most empirical studies about cost data disclosures are only unidirectional (Carr & Ng, 1995; Dekker, 2003; Mouritsen et al., 2001; Munday, 1992). Thus, the suppliers open their books up for the customers. Mouritsen et al. (2001) showed that the customer they examined in their study only delivered sales forecasts to its suppliers, but the suppliers disclosed time and cost information to the company, including information about the flow of materials, cost structures, capacity utilization, and adjustment times for assembly machines.

Seal et al. (1999) engaged in an action research project where two companies and the researchers together tried to establish a complete and detailed mutual open-book agreement. In principle, the two companies were positive to the idea of an open-book arrangement, but it failed to be realized during the 18-month-long period of the study. A frequent theme in the aforementioned empirical studies is the importance of creating a win-win situation between the two counterparts concerned (Carr & Ng, 1995; Kajüter & Kulmala, 2005; Mouritsen et al., 2001; Munday, 1992; Seal et al., 1999). A customer that misused the cost transparency will have a problem establishing new open-book accounting arrangements with new suppliers.

Open-book accounting is an interorganizational accounting practice that was initially associated with Japanese accounting practice (Carr & Ng, 1995; Cooper, 1996; Hiromoto, 1988; McMann & Nanni, 1995). However, in the twenty-first century, open-book accounting is a practice that has diffused to other parts of the world (Carr & Ng, 1995; Kajüter & Kulmala, 2005; Mouritsen et al., 2001). From a survey, Munday (1992) showed that open-book accounting was already common practice in accounting in the early 1990s within the plastic injection moulders industry in UK. It can, however, be noted that the suppliers to whom it was most common to open their books were Japanese ones.

#### 4.1.2. Target Costing and Interorganizational Cost Management

Target costing and functional analysis are also accounting practices with interorganizational applications that have diffused from Japan (Hiromoto, 1988; McMann & Nanni, 1995). For a more general description of target costing and the history of other Japanese accounting practices, see Ansari et al. (2006) and Okano & Suzuki (2006). Target costing and

functional analysis are focused on a product's design and development processes (Kato, 1993). In their study of Nissan Motor Manufacturing UK (hereafter Nissan), Carr & Ng (1995) showed that the company's target cost achieving activity was closely intertwined with its suppliers' activities. Nissan identified a vehicle target cost based on the simultaneous development of the vehicle target profit and the overall business plan. The vehicle target cost was divided into different parts with its specific objective being functionality and cost. To ensure that the target costs of new vehicle models are achieved, Nissan included its suppliers in the objective setting process, which was a necessity because supplier costs represent more than 80% of total costs. Thus, Nissan systematically disaggregated the cost-related information to coordinate the cost reduction efforts in the company and also for its suppliers. According to Carr & Ng (1995), the target costing process made an important contribution by influencing the actors' behavior in relation to the cost.

Mouritsen et al. (2001) observed how a company established interorganizational control after it had outsourced its development processes. However, the company under examination did not adopt a formalized target costing procedure because, according to the company, such a procedure could curtail its emphasis on innovation. Instead, the company only applied the functional analysis part of the target cost practices and, in combination with that, showed the company's overall purchasing budget to the suppliers to create cost consciousness.

In an action research project within the construction industry, Nicolini et al. (2000) found that a major obstacle to using target costing as a way of supporting supply chain integration was the internal accounting system. The problem for the collaborating companies was that they lacked accurate internal cost estimates and, as such, they did not know how to assess potential improvements to their operations.

According to Cooper & Slagmulder (2004), target costing was at the heart of the interorganizational cost management practices in the companies investigated. Cooper and his co-authors have studied interorganizational cost management practices within supply chain relationships in Japan since the early 1990s (Cooper, 1996; Cooper & Slagmulder, 2004; Cooper & Yoshikawa, 1994). Cooper & Slagmulder (2004) observed three interorganizational cost management techniques: functionality-price-quality tradeoffs, interorganizational cost investigations, and concurrent cost management.

Functionality-price-quality tradeoffs were used when the manufacturing cost exceeded the target cost for an item and the target cost could be attained

through minor changes in the supply chain relationship. In such instances, it was sufficient to make minor changes in the functionality or/and the quality specifications to reduce the manufacturing cost. A typical level of cost savings with this interorganizational cost management technique was 0–5%.

Interorganizational cost investigations were initiated when the manufacturing cost exceeded the target cost by too much for a functionality–price–quality tradeoff to produce adequate cost reductions. Thus, interorganizational cost investigations were used when it was necessary to bring about significant changes in the supply chain relationship. They were conducted rather than created through the increased involvement of design engineers from both companies in the relationship. Thus, interorganizational cost investigations made it possible to redesign different parts of the finished product to make it more cost efficient. According to Cooper & Slagmulder (2004) the typical level of cost savings with this technique was around 5–10%.

The third interorganizational cost management technique identified by Cooper & Slagmulder (2004) was concurrent cost management. This technique was used when it was necessary for the companies to achieve more aggressive cost reductions. Substantial cost savings could be achieved by making major design changes. This demand required much earlier involvement of the supplier in the design process and it was only used for important items. The typical level of cost savings with concurrent cost management was 10–15%.

#### 4.1.3. Value-Chain Accounting

Value-chain accounting is another interorganizational accounting practice that has been put forward by several writers (Anderson et al., 2000; Herget & Morris, 1989; Shank & Govindarajan, 1993) Dekker (2003) gives one of the most detailed empirical descriptions of value-chain accounting. He showed how a large UK retail firm and a group of suppliers developed and used an activity-based costing (ABC) model across firm boundaries. The ABC model was based on the principles of value-chain analysis and integrated cost information. The cost model only incorporated activities related to the moving of those products obtained through the relationships, under consideration, with the stores. The participating suppliers collected their data themselves. However, to secure consistency of data across suppliers, the retailer supported the suppliers by providing a document that defined key variables and described the cost model.

The value-chain accounting model was mainly used to reduce value-chain costs. The retailer's

logistics operations department used the cost information to initiate discussions intended to identify opportunities for cost reductions with the suppliers. Three types of analyses were made to support these discussions: benchmark analyses, strategic what-if analyses, and trend analyses.

The benchmark analyses were used to compare each supplier's activity costs with the average for the others. The retailer organized the suppliers into groups, each of which performed fairly comparable activities. Thus, it was possible to compare a supplier against the average for that group, thereby always avoiding specific comparisons between one supplier and another. Strategic what-if analyses were used to develop different cost scenarios relating to possible changes in the supply chain. All projects that were initiated between the retailer and its suppliers were evaluated in this way. The trend analyses were used to monitor the long-term development of the supply chain costs.

#### 4.1.4. Integrated Information System and Total Cost of Ownership

Integrated information systems operational across firm boundaries represent another interorganizational accounting practice that has been identified within the accounting literature (Frances & Garnsey, 1996; Kulp, 2002). According to Frances & Garnsey (1996), information and communication technology was a critical issue for the integration of British supermarkets and their suppliers. These authors showed that electronic point-of-sale scanners in the supermarkets and electronic data interchange (EDI) enabled detailed sales information to be transmitted to the suppliers. The information goes straight into the suppliers' production planning system. Thus, through means of the integrated information system, the supermarket was able to coordinate operations across company boundaries. Kulp (2002) investigated a specific integrated information system, the Vendor Managed Inventory system (VMI). VMI systems let the retailer delegate its inventory decisions to the suppliers by giving them access to its internal accounting information.

The total cost of ownership (TCO) is another interorganizational accounting application that supports purchasing-decision-makers by allowing them to focus on the total value received and not simply on the purchasing cost (Wouters et al., 2005). By applying a value-chain perspective, and extending the analysis to include important subcontractors, the purchasers obtain a better understanding of the total costs and of what drives these costs. According to Wouters et al.

(2005) the TCO can be perceived to be an application of ABC that extends across firm boundaries.

#### 4.1.5. *Qualitative, NonFinancial, and Informal Control Mechanisms*

Qualitative, nonfinancial, and informal control mechanisms are other interorganizational accounting practices that consider long-term customer and supplier relationships (Anderson et al., 2000; Carr & Ng, 1995; Cooper & Slagmulder, 2004; Gietzmann, 1996; Ittner et al., 1999). Nonfinancial measures, such as yield, throughput time, capacity utilization, and productivity, are used to evaluate supply chain relationships, and they are communicated to the counterparts involved in the supply chain. Supplier certification, tournament procedures, frequent meetings, and interaction in the business relationships are other nonfinancial control mechanisms that have been identified (Anderson et al., 2000; Gietzmann, 1996; Ittner et al., 1999; Van der Meer-Kooistra & Vosselman, 2000).

Van der Meer-Kooistra & Vosselman (2000) give a good and detailed description of the use of financial and nonfinancial measures in their case studies of outsourcing relationships in the Netherlands. For example, the case study on the Shell Research and Technology Centre in Amsterdam (hereafter Shell) showed that they measured quality and costs on a regular basis. Moreover, Shell and the supplier followed up a large number of nonfinancial measures, such as people utilization, client satisfaction, and indirect and direct labor ratios. Shell received specified reports from the supplier which made it possible for it to analyze the activities performed. Productivity was measured on a monthly basis by a third party.

Dekker (2004) identified several mechanisms for controlling behavior and for maintaining informal control in his study of a newly established alliance between a supplier of railway safety systems and the organization responsible for the Dutch rail infrastructure. The control mechanisms involved the formation of joint task groups and joint alliance boards, drawing up quality plans and programs of innovation, making functional specifications, adopting a consensus style of management between the two partners, and holding weekly meetings in which technical plans and designs were discussed.

According to Gietzmann (1996), tournament procedures may be an important ingredient in buyer/supplier relationships. He described how a Japanese assembler in Europe ranked its suppliers on the basis of the suppliers' performance. The suppliers were ranked according to the business volume. Thus, the assembler awarded business according to the ranking

assigned to the suppliers, and it is, therefore, in the interests of the suppliers to climb the ranks.

Carr & Ng (1995) described how Nissan had created cross-functional teams dedicated to collaborating with subcontractors to help them improve their operations. Thus, the joint task groups identified activity links and resource ties across company boarders. Cooper & Slagmulder (2004) found a similar practice when they studied business relationships in Japan: The two companies investigated, Komatsu and Toyo, shared a considerable amount of information about each other early in the product development process. As a consequence, it was possible for them to adapt their plans to suit each other.

#### 4.1.6. *Summary and Conclusion*

In dyadic relationships, the interorganizational accounting practice observed a broad range of formal and informal control mechanisms. There are formal mechanisms such as open-book accounting, target costing, value-chain accounting, and integrated information systems, and informal mechanisms such as joint governance design, trustworthiness, and cross-functional teams. This mixture of formal and informal control mechanisms seems to be common interorganizational accounting practice for dyadic relationships (Carr & Ng, 1995; Cooper & Slagmulder, 2004; Dekker, 2004; Mouritsen et al., 2001; Seal et al., 1999, 2004).

One common denominator within the dyadic interorganizational accounting practice seems to be an emphasis on information sharing across company boundaries (Carr & Ng, 1995; Cooper & Slagmulder, 2004; Dekker, 2003, 2004; Kajüter & Kulmala, 2005; Kulp, 2002; Mouritsen et al., 2001; Nicolini et al., 2000). This information sharing can be quantitative, in the form of financial and nonfinancial data, or of a more qualitative nature, passed on through media such as documents, the establishment of routines, and frequent meetings. Thus, the development within interorganizational accounting supports the companies in their effort to achieve improvements and cost reductions through the development of new ways of relating to each other.

A common issue within the empirical studies of interorganizational practice in dyadic business relationships is the discussion of the importance of trustworthiness (Carr & Ng, 1995; Cooper & Slagmulder, 2004; Dekker, 2003, 2004; Gietzmann, 1996; Kajüter & Kulmala, 2005; Langfield-Smith & Smith, 2003; Mouritsen et al., 2001; Munday, 1992; Nicolini et al., 2000; Van der Meer-Kooistra & Vosselman, 2000). According to these studies, the two counterparts have

to trust each other and the increased openness must be combined with an increased sensitivity of not misusing the information they receive from each other.

#### 4.2. Networks

Networks have not been the subject of a great number of investigations as yet. However, some empirical studies have considered the simultaneous handling of a set of relationships (Håkansson & Lind, 2004; Kajüter & Kulmala, 2005; Lind & Thrane, 2005; Mahama & Chua, 2005; Mourtisen & Thrane, 2005). In these studies individual relationships are perceived to be embedded in a network of interorganizational relations between independent companies. Most of the papers have studied formalized networks with a network center (Kajüter & Kulmala, 2005; Mahama & Chua, 2005; Mourtisen & Thrane, 2005); however, one of them reported on interorganizational accounting practice within an unbounded network (Håkansson & Lind, 2004). None of the papers about networks was published before 2004, thus, interorganizational setting networks can be considered to be a recent area of interest.

Kajüter & Kulmala (2005) described the practice of open-book accounting in a German car-manufacturing network. The car company introduced open-book accounting and had special worksheets designed to formalize the cost element disclosure within different parts of the network. A value-chain flow chart was constructed to obtain transparency within the entire car-manufacturing network. This value-chain flow chart showed the names and location of upstream suppliers, the flow of material, and each supplier's value-added cost for the suppliers involved with a particular component or system. The first tier supplier was responsible for the collection of information about its upstream suppliers and it provided the car manufacturer with a detailed cost breakdown for its system. The companies involved in the manufacturing network had not harmonized their cost accounting systems.

According to Kajüter & Kulmala (2005), the open-book accounting practices were supported by other more informal control mechanisms within the network, such as ongoing work in cross-functional, cross-company teams, and technical support provided free of charge. The car manufacturer initiated and provided the focal point for the informal control mechanisms, which also was the center of the network. The car-manufacturing network had not developed a general rule for how improvements and cost reductions should be shared between the parties in the network. Instead, this was resolved between the involved parties from time to time.

Mahama & Chua (2005) showed how interorganizational accounting practices, such as different forms of financial and nonfinancial measurements, incentive schemes, and open-book accounting arrangements, were associated with messiness in managing supply relationships. The focal company tried to establish an interorganizational practice that persuaded the suppliers to act in accordance with a contract letter. Prices were fixed for a range of services and the focal company designed a value-sharing scheme with its suppliers that was aimed to drive down costs over time. However, the suppliers did not act as expected: They overpriced all supplementary services not included in the fix price agreement. However, the focal company was able to change the content of the ongoing relationships by recruiting two new suppliers to deliver the extra services. The involvement of the two new suppliers changed the meaning and consequences of the interorganizational accounting and made it possible for the focal company to make a reasonable reduction in its costs through a fix price agreement with these suppliers in combination with workflow analysis. Thus, the content of a single relationship and its interorganizational accounting practice is dependent on other relationships in which it is embedded.

Mourtisen & Thrane (2005) studied three formalized networks comprising small- and medium-sized companies. The authors identified several control mechanisms, such as transfer prices, fees paid to the network center, intellectual capital statements, competency accounts, and peer reviews of actors before they could enter the network. These control mechanisms established the networks being studied as what the authors referred to as network enterprises, each with its own goals and visions. Thus, these network enterprises established their own goals and visions that differed from the participating companies' goals and visions. Furthermore, the control mechanisms enhanced the stability and predictability of the formalized network.

Håkansson & Lind (2004) showed how internal accounting played a key role in the formation of relationships. The authors studied accounting and its role in an unbounded telecommunication network with the relationship between Ericsson and Telia as the focal business relationship. The exchange between Ericsson and Telia was described as a complex mixture of different structures involving sub-units with decision-making authority, cooperation between sub-units in the two companies, and competition and conflict. Accounting in the form of responsibility accounting, budgets, reward structures, and profit measures was used to form "new" organizational units with partly overlapping accountability. Sub-unit managers within

Ericsson even had incentive systems that were closely tied to customer performance in predefined areas. The boundaries between Ericsson and its customers became blurred and units within Ericsson viewed each other as competitors in some situations. The implication of this is that sub-units need to obtain the cooperation of other units, both within and outside their own company, if they are to be able to achieve their own goals. Thus overlapping accountability forces units to interact with each other.

An interesting new dimension emerges in the network setting that one does not find with the dyadic setting: The indirect effects of the accounting become more important as the accounting becomes embedded into the total organizational design to a much greater extent than before. Although the use of different accounting techniques, methods, and control mechanisms reflects the individual companies' own organization of their affairs, it is more strongly governed by the individual companies' strife to become embedded in the more extensive network, of which they form a part.

## 5. Accounting—Theoretical Models

### 5.1. Introduction

Interorganizational accounting literature started to emerge in the late 1980s (Shank & Govindarajan, 1989, 1993); however, it is only since the turn of the century that publications on this topic have started to appear in a great number. An important milestone was passed in 1996 with publications that appeared in *Accounting, Organization and Society* (Frances & Garnsey, 1996; Gietzmann, 1996; Hopwood, 1996). Several of the early papers were atheoretical (Carr & Ng, 1995; Cooper, 1996; Munday, 1992), but, subsequently, papers have appeared that apply a mixture of theoretical models, such as transaction cost economics (Speklé, 2001), agency theory (Baiman & Rajan, 2002a), actor network theory (Mourtsen & Thrane, 2005), the industrial-network approach (Håkansson & Lind, 2004), structuration theory (Seal et al., 2004), and contingency theory (Groot & Merchant, 2000; Kajüter & Kulmala, 2005), and one adopting a system perspective, examining power, norms, and meaning (Frances & Garnsey, 1996).

If we categorize the applied theories into a market-based approach and an organized-structure approach, most of the published papers are classified as the market-based approach. The market-based approach consists of two major tracks: transaction cost theory and agency theory (also known as incomplete contracting theory). The two theoretical frameworks are similar and the origin of the two approaches can be traced to Coase's (1937) seminal paper on the theory of the firm.

Theoretical frameworks based on the agency theory have frequently been used in the interorganizational accounting literature (Baiman & Rajan, 2002a, 2002b; Demski & Sappington, 1993; Gietzmann, 1996; Gietzmann & Larsen, 1998; Kulp, 2002). The interorganizational setting within these papers has mainly been on dyadic buyer–supplier relationships. Incentive issues and information exchange issues are two closely related topics in papers based on an agency theory framework. A common argument made is that greater information exchange allows for greater effectiveness in the value chain. The logic behind this is that increased information exchange is expected to make it easier for the counterpart to identify improvements and cost reductions. However, increased information exchange also increases the potential for information misappropriation.

According to writers who have applied agency theory, a problem might arise because an actor in the supply chain invests in new technologies and, therefore has to bear the cost of the change, but another actor in the supply chain can capture the main benefits from the investment (Baiman & Rajan, 2002a, 2002b; Gietzmann, 1996; Gietzmann & Larsen, 1998). Investments that are efficient for the overall value chain are not likely to be carried out because each firm will be concerned with optimizing its own performance. Thus, transactions within cooperative interfirm relationships create incentive problems. A key issue in this approach is how accounting and other interfirm design instruments can be used to mitigate these incentive problems. Most of the papers published that applied a framework based on agency theory can be characterized as analytical (Baiman & Rajan, 2002a, 2002b; Demski & Sappington, 1993; Gietzmann & Larsen, 1998). However, some empirical studies have also appeared (Gietzmann, 1996; Kulp, 2002). Transaction cost economics was the other track of the market-based approach. The majority of the published papers within the interorganizational accounting literature have applied a theoretical framework derived from TCE. We will present this research in more detail below.

The organized-structure approach was characterized as being heterogeneous and the similarity between the papers classified as adopting this approach was that the papers used theoretical frameworks built on theoretical assumptions other than the market-based approach. This review of the interorganizational accounting literature shows that there are only a few papers that can be grouped within the organized-structure approach (Håkansson & Lind, 2004; Mahama & Chua, 2005; Mourtsen & Thrane, 2005);

Mouritsen et al., 2001; Seal and Vincent-Jones, 1997; Seal et al., 2004; Tomkins, 2001).

Some of the articles reviewed have used actor network theory as the basis for their theoretical framework (Mahama & Chua, 2005; Mouritsen et al., 2001; Mouritsen & Thrane, 2005). All the research reported in them is based on case studies. The interorganizational setting in these papers has mainly been network formations where a single relationship is considered to be embedded in a broader network of relationships. A central issue of this research has been to understand how relations work and how accounting functions within these relations. Thus, the papers are focused on interaction processes between heterogeneous actors that interact more or less successfully with each other. Accounting is often seen as an actor in itself (an actant), one that can mediate, shape, and construct interorganizational relationships. Accounting can be mobilized to shape and construct a particular form of reality in interorganizational relationships. Thus, rather than considering accounting as a set of techniques, it is viewed as an influencing factor—an actor—that influences the interaction between the counterparts in the embedded network. The industrial-network approach will be presented in more detail below.

### 5.2. *Interorganizational Accounting—Transaction Cost Economics*

The theoretical framework of TCE has been popular in the interorganizational accounting literature (Anderson et al., 2000; Birnberg, 1998; Cooper & Slagmulder, 2004; Dekker, 2003, 2004; Ittner et al., 1999; Langfield-Smith & Smith, 2003; Roodhooft & Warlop, 1999; Sartorius & Kirsten, 2005; Seal et al., 1999; Speklé, 2001; Van den Bogaard & Speklé, 2003; Van der Meer-Kooistra & Vosselman, 2000; Widener & Selto, 1999) and the published papers consist of both analytical and empirical papers. The empirical studies, representing the majority of the publications, used a wide variety of methods. Experiment, survey, and case studies have all been used to study dyadic relationships. A common point of departure in papers using TCE is the observation that interorganizational relationships have increased in importance as companies have reorganized their activities to an increasing degree and outsourced their noncore activities. According to these authors, supplier relationships, which could previously be handled through arm's-length transactions, now needed to be handled through more elaborate supplier relationships. Thus, the bilateral governance (a hybrid form of governance) is put at the forefront.

The increased focus on bilateral governance, with its emphasis on more extensive business relationships between buyers and suppliers, has increased the demands on accounting to provide support for the more elaborate make or buy decisions (Anderson et al., 2000; Ittner et al., 1999; Sartorius & Kirsten, 2005; Seal et al., 1999; Widener & Selto, 1999). Anderson et al. (2000), for example, applied a TCE framework in their study of make or buy decisions in the US auto industry. They based their study on data from a company that had put greater emphasis on long-term supplier relationships. They used data from 156 individual sourcing decisions within a new car program and found that the company outsourced more complex parts as well as parts belonging to more complex, interdependent sub-assemblies. Furthermore, this development was associated with a reduction in the number of suppliers for the outsourced parts. Thus, the company was outsourcing complex interdependent parts to just a few suppliers and thereby increasing its dependence on the chosen suppliers giving the suppliers a greater possibility to affect the company's competitiveness. This creates new demands on accounting and its role in the bilateral governance, requiring it to depict the effectiveness of the entire value chain.

According to Ittner et al. (1999), the governance structure chosen for these supplier relationships is critical for its success. In this survey-based study using data from the automotive and computer industries, Ittner et al. found that companies which combined elaborate supplier partnership practices with a greater use of advanced selection and monitoring practices tended to improve their performance. They also found that extensive use of nonprice selection criteria, frequent meetings with suppliers, supplier involvement in strategic planning processes, and use of supplier certification programs tended to increase the companies' performance. On the other hand, companies that use advanced selection and monitoring practices in combination with arm's-length supplier practices did not improve their performance.

The theme identified above of performance in relation to chosen governance form is central within TCE. A general issue in many articles is to relate accounting issues to the three basic governance forms: market, hierarchy, and bilateral governance (Birnberg, 1998; Cooper & Slagmulder, 2004; Dekker, 2003, 2004; Langfield-Smith & Smith, 2003; Speklé, 2001; Van den Bogaard & Speklé, 2003; Van der Meer-Kooistra & Vosselman, 2000). For example, Van der Meer-Kooistra & Vosselman (2000) identified three different control patterns within their framework: a market-based pattern, a bureaucracy-based pattern, and a trust-based pattern. These basic



forms were then systematically related to three influences: transaction, transaction party, and transaction environment characteristics. The following characteristics of the transaction environment were identified: “uncertainty about future contingencies, degree of market risks, and institutional environment” (*ibid.*, p. 61). Then, finally, the following five characteristics of the transaction parties were proposed: “information asymmetry, reputation, experience with cooperation in networks or with specific parties, risk attitude and bargaining power.”

To summarize, Van der Meer-Kooistra & Vosselman (2000, p. 62) suggest that:

- (a) A market-based control pattern is associated with (1) transaction characteristics: low asset specificity, high repetition, measurability of activities and output, and short to medium term contracts. (2) Transaction environment characteristics: many potential transaction parties, a market price that contains all the market information, social embeddedness, and institutional factors are not relevant. (3) Party characteristics are not important.
- (b) A bureaucracy-based control pattern is associated with (1) transaction characteristics: medium to high asset specificity, low to medium repetition, measurability of activities or output, and medium to long-term contracts. (2) Transaction environment characteristics: future contingencies known, medium to high market risks and institutional factors influence the contractual rules. (3) Party characteristics: reputation for competence, medium risk sharing attitude, and asymmetric bargaining power.
- (c) A trust-based control pattern is associated with (1) transaction characteristics: high asset specificity, low repetition, activities or output cannot be measured well, and long-term contracts. (2) Transaction environment: future contingencies are unknown, high market risks, social embeddedness, institutional factors influence the relation. (3) Party characteristics: reputation for competence; experience in networks; experience with contracting parties; risk sharing attitude; and no asymmetry in bargaining power.

Of the three groups of influential variables, the transaction situation is, of course, the most central. The degree of asset specificity, uncertainty, and frequency are central to most studies. Two examples are Speklé (2001) and Dekker (2004).

Speklé (2001, pp. 427–428) proposed a more general control framework based on TCE, which links control configurations and transaction situations.

The latter is characterized by “(1) uncertainty, or the extent to which the desired contributions are amenable to ex ante programming; (2) the degree of asset specificity; and (3) the intensity of *post hoc* information impactedness.” According to Speklé, these dimensions are associated with distinctive control archetypes and nine of these are identified. Two of them are focused on control in interorganizational relationships: hybrid arm’s-length control and hybrid exploratory control. Hybrid arm’s-length control is associated with high programmability and moderate asset specificity. Hybrid exploratory control is associated with low programmability, moderate asset specificity, and the low impact of *post hoc* information.

Dekker’s (2004) framework consisted of three forms of control: outcome control, behavior control, and social control. Two purposes of control within interorganizational relationships are identified; these are labeled appropriation concerns and coordination requirements. The purpose of appropriation concerns is for companies to safeguard their part of the value creation. The three common TCE attributes, asset specificity, environmental uncertainty, and frequency, are associated with appropriation concerns. The purpose of coordination requirements is focused on how to create value. According to Dekker, it is necessary for the partners within the relationship to pool resources, decide on the tasks to be performed, and then allocate the tasks among themselves. Thus, interorganizational relationships need to coordinate interdependent tasks across firms’ boundaries. The purpose of the coordination requirements is associated with interdependence and task uncertainty.

From an accounting point of view, the bilateral form of governance has been the most interesting as it deviates from the classical market/hierarchy dichotomy. Bilateral governance, with its more elaborate supplier relationships, puts new demands on accounting (Ittner et al., 1999; Seal et al., 1999) related to how to structure, manage, and control these supplier relationships (Dekker, 2004). Thus, it is necessary to extend accounting to encompass events across organizational boundaries. Van der Meer-Kooistra & Vosselman (2000, p. 52) described this by posing the question “How can firms which enter into strategic alliances with other firms structure the management control of such interfirm relationships?”

In summary, the transaction-cost approach focuses accounting on control issues, especially:

- (a) the role accounting can play in identifying the transaction characteristics to help choose most appropriate form of governance;

- (b) the role accounting can have in shaping the three different governance forms of which market and hierarchy are also covered in traditional accounting literature;
- (c) the new types of accounting techniques and methods that are necessary to support the third type—bilateral governance.

### 5.3. Interorganizational Accounting—Industrial-Network Approach

Tomkins (2001) and Håkansson & Lind (2004) give two examples of accounting and its role within the industrial-network approach. The interorganizational setting in these two papers is networks in which a single relationship is considered to be embedded in a network of relationships between independent companies. Tomkins' paper is analytical and Håkansson & Lind applied a case study method.

According to Tomkins (2001), one key problem for a company is that it is involved in a mixture of both close and arm's-length relationships. Thus, the company is part of a larger network of interconnected business relationships. One important consequence is that any company will be restricted by others to a large extent and will have to take some aspects of its network as given. However, with the help of bilateral negotiations, a company can change some of the individual relationships and thereby influence the business network. Håkansson & Lind (2004) formulate the same key question in a similar way when they discuss two ways a relationship can be conceptualized: as an isolated cooperative island or as one integrated element within a network of relationships.

Tomkins (2001, p. 183) started out from the following two questions for business network design from a managerial point of view:

- (a) Is the organization's information system adequate for mastery of events?
- (b) Is the organization's portfolio of alliances and relationships (i.e., mix of trust intensities) appropriate for meeting its objectives?

If a company is to be able to adequately master events across firm boundaries within a business network, according to Tomkins (2001), it will have to capture both the direct and indirect effects of its decisions. Thus, the company must capture the effects of the decisions made in relation to its direct partners and be able to extend this to determine how the decisions affect the connected business relationships with third or fourth parties. Obtaining a complete model for all these effects is probably impossible; it is too complex. One possible solution is to treat the

majority of the relationships as arm's-length transactions, and thus, an exogenous input to any model.

The second question about the organization's portfolio of relationships is closely linked to the first one. The portfolio of relationships needs to be a broad mix of business relationships ranging from very close intensive relationships to arm's-length ones. From a resource point of view it is not possible for the company to have close relationships with all its counterparts. Instead, companies are obliged to choose which relationships should be prioritized. To do this, a company must assess the entire mix of business relationships, because changes in one relationship can have effects on others. Thus, if a company prioritizes one relationship and works more intensively with that partner, it may be necessary for it to increase or reduce its collaboration with other connected partners. It is, therefore, necessary for the company to identify the critical companies within its business network to be able to choose between its counterparts.

Thus, companies can concentrate their effort on tracing the consequences of decisions made within the critical parties in its business network. According to Tomkins (2001), existing accounting techniques are adequate for mastering most events within business networks; however, how they should be used in the more complex interaction across organizational boundaries is not clear.

Håkansson & Lind (2004) analyze the role of accounting in the formation of embedded business relationships. The relationships constitute a mixture of structures involving hierarchies, relationships between sub-units, and even market ingredients. Established accounting practices involving responsibility accounting, budgets, reward schemes, and profit measures are important in the mixed structure. A key ingredient in the formation of relationships was the systematic use of accounting to shape business units with overlapping accountability. This was used within the companies under investigation, but it was also used as an organizational device to create "new" business units with overlapping accountabilities, which, at the same time, can cross firm boundaries. In this way, accounting used to help to shape a structure that forced business units to interact with each other.

Accounting has (*ibid.*, p. 67) "helped to establish a structure that is not a solution to the coordination problems, but rather, is a base facilitating a process that can lead to continuous adaptation of the 'solutions'." As a result of this, the overall structure and the accounting applied create contradictions that shape an unstable business network where actors need to find new temporary solutions.

In summary, the industrial-network approach focuses accounting on learning issues, and especially on:

- a) the role accounting can have in giving information for the successive prioritising of relationships with certain counterparts;
- b) the role accounting can have in providing information (in the form of feed-back) about the direct and indirect effects of changes in individual relationships and, thereby, help the company to develop them further;
- c) the role accounting can have to create a dynamic structure, i.e. a structure that develops through coevolution.

## 6. Concluding Remarks

In this review we have discussed the role and function of accounting in relation to the interorganizational setting of an individual company. It should be noted that there is ample evidence that this setting has changed in quite a dramatic way during the last few decades. The change can be described in terms of an increased awareness of how companies systematically relate to each other. One important consequence of the change in the means of relating is that, when assessing efficiency and effectiveness, managers need data concerning how activities within the company are performed and how resources are used in relation to activities and resources located within other companies. Such data on relationships are of interest to other external parties that need to assess how well the company is performing. This is especially the case for the closely bound partners of the company.

The above situation can be analyzed and explained in different ways. There are a number of theoretical approaches that focus on different problems and rely on different explanatory variables. In this chapter, we have tried to group these together into one of the two alternatives that we have called the market-based and the organized-structure approaches. These two approaches can either be seen as alternatives or as complements. They are alternatives in the sense that they represent two different economic worlds. In the market-based approach, the main problem in the interorganizational setting is to achieve an effective allocation of resources while safeguarding the independence of the companies involved. In the organized-structure approach, the main problem is to develop an interaction with others that will enable resources to be created and utilized in a better way. Despite these evident differences, the two approaches can also be seen as complements because they focus

on two different aspects that can exist side by side in one and the same world. In both cases, they indicate that there are different problems in the interorganizational setting and that these have an impact on the design of techniques, methods, and rules in accounting.

The two approaches can be illustrated by how they perceive and approach the focal unit of analysis, the business relationship. In the market-based approach, the relationship is seen in isolation and as a mechanism with which to handle governance in some specific situations. One important question deals with when a relationship is the most appropriate alternative, and another with how it should be formed and supported. In the organized-structure approach, the single relationship is seen as part of a larger organized structure—a network where it has important connections to and will impact on other relationships. One important issue deals with how relationships can be developed to become an integrated part of the larger structure, and another is how changes in other relationships can be utilized through adaptation.

When analyzing isolated relationships, trustworthiness is an issue that comes to the fore. The development of closer relationships has actualized the need to trust each other and, especially, has drawn attention to the fact that increasing the closeness must be combined with greater sensitivity to not misusing the information received from a counterpart.

Accounting practices such as open-book accounting, value-chain accounting, and target costing, where the companies disclose information unilaterally or mutually, could support trust creation processes. However, interorganizational accounting practice could also destroy a close relationship if a counterpart misused disclosed information.

Another issue regards the switch between different governance mechanisms, i.e., going from a hierarchy to a relationship (known as outsourcing) or from a market to a relationship (called quasi-vertical integration). Such changes are often accompanied by changes in interorganizational accounting techniques and methods, affecting both what should be controlled and how it should be controlled.

When relationships are considered to be part of a larger structure, accounting has to take on a new dimension. Accounting systems have a number of indirect effects, both in relation to organizational design and behavior. These aspects become central in network situations as, by nature, these things are associated with finding and developing suitable combinations of counterparts. This means that accounting is much more embedded in the overall design of organizations. The use of different accounting methods or tools must

be considered to reflect the fact that both of the individual companies involved in a relationship are reorganizing themselves, but an even more important consideration is that each company is trying to embed itself ever more deeply into an increasingly extensive network.

Applications of two more specific theoretical models for accounting issues were then described. Transaction cost economics focus on control problems, and accounting has mainly been applied for ongoing relationships and to find the right governance mode for new relationships. In principle, accounting is used to assess the situation, that is, to relate a transaction to the given situation in which the transaction is made, and for the design of appropriate governance structures. One key issue has been to find new accounting techniques, methods, and other control mechanisms with which to handle the bilateral (relationship) governance.

The industrial-network approach is more concerned with development and, thereby, with issues related to learning. Accounting can concern the successive prioritization of counterparts as they are changed owing to the development of the network as a whole. Furthermore, accounting can be used to develop a structure with dynamic capabilities. Both of these aspects relate strongly to the development of a larger, more organized structure as described above. However, there are also issues related to the development of single relationships and how these are developed.

Two conclusions emerge from this chapter. The first is that there is reason to believe that the role of accounting in interorganizational settings will continue to be important and, probably, even increase in importance. There is considerable potential to develop a more efficient and effective industrial structure if the companies learn to take better advantage of each other. The second conclusion is that this will lead to a large set of new accounting issues that need to be addressed in a number of different ways. For this, we need a whole set of different theoretical approaches of which transaction cost economics and the adoption of an industrial network approach will be but two.

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# **Management Accounting Around the World**



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# The History of Management Accounting in France, Italy, Portugal, and Spain

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**Abstract:** Historical research has shown the influence of environmental contexts on the design and functioning of management accounting systems. In contrast to the relatively competitive settings that witnessed the emergence of cost systems in Anglo-American settings, the focal countries of this chapter featured *inter alia* the imposing role of religious and social philosophers' ideas on society as well as distinctive degrees of state intervention in the economy. In these contexts, firms implemented costing practices at patterns that differ from those reported for Anglo-American organizations. In particular, the studies reviewed in this chapter question traditional contentions that double-entry bookkeeping spread from the fifteenth through the eighteenth centuries and that cost calculations have been implemented only since the advent of the British Industrial Revolution. Furthermore, the emergence of costing practices in the focal countries of this chapter reveals extensive reliance on the notion of public good rather than on the idea of profit. Finally, the findings of this chapter to some extent question the conventional wisdom stating that standards applied first to raw materials and only later to the labour force. The chapter also outlines some suggestions for future research in these settings.

## 1. Introduction

Recent historical research has illuminated the miscellany of organizational and social variables that mediated the emergence of early cost calculations (Zan, 2004a). In particular, such research has added to the already vast number of studies of the relatively competitive textile and iron industries in Anglo-Saxon settings (e.g., Edwards & Boyns, 1992; Fleischman & Parker, 1997; Tyson, 1998). Also, increasing numbers of investigations have addressed the emergence of cost accounting in environments where markets and competition were less important—for example, Spain and its overseas colonies during the sixteenth to nineteenth centuries. These studies have justified Scott's (1995, p. 146) assertion: "It is difficult, if not impossible, to discern the effects of institutions on social structures and behaviors if all our cases are embedded in the same or very similar contexts."

In this chapter, I review research that has examined early practices of cost accounting,<sup>1</sup> as well as early theorizing about cost, in Latin settings in present-day France, Italy, Portugal, and Spain. Such a review is of interest for at least two reasons. First, the four focal

countries witnessed varying degrees of state intervention in the economy and of market competition, which in turn influenced specific practices of cost management (Gutiérrez Hidalgo & Romero Fúnez, 2001a, 2001b; Nikitin, 1990). Second, a number of investigations have focused specifically on the two-way causal connections between cost accounting systems and organizational reforms (Álvarez-Dardet et al., 2002; Núñez Torrado, 2002a). In sum, the wider social, political, and economic contexts in our four focal countries exerted a considerable influence on the design and functioning of early cost accounting systems, and this review illustrates how such systems reflected social change (Bhimani, 1994a, p. 400).

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<sup>1</sup>Present-day understandings of management accounting in firms can hardly be applied to emerging practices, such as those performed by organizations in proto-industrial settings. The latter usually lacked the scope, frequency, purpose, and encompassing features that characterize management accounting systems in today's firms. Therefore, I use the term "cost calculations" to refer to such early practices.

Accounting history research published in international journals focuses overwhelmingly on the narrow time segment 1850–1940 (Carmona, 2004). Accounting historians working on our focal countries, on the other hand, have covered a much longer period of time. As Zan (2004b) argues, new research on cost accounting practices in proto-industrial settings is questioning the traditional assumption in accounting historiography that although the sixteenth and seventeenth centuries saw the spread of double-entry bookkeeping, costing and other managerial uses of accounting emerged only from the end of the eighteenth century. Accordingly, the observation period of this review extends from the sixteenth century through the Second World War.

## 2. Management Accounting Historiography in the Focal Countries

The historiography of management accounting differs across the countries addressed in this review. In the case of France, Boyns et al. (1997a, p. 9) noted that “it is only in recent years that the development of accounting in that country has become a focus of study.” However, growing interest has resulted in relevant findings that have been published in well-regarded journals, both in France and internationally. In general, French accounting historians like Lemarchand (1993, 1994, 2002), Nikitin (1990), and Berland (1998a, 2001) have focused on practices spanning the eighteenth to the twentieth centuries and on the contributions of authorities who influenced the deployment of cost accounting practices in organizations. Lemarchand & Nikitin (2000) maintain that France played an important role in disseminating accounting practices and theoretical ideas across European countries. This topic has attracted international interest, from the early study of Garner (1954, Chapter 2) concerning the work of nineteenth-century French authors on the notion of cost and cost calculations to more recent work by academics from outside our focal countries (e.g., Bhimani, 1993, 1994a, 1994b), and has generated fruitful cooperation between French and British scholars (Berland & Boyns, 2002; Boyns et al., 1996, 1997a, 1997b; Lemarchand & Parker, 1996).

Italian accounting scholars have traditionally shown interest in historical research (Carmona, 2004). However, as Zan (1994) notes, this interest has been split between early accounting practices and later theories. There is what Zan (1994, p. 258) calls “a considerable body of research investigating ... accounting practice in the thirteenth and fifteenth centuries, concentrating on the emergence of the ‘Italian method’ of double-entry bookkeeping” (e.g., Bisaschi,

2003; Riccaboni et al., 2006). But such interest in the practice of accounting disappears for centuries after the publication of Paciolo’s *Summa*. According to Zan, research in Italian accounting history since the end of the fifteenth century has focused largely on the history of accounting thought. This bifurcated research pattern explains the contention of Antonelli et al. (2005) that “outside of the activities of the state-run Venice Arsenale in the seventeenth century ... few published works have examined costing activities in Italian industrial enterprises since the seventeenth century” (see also Bergarmin Barbato et al., 1996). Consequently, Italian investigations into the history of management accounting have been relatively sparse until quite recently (e.g., Antonelli et al., 2002, 2005; Cinquini & Marelli, 2002).

Portuguese accounting scholars have demonstrated interest in the history of the discipline, focusing primarily on events and biographies of the twentieth century (Silva de Serra Faria, 2005), and on the role of various educational institutions in the emergence of the accounting profession in Portugal (e.g., the Portuguese School of Commerce; see Rodrigues & Craig, 2004; Rodrigues et al., 2003, 2004). To a lesser degree, these research efforts have addressed management accounting issues (e.g., Matos-Carvalho et al., 2004).

In Spain, following the lead of Esteban Hernández-Esteve, accounting historians traditionally focused on issues related to the implementation of double-entry bookkeeping in the public and private sectors and on treatises addressing accounting issues (e.g., Donoso-Anes, 1996). Until the late 1980s, there was little interest in an historical examination of cost accounting practices. However, this situation changed with Gutiérrez Hidalgo’s research on cost and spatial practices at the Royal Tobacco Factory of Seville (RTF) during the eighteenth century (Gutiérrez Hidalgo, 1993). Since the 1990s, many accounting scholars have followed suit, especially by examining cost calculations in royal factories during the eighteenth and nineteenth centuries (Gutiérrez et al., 2005).

In the next section, I review some examples of cost calculations deployed during the Renaissance, as well as the interplay between such practices and the Scholastics’ views on the organization of the economy. Similarly, I embed the examination of cost accounting practices before the Industrial Revolution in their wider contexts, especially in the ideas of mercantilists. The section on the nineteenth century examines both cost accounting thought and practices, the latter illustrating the emergence of industrial accounting in France, Italy, and Spain. I then analyze the intertwining of scientific management ideas and cost accounting

practice that occurred in France and that paved the way for practices of budgetary control. The chapter ends with an analysis of the main findings and some suggestions for further research in this area.

### 3. Cost and Management Accounting Practices in the Renaissance

#### 3.1. Scholasticism and Economic Issues

Medieval Catholic discourse included rules and guidelines regarding commerce, trade, prices, profit, and usury. The Scholastics, for example, developed a theory of economic systems in which the most difficult cases of conscience were to be decided by appealing to the Bible and the doctrine of Aristotle.<sup>2</sup> To speculate was to “sin most gravely” (De Roover, 1967). Drawing on the moral philosophy of Aristotle, the Scholastics stated that traders should charge a “just price” (Wren, 2000), as an antidote to avarice and gluttony. However, as De Roover (1967) notes, there was no general agreement on the nature of a “just price”: for some it was the amount that allowed people to maintain their social status; to others it was the cost of production; for yet others it could be set at a maximum or minimum level by legal authorities.

The notion of just price was linked to the idea of profit. St. Thomas Aquinas (1273) reasoned that the exchange of property, as by a tradesman whose business is the trading of commodities or money, is both natural and necessary when it is done in order to satisfy the needs of life. In contrast, the exchange of commodities or money, “not on account of the necessities of life, but for profit ... is justly deserving of blame ... it satisfies the greed for gain which knows no limit and tends to infinity.” Profit, in and of itself, is not sinful. It becomes lawful if intended to maintain one’s household, to assist the needy, or to fill a clear and present need of one’s country. In such cases, it is not an end in itself to seek gain. It is “payment for a person’s labour.”

The notion of competition was wholly neglected in the writings of Scholastics until the end of the sixteenth century (Wren, 2000); instead, attention was paid to the role of the state in price setting. Aquinas pointed out, “those who govern the state must determine the just measure of things saleable ... it is not lawful to disregard such measures as are established by public authority or custom” (St. Thomas Aquinas, 1273, pp. 320 and 323, emphasis added). A higher price, however, could be asked if the seller “has changed something for the better ... or because the value has changed with the change of place or time ...

[or] on account of the danger incurred in bringing the object to the market” (*ibid.*, p. 328).

In this chapter, I assume that the ideology of the Catholic Church exerted a distinctive influence on understandings of the economy and societal movements during the *ancien régime* and, hence, on the notions of cost and profit. But this assumption does not necessarily imply that such understandings were peculiar to the four countries examined in this chapter. Quattrone (2004, p. 651) contends that the differences between Lutherans and Catholics were not great.

#### 3.2. Cost Calculations in Regulated Markets

Scholastic doctrine on the functioning of the economy provided a rationale for Catholic states to enforce mechanisms to deter overpricing as well as to ensure the supply of basic goods to the public (Lane, 1944; Yamey, 2000). These ideas also interacted with environmental events such as plagues to lead some European kings to regulate markets (Fernández Conde, 2004). The Royal Soap Factory of Seville (RAS) exemplifies a firm operating in a regulated market (Carmona & Donoso, 1999, 2004; for the printing industry, see Martínez Guillén, 2005). On 23 May 1396, King Enrique II of Castile granted the monopoly of soap production and distribution, in the City of Seville, to Archbishop Ruy López-Dávalos. In 1423, King Juan II extended the privilege to the entire area of influence of Seville and granted it to Admiral Alonso Enriquez, who simultaneously received the Dukedom of Alcalá. Importantly, the granting decree established that the price of soap should be set by the local government of Seville. Naturally, the Duke of Alcalá and the local government engaged in continuous disagreements over the just price of soap. Such disputes were resolved by *ad hoc* tests that reproduced the soap production process with the intention of calculating the production cost of a pound of soap. These tests required detailed standard procedures to guarantee objectivity, as well as sophisticated cost calculations.

Archival evidence demonstrates that tests were conducted as early as 1520 and constituted a regular practice during the sixteenth and seventeenth centuries, leading Carmona & Donoso (2004, p. 149) to suggest that such tests constituted an “institution” in the sense defined by Meyer & Rowan (1977). The 1525 test, the first in the archives, was developed at the initiative of the local government of Seville, which considered the soap price “too high.” Two soap experts from outside the City of Seville were hired to conduct the test; to preserve their independence and to buffer them from pressures, they were not allowed to stay overnight in the city during the testing period. A local judge supervised the tests, and a Church accountant

<sup>2</sup>This review of Scholasticism and the economy is based on Carmona & Macintosh (2002).

kept the records and wrote the final report, demonstrating the existence of accounting expertise among the clergy, as well as their involvement in economic developments (see also Quattrone, 2004). The tests usually began on Saturdays and the cauldron containing the soap was sealed until Monday, by which time the soap had solidified, and was weighed.

Cost calculations accounted for the raw materials used in the soap production process: olive oil, ashes, lime, wood, and lye. Representatives of the local government and the duke, along with the Church's accounting expert, estimated the factory's annual cost, which involved such items as maintenance, taxes, fabrication of sundry materials, the loss of the rent that would have been obtained if the building hosting the RAS had been leased to another user, and the salary of the administrator. The factory costs were allocated on the basis of the expected annual production of soap in order to calculate the cost per pound of soap. This cost was also expected to become the market price because no allowance for profit was formally acceptable at the time. For the test conducted in 1525, difficulties in dealing with decimals left a remainder of 14,500 maravedies of the factory's annual costs that could not be allocated to the cost per pound of soap, and the decision was not to increase the soap price correspondingly but to swallow the incalculable costs in order "to benefit the people of Seville."

Cost calculations performed at the RAS have some additional implications. For one thing, the case of the RAS shows considerable sophistication in cost calculations. To use present-day terminology, the authorities involved not only were aware of such notions as standards of performance of raw materials, labour, and capacity, but also incorporated more sophisticated ideas like opportunity cost (e.g., the rent that would have been obtained if the building in which the factory was located had been leased to another user). Furthermore, as Graves & Radcliffe (2004, p. 82) note in their comments on this investigation, the local government and the duke prepared costing schemes to bolster their respective cases. For example, the duke's representatives argued that the tests should include the salary of a priest in the cost of a pound of soap, because religious services had to be offered to operators on Sundays. In general, the ascribed objectivity of costing calculations created a rhetoric that could support the interests of both the conflicting parties. The length of the observation period of this study provides a perspective on the changing role of the notion of private profits and the way in which costing calculations supported a case for profit (Carmona & Donoso, 1999). Although it was not possible in 1525 for the representatives of the duke to claim profits on an

activity that was intended to deliver a public service, in implicit accord with the dictates of the Scholastics, this understanding of profit changed around 1692, near the end of the observation period. During the negotiations that followed the test conducted that year, the duke challenged the attempt of the local government representatives to include an additional 8% cost for deterioration of the materials and the stored soap, as "if such expense is considered, then there will be no allowance for earnings. This lacks support [because] what is expense is not earnings, and earnings cannot be denied to the purveyor. Moreover, the privilege will be useless if I cannot profit from it" (Carmona & Donoso, 2004, pp. 147–148).

### 3.3. Cost and Management Discourses in State-Owned Monopolies

During the Renaissance, state-owned monopolies operated for strategic or fiscal reasons. The case of the Venice Arsenal illustrates the former; the Venetian Republic relied on the Arsenal to guarantee the Republic's security at sea and to preserve its trading and wealth. The Arsenal, termed by Galileo "the factory of wonders," mobilized a complex work organization that could assemble a galley in a few hours. And it produced records that cover 65 km of shelving in the Venetian State Archive.

Accounting and management scholars, investigating this archive, have focused thus far on the management and accounting discourses that emerged in that setting between 1580 and 1679 (Zambon & Zan, 2005; Zan, 2004b). These discourses began with the aftermath of the 1570 Battle of Lepanto against the Turkish fleet, which resulted in the Republic's decision, in 1580, to keep a reserve of 100 light galleys plus 12 great ones; and they ended on the eve of the 1679 Candia crisis, which signalled the decay of Venice's sovereignty over the Eastern Sea.

Archival evidence suggests that the Arsenal enforced new forms of management through accounting, techniques that in present-day terminology would be referred to as organizational design and the logic of the budget (Zan, 2004b, p. 146). Furthermore, accounting and managerial discourses evolved over the period studied, consistently incorporating innovative operational concepts such as work-in-progress. In general, Zan argues that such forms of economic discourse emerged in a context of societal norms that were particularly hostile as a consequence of the working traditions imposed by the work gangs. The ethos and pathos of concepts like efficiency, apparent in the archival material, would have further implications for subsequent reexaminations of the "genesis" of management.

Zan (2004b) examined both regularity and change in the managerial and accounting discourses at the Arsenal. Discursive regularities included issues and problems addressed in the reports issued by elective officers, such as ship inventories, ship deterioration, and the number of ships required at different stages of completion in order to keep 100 galleys in reserve. As Lane (1934, p. 242) notes, this goal was extremely ambitious; the entire Venetian fleet in the sea between 1544 and 1602 consisted of 117–135 light galleys and 6–18 great galleys. Thus the Arsenal was keeping on its premises a reserve nearly equal to the state's entire fleet, which would pose considerable organizational and calculational problems for its management.

Examination of materials and components constituted another regular matter of concern, and, again, this issue was addressed through the lens of the 100-galley target. In particular, the reports raised concerns about the quality of wood and its subsequent storage on the Arsenal's premises. Analysis of labour consisted of a quantitative description of manpower along with comments on the quality of the workforce, especially workers and people at intermediate levels in the organization. In general, the reports expressed concern about finding enough good workers to meet the increasing production demand and properly manage raw materials. Finally, the official reports address what Zan (2004b) calls broader organizational issues: contracting in and out, discipline of the workforce, and production scheduling.

In contrast to those of the elective officers, the reports by Baldissera Drachio<sup>3</sup> and Bartolomeo Tadini, experts on the Arsenal, illustrate discursive changes (Zan, 2004b). Drachio and Tadini provided an integrative view of organizational and production processes. In his report of 1586, Drachio discussed the organization of production and logistics, the organization of labour, and the overall organizational structure of the Arsenal. He addressed the recurrent problem of the supply of oak and exhaustion of the forests surrounding Venice by making proposals for improving the conservation of wood at the Arsenal and its use at every stage of the production process. Similarly, he argued that a new standard ship design could standardize work to ensure a more reliable product. As far as the organization of labour was concerned, Drachio recommended motivating the workforce by standardizing the work of gangs and specializing them according to the type of ship, member seniority, and support activities. He also

discussed about the more cost-effective use of labour and recommended measures to enforce discipline and coordination of work. Finally, Drachio considered the organizational structure of the Arsenal, which he thought should be led by a superintending executive with the power “to regulate, order, and reform the Arsenal, having authority and absolute power to remove, imprison or ban workers for a period, or for life” (see Zan, 2004b, p. 158).

Tadini wrote reports in 1593 and 1594 (see Zan, 2004b). Concerning materials, he addressed theft prevention and the reduction of material waste. As for the workforce, he argued that poor productivity stemmed from unreliable attendance, which rendered scheduling difficult. To enable standardization, Tadini made a forecast of the labour-cost structure at the Arsenal and proposed this to be conducted on a period basis. According to Zan, however, the most innovative aspect of Tadini's reports concerns the involvement of work gang bosses and clerks in the planning and control processes “to foster ... internal competition” (p. 160). He suggested a 6-month reporting period along with the enforcement of a scheme of rewards and punishment, the latter ranging from public shame up to removal of the gang boss from his position. Further, he supported a weekly breakdown of the 6-month reporting period, so that every Saturday the accountant would meet the supervisors to make forecasts and plan targets for the following week.

In general, the studies on accounting and managerial practice at the Venice Arsenal show how accounting innovations fostered management discourses (e.g., Drachio and Tadini). These discourses—and this is a recurrent theme with respect to state-owned monopolies—do not include any notion of profit maximization but, as Zan (2004b, pp. 165–166) notes, feature “a logic of common good, or public interest both in military and economic terms, inside an organization which cannot even be characterized as profit-seeking, but rather as a public body not operating on the market.” For example, the emphasis on materials consumption and waste reflected a preoccupation with proper management of the Arsenal rather than “efficiency” searches driven by a profit-seeking mentality. In this context, control measures over the labour force were subordinated to such purposes.

#### 4. Cost and Management Accounting Practices between the Renaissance and the Industrial Revolution

##### 4.1. Mercantilism and the State's Intervention in the Economy

Between 1630 and 1720, France underwent a period of economic recession now known as the *longue durée*. The stagnation of the country over such a long

<sup>3</sup>Drachio is a largely unknown character. Tadini was the accountant of the Arsenal (see Zan, 2004b).

period provided a basis for the ideas of the mercantilists. Mercantilism stressed five factors: the key role of precious metals in a nation's economy, which implied that countries lacking them should emphasize international trade in order to gain access to precious metals; industrialization, especially in textile manufacturing; thorough regulation of economic activity; the deployment of supervisory bodies to ensure the actual enforcement of regulations; and protectionism against foreign imports as a means of promoting domestic industries. The ideas of mercantilism are exemplified in the policies of Colbert, a Superintendent of Commerce and Comptroller of Finances in France, who enacted *règlements* that covered nearly every aspect of economic life. In the case of the textile industry, the *règlements* were aimed at ensuring product quality by categorizing dyers and by establishing six stages in the manufacturing process—a system that remained in use until the French Revolution (Herckscher, 1955). In order to foster economic reconstruction in a country characterized by limited social mobility and a lavish lifestyle among the wealthy, the state enforced a policy of royal manufactories, granting privileges to firms operating in sectors regarded as crucial to expand the industrialization project—for example, in 1665, to the Manufacture Royale des Glaces de Miroirs (MRGM), now known as Saint Gobain; see Bhimani, 1994a).

In Spain, the death of the last monarch of the Hapsburg dynasty in 1700 brought the throne to the French Bourbons. The mercantilist ideas current in the Bourbons' home country were particularly suitable for the Spanish setting, where just one-eighth of goods exported to the Spanish colonies in Latin America had been made in the country (Herr, 1958). In Spain, the implementation of mercantilism created a vast network of royal factories that, unlike those in France, were often state owned (e.g., the Royal Textile Factory of Guadalajara). Importantly, the fortunes of the Spanish royal factories were uneven; firms operating under strict monopolistic conditions (e.g., the RTF) were relatively successful, but those operating under certain market conditions sometimes went bankrupt (e.g., the Royal Textile Factory of Ezcaray).

#### 4.2. Royal Privileges, Royal Manufactories, and Cost Calculations

The case of France's MRGM constitutes an early illustration of the policy of mercantilism. As Bhimani (1994a, p. 402) explains, the state granted the company, which was owned by private shareholders, a 20-yr exclusive privilege to "make mirrors and other crystal objects ... for decorating royal houses and for the public to enjoy." Intending to deter the import of

such goods from Venice, which enjoyed the international monopoly of mirror making, the French government made provisions to attract mirror makers from Venice. MRGM underwent some substantial changes, including its amalgamation with Manufacture des Glaces de France (MGF) in 1695, as well as a number of financial problems that arose during the crisis that followed the Spanish war of succession in 1702. As a result, shareholders banned future borrowing and demanded exclusive reliance on MGF's own resources. As far as accounting was concerned, Bhimani (1994a) found that MGF reflected the rationale of order that characterized the first half of the eighteenth century, and that its shareholders enjoyed social prestige inasmuch as the company was operational, profitable, and liquid. As far as accounting was concerned, the firm used a charge and discharge system since its establishment in 1665 until circa 1820 (Boyns et al., 1997b, pp. 408–409; Lemarchand, 1994), and that aimed at "stewardship and safekeeping of the firm's resources" (Bhimani, 1994a, p. 414).

In Spain, the accession of the Bourbons brought more state intervention in the economy. As Helguera (1996, p. 115) explains, the Bourbons found an economy that looked like "a complete desert ... the consequence of the deindustrialization undergone by the country during a crisis that lasted the whole seventeenth century." During the eighteenth century, the state relied largely upon the notion of royal factories owned and managed by the state to ensure implementation of mercantilist ideas. The Royal Textile Mill of Guadalajara (RTM) was an early example of a royal manufactory that was launched in order to lessen Spain's dependence on other countries in such a pioneer industry as textile manufacturing (Carmona & Gómez, 2002). Other royal manufactories in this industry were located in Almagro, Ávila, Cuenca, Ezcaray, San Fernando, Segovia, and Vallejo. A shortage of qualified workers motivated the state to hire foreign technicians to run operations. In the case of the RTM, some 80 Dutch families were brought to Guadalajara to run production and to teach Spanish apprentices the specifics of textile manufacturing. The foreign masters earned fixed, high salaries that imposed a considerable burden on the firm (Carmona & Gómez, 2002, p. 234). This transfer of knowledge was organized around the guild structure that still operated in the textile industry in Spain and that aimed at protecting the interests of Spanish operators. In such a context, the pay imbalance between Dutch and Spanish workers provoked some organizational problems.

In contrast to other Spanish royal manufactories that operated under monopolistic conditions for fiscal

(e.g., tobacco) or strategic (e.g., gunpowder) reasons, the textile industry had to face competition from well-established foreign firms. From their inception, the royal textile manufactories in Spain reported financial losses (on Ezcaray, see Prieto-Moreno & Larrinaga-González, 2001; on Guadalajara, see Carmona & Gómez, 2002).

The manufacturing process at the RTM was governed by instructions that encompassed every aspect of the production process, which combined what present-day terminology would call mass production with stages characterized by craft technology. The organization of production around separable stages facilitated cost calculations. For the RTM, the archives show a considerable amount of cost data, although there is no trace of regular periodic calculation (Carmona & Gómez, 2002, p. 243). In particular, Carmona and Gómez reported that the RTM implemented standards to control the activities of both management and workforce and, for the latter, differentiated between Dutch and Spanish workers. The use of such calculations is shown by reports dated 1741 and 1742 and aimed at providing an objective basis for salary and wage costs. In 1742, the salaries of support departments were apportioned to production cost on a one-eighth basis to the cost of a yard of white twill. Such reports reveal a gradual evolution from guild control at the beginning of the century to formal cost control around the 1740s. In contrast to the predictions of Fleischman et al. (1995), who argued that standards for labour required more sophistication and therefore would be adopted later than those for raw materials, Carmona & Gómez (2002) found standards of control over labour in the absence of similar calculations for raw materials.

The Royal Textile Factory of Ezcaray illustrates another case of a royal manufactory operating in a competitive environment (Prieto-Moreno & Larrinaga-González, 2001). Like the RTM, the Ezcaray manufactory eventually filed for bankruptcy. For their observation period, 1767–1785, Prieto-Moreno and Larrinaga-González demonstrated that the firm deployed considerable cost calculations, a finding that supports arguments made by Carmona & Gómez (2002) concerning early cost systems in competitive markets. First, the Ezcaray manufactory enforced cost calculation that had an *ad hoc* rather than a periodical character (Prieto-Moreno & Larrinaga-González, 2001). Such calculations were performed by the accountant and two assistants, and included budgets and the use of cost data for pricing purposes. The high profile of the accountant in the management of the Ezcaray manufactory echoes a long tradition in

the Spanish public sector (e.g., in the construction of the monastery of El Escorial at the turn of the sixteenth century; see Zarco Cuevas, 1990). Second, Prieto-Moreno and Larrinaga González found no trace of integration between costing calculations and accounting data kept for external purposes—perhaps owing to the use of a single-entry bookkeeping method and, in the main, to the nonperiodic character of cost calculations. Finally, the management at the Ezcaray factory relied on cost calculations to support its claims for funding from shareholders as well as to get state subsidies from the Crown (see Prieto-Moreno & Larrinaga-González, 2001).

The RTF is regarded as the canonical case of management within the Spanish system of royal factories (Alvarez et al., 2002). This manufactory started operations in the late seventeenth century in Seville, the city having been given the tobacco production monopoly as compensation when Cadiz received the monopoly of trade with the Spanish colonies in Latin America. At that time, the RTF made snuff (its main product up to the mid-eighteenth century) and cigars. As the demand for tobacco products increased, the supervisory body of the RTF decided to move the factory premises to a purpose-built building outside the city walls. Operations began in these new premises in 1758, at which time the RTF employed 1,400 operators and contributed 28% of total Crown income (Artola, 1982). Following the spirit of the mercantilists, operations at the RTF were regulated by instructions issued by its supervisory body in Madrid. The regulations were highly detailed and comprehensive, covering matters such as the stages of snuff production, prevention of theft, accounting procedures, and measures to ensure product quality.

The RTF has attracted the interest of a number of accounting scholars (e.g., Álvarez et al., 2002; Carmona et al., 1997, 2002; Gutiérrez Hidalgo, 1993; Gutiérrez Hidalgo & Romero Fúnez, 2001a, 2001b; Romero Fúnez, 1997, 2005). Carmona et al. (1997) drew on the Foucauldian framework of power/knowledge to examine the functioning of cost accounting practices at the RTF (Foucault, 1977). From this perspective, accounting practices are part of a disciplinary system that instils self-surveillance and auto-regulation of organizational activities. Accounting constitutes a form of power/knowledge comprising regimes of calculation and associated discursive practices that operate as a scheme of surveillance. Such an approach, which had already been used by certain accounting scholars (e.g., Hoskin & Macve, 1986; Miller & O’Leary, 1987), had rarely addressed the disciplinary power of accounting in actual factories.



In 1773, the regulatory body of the RTF issued an instruction aimed at implementing cost accounting practices. Carmona et al. (1997) used this document, along with the regulations issued from 1744 through 1790 and the archival evidence on the actual practice of accounting at the RTF, to show how accounting mediated disciplinary practices for raw materials. The tobacco leaves were extremely expensive and there was high risk of theft and smuggling. To deter such malpractices, the RTF applied extensive accounting controls to the flow of tobacco as it passed from one production stage to the next, and established standards for production waste to minimize spillages, breakages, and “unnecessary” loss of materials during transportation within the factory and during the manufacturing process. Such accounting controls were reinforced by physical controls over operators and middle managers, for example, searching them as they left the factory. In general, Carmona et al. (1997, p. 413) found that the emergence of cost accounting practices in the RTF as a disciplinary regime was intertwined with the state’s recognition of the importance of tobacco as a source of revenue, but also with the status accorded to the RTF as a symbol of the might of the Spanish Crown. The implementation of accounting-based controls for direct labour and direct materials was particularly intense for those phases of the production process that were not susceptible to effective visual supervision and, hence, provided opportunities for theft and smuggling.

The case of the RTF also illustrates the relationship between accounting and spatial practices in the factory (Carmona et al., 2002). When the RTF moved into a purpose-built building outside the city walls, the intervention of detailed accounting calculations into factory space resulted in calculable spaces and a method for governing individuals. In particular, the system of cost centres enforced by the cost instruction of 1773 reconfigured factory spaces and enabled a system of discipline over areas and individuals with below-standard performance.

During the eighteenth century, Spain ruled many Latin American territories. The case of the gunpowder monopoly in New Spain (present-day Mexico) illustrates the extent to which cost accounting calculations across state-owned enterprises may have constituted a general phenomenon (Núñez Torrado, 2002a, 2002b). Gunpowder was of course a crucial military resource, and it also served an important function in mining, providing the country with the precious metals that the mercantilists deemed essential. Indications of mismanagement by those in charge of renting out this critical monopoly led the state to take over the production of gunpowder in

New Spain from 1766 (Núñez Torrado, 2002b, p. 281). This measure was enforced by José de Gálvez, a General Inspector of New Spain, who was instructed to maximize the income from the Crown monopolies and the collection of existing taxes. In 1777, Gálvez enacted an ordinance to regulate the production of gunpowder in New Spain. The ordinance covered the organization of production, the role of the accountant, and the nature of the production process for gunpowder, which differed according to its use either in mining or in the military. Overall, the findings of Núñez Torrado (2002a, 2002b) indicate that the gunpowder monopoly differed from the textile (e.g., RTM) and tobacco (e.g., RTF) industries in its use of accounting calculations for management purposes. Whereas the RTF used cost calculations to enforce discipline and surveillance on the shop floor and the RTM used them to differentiate individuals and enforce piece-rate systems, accounting controls in the gunpowder monopoly in New Spain were primarily aimed at tracking the flow of sensitive materials across the various stages of the production process.

The historical research into cost and management practices of Portuguese companies is still sparse. The study of Matos-Carvalho et al. (2004) on the Silk Factory Company in the eighteenth century constitutes a significant exception. This chapter examines the company’s methods of product costing, pricing, inventory accounting, expense recognition, and production control in the context of the political, economic, and social settings of eighteenth-century Portugal. Interestingly, for our purposes, Matos-Carvalho et al. found that cost and financial records were integrated at the Silk Factory. Furthermore, the main purpose of cost data was the calculation of a cost “price,” consisting of direct costs and an apportionment of indirect costs. This, the authors argue, enabled managers to compute the full cost of each order and, ultimately, inform decisions on price setting.

## 5. Competitive Markets and Crisis in the Nineteenth Century

### 5.1. The Wider Contexts of Cost Calculation

During the late eighteenth century in France, there was a steady tendency towards deregulation, market competition, and less intervention of the state in the economy (Bhimani, 1994a, pp. 415–422). French *philosophes* like Diderot, Montesquieu, and Rousseau had severely criticized mercantilism and its support of *ancien régime* privileges, but the implementation of their ideas had to await the end of the Napoleonic Wars in 1815 and the triumph of liberalism and market competition in France during the rest of the nineteenth century.

In Spain, in contrast, the end of the Napoleonic Wars resulted in the enthronement of King Fernando VII as an absolute monarch and heralded a return to the institutions of the *ancien régime*, including extensive witch hunts for anyone with liberal ideas and the restitution of the Inquisition on 13 May 1814. The ideas of absolutism “pervaded every aspect of economic life,” and the Catholic Church, “the genuine depository of the purest essences of absolutism” (Cuenca Toribio, 1976, pp. 115 and 116), regained its political and social influence. This ideological catastrophe for the liberals coincided with an economic crisis caused by the loss of Spain’s colonies in Latin America, and resulted in the succession of three finance ministers in the period 1817–1818. Throughout this politically turbulent century, Spain witnessed the continual alternation of liberals and conservatives in government, and such political turmoil tended to prevent the creation of industrial infrastructures in the country.

### 5.2. Industrial Accounting in Nineteenth-Century France

Historical research into the management accounting practices of French firms during the nineteenth century has focused on the implementation of industrial accounting (see Boyns et al., 1997a, 1997b). Industrial accounting—incorporating cost calculation into an accounting system based on double-entry bookkeeping—was developed by industrial enterprises for managerial purposes (Boyns et al., 1997a, p. 17) and has been linked by some commentators to the increasingly competitive markets that were experienced by France after the abolition of royal privileges (Nikitin, 1990, p. 78; 1996a, p. 94). There is general agreement with Nikitin’s finding that industrial accounting had begun by 1820 (Boyns et al., 1997a, p. 161).

MGF, a relatively early adopter of industrial accounting (Bhimani, 1994a; Nikitin, 1990), had four branches: its headquarters in Paris, mirror factories in Saint-Gobain and Chauny, and a soda factory in Chauny. Nikitin (1990) found that in accounting for glass production, the company distinguished among the three stages of the manufacturing process: pouring, abrasion, and polishing. This distinction resulted in sets of unitary costs for every stage of the manufacturing process (Nikitin, 1990, p. 79), which led to an overall example of process costing. In October 1832, the new double-entry bookkeeping system was fully implemented, along with its accompanying series of rules.

From the firm’s perspective, the cost of each branch included all its expenses for raw material, wages, and maintenance and repair, as well as all its

investments, including the construction of buildings. Nikitin (1990, p. 81) explains that the manufacturing cost determined the “price” at which the branches sold their production to the Paris headquarters, the only division of the company that could sell directly to customers. Thus a new cost price was calculated in Paris, including operating costs, depreciation, and dividends.

In his detailed account of industrial accounting at Saint-Gobain, Nikitin (1990) focused on five issues:

- (a) *Direct and indirect costs.* In the case of labour costs, indirect costs consisted of administrative expenses that formed part of the overhead.
- (b) *Production costs and cost per unit.* It was clear to the Board of Directors of Saint-Gobain that the rate of absorption of overheads was driven by production levels.
- (c) *Continuity of accounting methods.* These methods enhanced the comparability of data over time.
- (d) *Motivation of employees.* By 1833, Saint-Gobain had implemented a remuneration system that was scientifically based and its outcomes determined the amount of bonuses. In general, the variable portion of employees’ salaries ranged between 20% and 30%. This relatively large variable wage component reflected management’s initial distrust of operators.
- (e) *Depreciation.* Depreciation did not change during the eighteenth century, when it consisted of charges according to the actual value of buildings, machinery, and inventories. However, by 1872, the directors realized that the firm required heavy investment in machinery in order to deter competition. Consequently, the firm began to distinguish between ordinary depreciation “calculated according to steady rules” and extraordinary depreciation “determined by the Board of Directors according to the profit and rectifying the slow progress of the ordinary depreciation as regards the value of some items” (Nikitin, 1990, p. 90).

Overall, Bhimani’s (1994a, p. 433) examination of accounting changes at Saint-Gobain led him to conclude that they reflected more than mere technical and procedural methods applied in a void and in isolation from broader social, economic, and politico-cultural forces.

The French case of Decazeville exemplifies industrial accounting in one of the leading sectors of the Industrial Revolution: ironworks (Boyns et al., 1997a, pp. 155–161; Nikitin 1996b). As far as cost accounting was concerned, Decazeville focused on

the calculation of costs for intermediate products, transfer prices, and causes of cost variations. Intermediate products play a crucial role in the production process of iron. In Decazeville, the accounting procedures established that intermediate products would be valued at their direct costs and that no overhead rate would be charged to work-in-progress. The rationale was that finished goods were the products that interfaced with the market (Boyns et al., 1997a, p. 158). In contrast, the transfer price to be charged for goods exchanged internally became a contentious issue; although the firm stated that such transactions should be treated as if they were taking place between individual establishments, the absence of market prices for the intermediate products resulted in artificial prices that produced meaningless data and required considerable efforts in record keeping (see Boyns et al., 1997a, p. 159; Nikitin, 1996b). Finally, analyses of cost variations were conducted during 1838 and 1839 to explain how a decrease in production volume was accompanied by increases in labour costs and loan interests. According to Boyns et al. (1997a, p. 159), the analyses showed that labour costs had increased as a consequence of greater production in smaller batches, and that the higher total interest payments were caused simply by increases in the interest rate. In general, Boyns et al. (1997a) believe that cost accounting data did not play a dominant role in either the management of Decazeville or the disciplining of the workforce.

### 5.3. Industrialization and Cost Accounting Practices in Nineteenth-Century Italy

Research into cost accounting practices of Italian firms has emerged quite recently (Zan, 2004b). Such investigations have focused on the role of cost management in the increasingly competitive environments featured by that country from the second half of the nineteenth century. Antonelli et al. (2002) examined the records of La Magona d'Italia, a firm that operated in the iron, steel, and tinplate industries. La Magona implemented a cost accounting system that aimed to calculate production costs for purposes of inventory valuation, price setting, and, in situations of market competition, support for efficiency improvements. Antonelli et al. (2002) found that this system was heavily influenced by the ideas and practices of British firms operating in that sector, and was insulated from the influence of the long tradition of Italian accounting thought.

Antonelli et al. (2005) studied Manifattura Ginori, a pottery manufacturer whose double-entry book-keeping system both enabled cost calculation and fit the changing needs of the business as it evolved from

artisanal manufacturing to large-scale production. Manifattura Ginori used its cost accounting system to standardize repetitive tasks, set piecework wage rates, and establish product prices. The findings of Antonelli et al. (2005) indicate that despite the close links between Sèvres and Ginori during the eighteenth century, the former was an unlikely source of practices for the latter, although “other French manufacturers may have been.” In particular, Ginori’s cost practices were similar to those of firms like Saint-Gobain, the Baccarat Crystalworks, and the ironworks of Decazeville. In line with results found for La Magona d'Italia, the findings for Ginori indicate that cost practices seem more likely to have inspired accounting texts than vice versa.

### 5.4. Cost Calculations in State and Privately Owned Firms in Spain

The restitution of absolutism and the ideas of mercantilism in Spain, after the Napoleonic Wars, supported state intervention in the economy and a leading role for royal manufactories. The country experienced a severe economic crisis following the loss of its overseas colonies and accentuated by the desire of the wealthy to spend their money on luxury goods rather than investing it in manufacturing firms. Again, the wealth of the RTF archives has provided a basis for academics investigating the role of cost calculations in nineteenth-century firms in Spain (Carmona & Gutiérrez, 2005; Carmona & Macías, 2001; Macías, 2002a, 2002b).

Carmona & Gutiérrez (2005) examined the outsourcing of cigarette manufacturing at the RTF during the economic crisis of 1817–1819. The loss of the Spanish colonies diverted colonial remittances and donations from Spanish convents, which then experienced serious financial problems. Meanwhile, the RTF was considering launching a new product—the cigarette—which was expected to be much cheaper than the cigar and therefore to succeed in hard times. After the RTF had used its own operators to conduct several tests to calculate the production cost of cigarettes, management concluded that the product could not be marketed because of the high labour costs of RTF personnel. The product had to be manufactured by male operators because they dominated the RTF workforce and otherwise would create gender conflicts inside the manufactory. However, they earned higher salaries than their female counterparts and this made cigarette manufacturing unfeasible. It then occurred to the regulatory body of the RTF to outsource cigarette production to poor Catholic nuns in Seville. Although the nuns provided an ideal solution because they constituted a disciplined workforce in an enclosed

environment, the royal decree that granted them the cigarette production claimed that the concession was motivated by “the royal compassion.” Drawing on the Foucauldian framework of power/knowledge, Carmona and Gutiérrez show that the entire payroll of 14 convents manufacturing cigarettes for the entire Spanish market equalled the salaries of six female operators at the RTF in February 1818. Accounting was central to a disciplinary system that included strict quality standards, a time schedule for production delivery, standards for consumption of raw materials, and liability for any damage to the raw materials. Production demands kept the nuns working all day for minimal compensation, and some of the convents withdrew from the manufacture of cigarettes; convents with other sources of income had refused from the beginning to participate in the program. Nevertheless, Carmona & Gutiérrez (2005) suggest that the system was less intrusive than that of the panopticon, with its visual controls over operators (Bentham, 1787).

The role of cost accounting data in the relationship between the RTF and its supervisory body from 1820 to 1887 was examined by Carmona & Macías (2001), who drew on the insights of institutional sociology. By decree, the supervisory body requested that the RTF implement both cost accounting and a budgetary process, both in the organization and in its reporting. The RTF complied with the demands for a budgetary process while ignoring the request for cost calculation. Carmona and Macías attribute the state’s decree to (a) the state regulatory body’s quest for legitimacy, (b) the agency of senior employees of the state regulatory body, who were trying to retain their jobs and compensation packages on the eve of the industry’s privatization, and (c) the agency’s interest in instilling a basis for mimetic isomorphism within the monopoly (DiMaggio & Powell, 1983). The RTF’s different responses to pressures for reporting budgeting and cost information were explained by (a) the firm’s expectations concerning how much attention would be paid to nonconformity in the two cases, (b) the expected impact of institutional rules and norms on organizational goals, and (c) the extent to which the institutional source was consistent in its demands.

In 1887, the state was having trouble balancing the public finances, and management of the Spanish tobacco monopoly was leased to the Bank of Spain, a private firm (Instituto de Estudios Fiscales, 1976), with a consequent change in accounting systems. Drawing on a vast array of primary sources, Macías (2002b) demonstrated that privatization brought about the use of cost data for inventory valuation, decision making, and performance evaluation. In

agency theory terms, she found that privatization gave rise to new agency relationships; the contracts regulating such relationships provided new incentives for control and, hence, new demands for accounting information. Cost data began to be used for decision making after privatization, in 1887. Although such information was used to monitor managerial performance, this practice did not become a stated objective until 1891 (Macías, 2002b, pp. 53–54).

The imposing presence of the Spanish state in all spheres of life kept privately owned firms relatively small and unsophisticated, so there are few surviving records of cost management systems. Ruiz Llopis (2005) examined cost accounting practices at Trenor and Company of Valencia from 1838 to 1926. This firm provides an early example of diversification; its activities spanned trading, manufacturing, agriculture, and financial services. The system of cost accounting aimed to support the transfer of products between the factories and the headquarters and was fully integrated into the double-entry bookkeeping system of the firm; hence it constitutes an early example of industrial accounting in Spain (see also Boyns et al., 1997b). In general, the cost accounting system served purposes of inventory valuation and financial reporting (Ruiz Llopis, 2005, Chapter VI).

## 6. The Literature on Cost Accounting during the Nineteenth Century

During the nineteenth century among the countries on which this chapter is based, France made the primary contribution to the cost accounting literature. Nikitin (1992, quoted in Boyns et al., 1997a, p. 85) classifies the works of the French authorities into four categories: (a) texts on single-entry bookkeeping; (b) idiosyncratic texts on cost calculations within a double-entry bookkeeping system, which exerted little influence on later authors; (c) texts that were instrumental in establishing the doctrine of industrial accounting; and (d) texts on the development of industrial economics, which, according to Nikitin (1992), constituted an early predecessor of modern management accounting. Given the purposes of this chapter, I focus here on categories (c) and (d).

The works of Pierre-Antoine Godard-Desmarest constitute a fine contribution to the theorization of industrial accounting (see Nikitin, 1996a). Godard-Desmarest, a former General Inspector of the Army, purchased Baccarat Crystalworks in 1822 and ran the firm until 1839. During this period, the firm implemented an accounting system that provided management with an “effective knowledge of its costs.” Some commentators contend that the cost system was so effective and relevant that it gave the firm a competitive

edge over its rivals (Boyns et al., 1997a, p. 153). In 1827, Godard-Desmarest published his *Traité Général et Sommaire de la Comptabilité Commerciale* (Treatise on Commercial Accounting), a text based on his experiences in the army and at Baccarat. The innovative system of industrial accounting at Baccarat consisted of a double-entry bookkeeping system that included cost calculations and tracked the production flow at each stage of the manufacturing process.

In contrast to the complex production system actually used at Baccarat, which comprised multiple processes and multiple products, Godard-Desmarest illustrated his book with much simpler examples. As Garner (1954) notes, this book is particularly relevant in the discussion of accounting for inventory. Godard-Desmarest suggested that fluctuations in the valuation of raw materials during the year should be resolved by determining the average cost of such inventory at year-end. If monthly statements on the cost of raw materials were necessary, he said, “we must choose some value more or less inaccurate, and make the necessary adjustment at the end of the year” (quoted in Garner, 1954, Chapter 2). As far as work-in-progress was concerned, Godard-Desmarest argued that accountants should calculate costs for each stage of the production process and open accounts for each departmental work in process “to which would be debited the costs transferred from prior departments as well as the new costs incurred in the department (e.g., direct labour, fuel, and depreciation on equipment)” (quoted in Garner, 1954). He demonstrated particular concerns about quality, urging that materials be inspected and classified by quantity and quality, and that receipts and issues entered on “registers and notebooks [be] regularly kept, and under the responsibility of tried and tested accounting employees” (quoted in Garner, 1954).

Around the 1860s, publication of the works of Courcelle-Seneuil, Barlet, Heudicourt, Guilbault, and others marked the establishment of the new doctrine of industrial accounting (Boyns et al., 1997a, p. 92). This new approach, Boyns et al. argue, may be partly attributed to the emergence in France of “industrial (or business) economics,” a subject that had entered the curriculum of the Paris School of Commerce. Industrial economics benefited from the information provided by industrial accounting, and this, Nikitin (1992, quoted in Boyns et al., 1997a, p. 93) argues, exemplifies an increasing interest in the outputs of accounting systems, not merely in their technical aspects. The works of Guilbault are particularly relevant among those published by these authorities. According to Garner (1954, Chapter 2), Guilbault’s understanding of process costing was well ahead of

his time, for instance in the distinction between fixed and variable overhead costs. Drawing on examples gathered from mining, ironmaking, and sugar refining, Guilbault proposed the use of the average-cost method of pricing raw material into production (Garner, 1954). In particular, Guilbault argued that commercial, sales, and administrative expenses should not enter into the calculation of factory product cost.

## 7. Homogeneous Sections, Standard Costing, and Budgetary Control until the Second World War

The literature on cost and management practices in our four focal countries during the twentieth century has been developed mainly in France. The richness of the twentieth-century archival evidence on management accounting thought and practice has attracted both French and international accounting historians.

### 7.1. The Homogeneous Section: The Works of Lieutenant-Colonel Rimailho

The implementation of standard costing and budgetary control practices in French firms during the twentieth century is indebted to the efforts of a few visionary individuals. For example, the notion of homogeneous sections (*sections homogènes*) is crucial for proper understanding of cost accounting in twentieth-century France, as it came to underpin the cost accounting section of the first *plan comptable*. A homogeneous section is a cost centre organized around a main activity to enable the allocation of its costs to products or to other sections. This notion is strongly linked to Lieutenant-Colonel Rimailho (Bouquin, 1995; Lemarchand, 1999, 2002), who in 1927 was appointed head of the Commission Generale d’Organisation Scientifique du Travail (CGOST, later renamed Cégos). In that capacity, Rimailho realized that the calculation of full costs by allocating indirect costs via a single overhead rate was considered less satisfactory (Lemarchand, 2002). As a contemporary commentator noted,

The old rules (such as the one which consists in applying the same coefficient to direct labour) provide a thoroughly rough approximation, when absorption rates are about 200 percent. This is why industries with complex production tend more and more to divide up their operations so as to constitute homogeneous groupings where all the expenses are charged on to production. The exchanges from one group to another are valued by using internal selling prices. (DGA 054 07 611, Lelong, 1921, p. 16; quoted in Lemarchand, 2002)

Military plants traditionally enforced a system of workshops with specialized teams that led to a

rationalization of the production process. Drawing on his military experience, Rimailho proposed the implementation of homogeneous sections “in such a way that different specialized activities which make up the section are, in principle, employed in the same proportions for each task undertaken in the section” (Rimailho, 1928, p. 66; quoted in Lemarchand, 2002). This homogeneity enabled the use of an hourly rate, or any other allocation rate, to apportion overheads to individual orders. In the case of hourly rates, this enabled the calculation of the cost of an order as a function of the time spent in each section.

### 7.2. Scientific Management and Standard Costing

Early twentieth-century French firms deployed sophisticated cost systems (Bhimani, 1993, 1994b). Of particular relevance for this chapter is the case of Renault, the car manufacturer. The firm was founded by Louis Renault in 1898, and at the outset of the First World War it employed nearly 5,000 people. As Bhimani (1993, pp. 4–5) notes, the war brought about some changes in its production portfolio (the company supplying the army with war vehicles and munitions) and also in its internal accounting procedures. In 1916, the head of finance and accounting at Renault requested an independent assessment of the firm’s accounting system. The report suggested that accounting functions should be reorganized into four areas: financial accounting, accounting for material, factory accounting, and cost-price accounting. The new accounting method should conform to “*la méthode Taylor*” (in reference to Frederick W. Taylor’s *Shopfloor Management*). This notion was not a new one for the car industry (Zimnovitch, 2001), nor was it new to a firm that had, in 1912, submitted a directive entitled “Implementing work rates” to its workshop managers and production executives. According to Bhimani (1994b, p. 658), the directive detailed how time and motion studies and the rate payable to employees for individual tasks were to be coupled. After the time and motion studies led to work speed-ups, the workers complained that they could not keep pace and that improvements in productivity were not accompanied by salary increases. This conflict resulted in several strikes.

The weak relationship at Renault between productivity and operators’ compensation violated one of the basic tenets of scientific management and even prompted Taylor himself to write a letter to a member of Renault’s management team (Bhimani, 1993). The standardization of working practices continued at a steady pace during the next decade, although Renault established mechanisms to ensure “a calculable link between pay and the will to produce.” On

24 January 1928, the General Control Department established the correct method of payment for a particular machine operator (quoted in Bhimani, 1994b, pp. 664–665).

The operator will be paid as follows:

- (1) He will be paid a predetermined hourly wage rate. The workshop supervisor is responsible for calculating the amount and conveys the information to the wage accountant.
- (2) In addition to the hourly wage, operators are also paid a bonus. This bonus rewards the proper execution of tasks, savings obtained on overhead costs, the number of rejects, etc.
- (3) In addition to this bonus, another hourly bonus is paid to recognised seniority.

Bhimani (1994b, p. 671) contends that the implementation of such sophisticated cost accounting and control practices can neither be disentangled from the personality of Louis Renault nor from a complex web of mobilizing factors such as the need to rebuild the economy in the aftermath of the First World War, or the deployment of an 8-h day across the industry.

### 7.3. Problems with the Implementation of Scientific Management: The Case of Ansaldo in Italy

Ansaldo, a Genoa-based firm, operated in the inter-related fields of engineering, shipbuilding, and metal and steel manufacture during the second half of the nineteenth century and early decades of the twentieth century (Antonelli et al., 2004). The company experienced considerable growth until the early decades of the twentieth century, when it underwent severe financial problems that eventually resulted in the company’s being taken over by the Institute for Industrial Reconstruction, the state’s financial holding unit, in the 1930s. During the period 1903–1921, the firm was owned by the Perrone brothers, who demonstrated interest in scientific management but were not convinced that such methods were suitable in the small batch production that Ansaldo featured. During the market upheaval and financial problems of the post-war years, the Perrone brothers had little time to implement such changes in spite of being persuaded that they would benefit the firm. In the 1920s, an emphasis on efficiency brought about some changes towards a more scientific management approach, but it was not until 1935, when the state took management of the firm, that Ansaldo implemented organizational changes that conformed to prescriptions of scientific management. Importantly, the passing of Ansaldo into state hands catalyzed the adoption of scientific management, though the prevailing organizational structure acted as a barrier to change.

#### 7.4. Budgetary Control

In France, the implementation of budgetary control started in the 1930s (Berland, 1997, 1998a; Berland & Chiapello, 2004). Budgetary control consists of comparing activity forecasts (categorized into objectives or standards) with the corresponding achievements; the variance between these two figures is then interpreted as good or bad performance (Berland, 1998b, 2001). Research into the implementation of budgetary control in French firms has relied on the work of Nicolas Berland and focused on case studies (Berland, 1997), diffusion and dissemination patterns (Berland, 1998b), the levels of environmental uncertainty that fostered the implementation of the technique (Berland, 2001, 1998b), and international comparative studies (e.g., Britain and France; see Berland & Boyns, 2002).

Berland found that budgetary control comprised a number of individual practices such as standard costing, whose idea was known in France circa 1920 although there was a 40-yr lag until its actual implementation in firms (Zimnovitch, 1997). The new technique diffused through a number of mechanisms such as professional reviews, books, the role of organized groups such as Cégos, some professional organizations (e.g., engineers; see Berland & Boyns, 2002), and the experiences of the public sector (Berland, 1998a, 1998b). In spite of such awareness among French firms, few of them implemented the technique; and of those that did, many did not use budgets in every part of the organization. In his examination of dissemination patterns, Berland (2001) found that the factors that conduced to adoption of budgetary control by firms such as the Compagnie d'Electricité de Strasbourg (a monopoly) and Pechiney (a cartel; see Berland & Boyns, 2002, p. 343) included being able to formulate reliable forecasts and operating in stable environments. In France, the implementation of budgetary control was not restricted to large firms that had adopted a decentralized structure (Berland, 1998a).

#### 8. Conclusions

The review in this chapter suggests different patterns of historical research in our focal countries of France, Italy, Spain, and Portugal. In France, scholars have focused on the eighteenth through the twentieth centuries. In Italy, accounting historians have studied the evolution of accounting theory, while studies on the history of cost and management accounting have been mostly confined to the emergence of such practices around the turn of the seventeenth century and, recently, to cost accounting practices in nineteenth- and twentieth-century organizations. In Portugal, where

interest in historical matters has been growing, researchers have focused on the emergence of the accounting profession during the eighteenth and nineteenth centuries. Finally, in Spain, research on the history of cost and management accounting practices has focused on the eighteenth and nineteenth centuries, especially in state-owned enterprises. Such diverse patterns of research may be attributed to a variety of factors: the availability of archival sources, actual differences in the development of cost accounting practices in organizations, the interest of accounting scholars in particular periods, and the status of historical research in the community of accounting academics. This, in turn, makes it difficult to compare historical cost management practices across countries.

In general, however, the studies reviewed in this chapter suggest that social and political contexts overwhelmingly influenced cost and management practices in our focal countries. During the Renaissance, the ideas of the Counter-Reformation and the Scholastics exerted a considerable influence in the focal countries. As Quattrone (2004, p. 653) points out, some European monarchs found in the Roman Catholic Church a powerful ally in pursuing their absolutist projects. In conjunction with factors such as plagues, this may explain the strong intervention of the state in the economy to guarantee a "just price" through regulated markets. The perceived objectivity of cost calculations invested both the regulator and the owner with legitimacy in the public eye, even though cost data merely constituted a basis for price negotiation. In Italy, at the turn of the seventeenth century, the Republic of Venice owned its Arsenal for strategic and military reasons, but the Arsenal was also economically crucial. Its managers introduced sophisticated discourses that drew upon advanced notions of cost and work-in-progress, but such discourses were ultimately guided by the idea of public service rather than profit maximization (Quattrone, 2004, p. 649; Zambon & Zan, 2005; Zan, 2004b). This notion is spread throughout the eighteenth-century documents regarding Spain's network of royal factories. Finally, the increasing competition experienced by French organizations after the 1820s facilitated the emergence of cost accounting practices to enhance productivity. In Spain, conversely, the triumph of absolutism after the Napoleonic Wars halted the liberalization process and considerably hampered the industrialization of the country. Market intervention interacted with a severe economic and political crisis caused by the loss of the overseas colonies to insulate Spain from the ideas of scientific management that characterized the French setting (Bhimani, 1993, 1994b; Bouquin, 1995; Lemarchand, 1999).

The studies reviewed in this chapter question traditional contentions that double-entry bookkeeping spread from the fifteenth through the eighteenth centuries and that cost calculations have been implemented only since the advent of the British Industrial Revolution but more, especially, since the end of the eighteenth century. In contrast, this review has demonstrated that sophisticated cost calculations have been deployed in some of the focal countries since the Renaissance. In the case of Spain, for example, such early cost accounting practices existed but were not integrated into the double-entry bookkeeping system until the late nineteenth century (Ruiz Llopis, 2005). In contrast, evidence from the French setting suggests that the advent of competition after the Napoleonic Wars and the intertwining of cost and financial accounting considerably improved cost accounting practices in firms (Boyns et al., 1997a, 1997b; Nikitin, 1990, 1996a).

There are few comparative studies addressing the dissemination of cost accounting practices across the focal countries.<sup>4</sup> Much could be learned from examining the diverse patterns of cost accounting in comparable settings. In France, for example, where royal privileges were granted to private individuals around the turn of the seventeenth century, studies thus far have found no trace of cost accounting practices until the advent of competition in the country around 1820. Conversely, in Spain there is evidence of sophisticated cost calculations in royal manufactories since the first quarter of the eighteenth century despite their slow pace towards competition.

The studies reviewed in this chapter to some extent question the conventional wisdom stating that standards were applied first to raw materials and only later to the labour force. On the one hand, at the Venice Arsenal management efforts did primarily target raw materials and other forms of inventory (Zambon & Zan, 2005; Zan, 2004b). The same pattern is evident in nineteenth-century French organizations and in the textual material of French cost accounting authorities (Boyns et al., 1997a, 1997b; Garner, 1954). But the patterns in Spanish firms differed greatly; the Royal Textile Factory of Guadalajara implemented sophisticated cost controls that enforced discipline over employees though it had no control at all over materials (Carmona & Gómez, 2002), whereas the RTF simultaneously deployed strict control over materials and

employees (Carmona et al., 1997, 2002). Further research in this area may explain these differences.

Although the focal countries of this chapter witnessed similar contexts over considerable portions of the observation period of this chapter, cross-country comparisons are not easy, largely owing to different patterns of historical research. For example, while the eighteenth century has been extensively investigated in Spain, Italian academics still have good research opportunities for that period. Much understanding can be gained from comparative research into the cost practices of firms operating in the contexts addressed in this chapter, which differ from those that have been extensively studied in works already published in international journals.

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<sup>4</sup>This finding contrasts with the wealth of comparative research addressing Britain and France (e.g., Berland & Boyns, 2002; Boyns et al., 1996, 1997a, 1997b), as is noted above.



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# Management Accounting Practices in the People's Republic of China

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**Abstract:** This chapter surveys the current management accounting and control practices by Chinese companies and factors that affect their adoption. This discussion is placed in the historical context of management accounting practices in China. The Chinese government's open door policy and economic reform beginning in 1978 ushered in a period of increasing receptivity to modern management accounting applications. Since 1997, the pace of application has accelerated because of increased marketization and privatization. As a result, current management accounting practices, as reported by our sample of listed companies and a number of other recent surveys, have at best reached the third stage defined by the International Federation of Accountants (1998), though there are some fourth stage applications. Marketization and privatization, together with China's accession to the World Trade Organization, information technology, accounting education, and research, will continue to drive future development of management accounting in China

## 1. Introduction and Overview

The primary objective of this chapter is to provide an overview and assessment of management accounting practices in the People's Republic of China (hereafter China) from 1997 to the present. Specifically, it will

- examine the extent of management accounting technique applications (especially by listed Chinese firms);
- identify unique features of Chinese management accounting practices;
- identify factors that facilitate or hinder the application of management accounting techniques; and
- suggest possible future directions for the evolution and understanding of China's management accounting practices.

Through such description and analysis, readers should gain an insight into Chinese companies' current management accounting practices as well as the factors that influence them.

Although this chapter concentrates on practice, it will also examine education insofar as it affects practice. Also, China has a several-thousand years history and was one of the world's major economic and political powers during much of this time. It would be naïve to

think that China's business enterprises did not develop effective systems for record keeping and management, even if these were not labelled as management accounting. Hence, while we are primarily concerned with current practices, we will also review earlier developments to provide a more complete picture.

A major reason for focusing on the period since 1997 is that this year marked a major change in thinking in China's central government, which wields absolute power over how economic activities in the country are conducted. During the 15th National Congress of the Communist Party held in that year, the Secretary General of the Communist Party of China, Jiang Zeming, ushered in an ideological breakthrough by calling for experimenting with all forms of ownership that can be used to advance socialist productive forces (Jiang, 1997). In particular, he identified shareholding companies as a useful tool for transforming the thousands of state-owned enterprises (SOEs). While the earlier 14th National Central Committee of the Chinese Communist Party (Jiang, 1992) had already endorsed the use of capitalist institutional forms and management methods in its resolutions on the establishment of a socialist market economy, Jiang's (1997) report paved the way for politically and ideologically accepting joint-stock

companies as a means of organizing societal resources. Subsequently, there was a big increase in the number of listed companies (from 745 in 1997 to 1,377 by the end of 2004). A wide spectrum of Chinese companies also have intensified their study and adoption of modern—meaning Western-originated—management accounting practices.

At the outset, it is important to define what we mean by “management accounting practices.” Reconciling different terms used in China vs. the West for a given technique is beyond the scope of this chapter. Instead, we define the scope of management accounting by consulting the following sources: major management accounting textbooks (e.g., Atkinson et al., 1997; Hilton, 2005; Horngren et al., 2003), and survey literature on management accounting practice in North America (e.g., Brunner et al., 1998; Foster & Young, 1997; Garg et al., 2003; Groot, 1999; Lawson et al., 2003), Europe (Groot, 1999; Speckbacher et al., 2003) and China (e.g., Firth, 1996). On the basis of this process, we limit our focus to 23 different systems/techniques (“practices” hereafter). These practices include, for example, cost behavior analysis, cost allocation, activity-based costing/activity-based management (ABC/ABM), environmental accounting, standard costing, target costing, kaizen costing, operating budgeting, capital budgeting, performance measurement, transfer pricing, responsibility accounting, performance evaluation, compensation system, and value chain analysis. Acknowledging that many of them may have had historical Chinese counterparts under different names, and that management practices have both formal/explicit and informal/implicit aspects, we will refer to these as management accounting practices for convenience.

To initiate this examination, the section below will highlight the evolution of management accounting practices in China from historic times to the founding of the People’s Republic in 1949. Then, Section 3 will review political and economic developments relevant to management accounting practices in China from 1949 to the present. With the aid of this historical background, Section 4 will address developments in practice from 1949 to 1997, our watershed year, while Section 5 will focus on developments from 1997 to the present. Finally, Section 6 concludes the chapter with a summary and discussion of possible directions for future development.

## 2. Management Accounting in China Before 1949<sup>1</sup>

The use of accounting for management purposes in China has a recorded history that spans over 4,000

years. Feudalism was the norm during most of this period, and the dominant use of management accounting was for supporting government functions and institutions. Starting with a single-entry bookkeeping system in the Shang Dynasty (16th–11th century BC), government accounting had evolved to contain elements of bookkeeping, calculation, reporting and use of information by the Western Zhou Dynasty (11th century to 771 BC). Furthermore, the accounting function was accorded sufficient importance to merit its establishment as an independent department alongside ones responsible for finance and material management. Within the accounting department, there was segregation of duties between the handling and recording of cash transactions, cross-checking between and within departmental units, and cross-checking among daily, half-monthly, monthly, and annual reports.

The role of accounting was further expanded during the Spring and Autumn Period (770–476 BC) and the Period of the Warring States (475–221 BC). Criminal and economic laws were enacted that dealt with theft, embezzlement, nonrepayment of debts, loss of government properties, unfaithful reporting, and measurement. A warehouse management system also was established and regulated by law. Under this system, certain strategic materials were specially stocked to deal with wars, disasters, and other needs. The laws governing the system provided further impetus for the application of accounting in management.

Management uses of accounting became increasingly codified during the Qin Dynasty (221–207 BC). For example, laws enacted during this period required that accounts be carefully checked and to truthfully reflect actual economic events and material flows; accounting officers must be ethical and law abiding; and accounting records and calculations must be accurate. In addition, in cases of government official succession, successors were required to check their predecessors’ accounts and undertake stocktaking, and report the results to their superiors. There also were laws governing the receipt and issuance of materials and money, and spending norms were established for important expense items. The equation of “income = spending + surplus” was established. Finally, a system of production norms was introduced in government-run mills.

During the Western Han Dynasty (206 BC–24 AD), separate accounts were increasingly used to track specific expenses and to record the quantity and value of materials used by type. In the prosperous Tang Dynasty that followed (618–907 AD), independent monitoring and auditing departments were developed, and the three-element accounting

<sup>1</sup>This section is heavily based on Guo (1982, 1988, 2004).

equation of “income = spending + surplus” was replaced with the four-element equation of “beginning balance + new acquisitions – expenses = closing balance.” Another major innovation was the emergence of state budgets. At one time, such budgets were prepared not only for army units, provinces and counties, focusing on tax revenues, but there also was a special budgetary fund system which restricted the use of certain tax revenues for earmarked purposes, such as paying government officials’ salaries. The Five Dynasties Period of 908–959 AD did not seem to have produced much management accounting innovation. In the Song Dynasty (960–1279 AD) that followed, expense analysis was a major focus of attention. In addition to using comparative statistics across different types of expenditures, there was widespread use of revenue and expense norms and the provision of incentives for attaining these norms.

Two double entry bookkeeping systems emerged during the Ming Dynasty (1368–1644 AD) for internal checking and control. The first was called “San-jiao Zhang.” It was an incomplete double entry system because it used single entries for cash transactions, but double entries for credit transactions. The other system, called “Longmen Zhang,” was more advanced as it required all transactions to be recorded as double entries. This system also classified accounts into Jing (revenue), Gai (capital and liabilities), Cun (assets), and Jiao (expenses and taxes).

While accounting also was used to manage private enterprises throughout this entire period, such uses especially blossomed in the Ming Dynasty. For example, specialist “accounting offices” first became widespread during this period, although such specialization had emerged during the earlier Yuan Dynasty (1271–1368 AD). Large Ming Dynasty private enterprises often had accounting officers both at their headquarters and branches. The headquarters accounting officer would use general ledgers to control journals in branches. There was clear segregation of duties among accounting, cashier, transaction, operations and stock keeping, and important expenses were kept track of separately. In trading establishments, the cost of sales was calculated using the stock taking method (closing stock minus opening stock) or the highest purchasing price. The methods used by manufacturing and mining firms were more sophisticated. For example, expenses were separately recorded, and mining costs were tracked separately from smelting costs. Remarkably, there also emerged analyses of the relationship between production volume and profit.

The Qing Dynasty (1644–1911 AD) marked the end of feudalism in China. During the Qing emperors’ reign, China came under increasing influences from

foreign—especially European—powers. Chinese enterprises, which had business dealings with foreign companies, were especially influenced by the practices of their trading partners. For example, Zhongxing Coal Mining Company was able to provide systematic information about the cost of fixed assets, raw materials, auxiliary materials, and other production costs and expenses (Guo, 1988, p. 296). Accounts also existed of a large and prosperous family using a number of effective measurements and controls, including the segregation of duties, the control of cash, and the use of budget for planning (Chan et al., 2001).

Following the overthrow of the Qing Dynasty in 1911, the Nationalist government of the Republic of China enacted a series of accounting, auditing, and budgeting laws. The certified public accountants (CPA) profession emerged, accounting firms began to be established, and accounting became a major subject taught in universities and other learning institutions. Western debit/credit double entry bookkeeping and cost accounting were introduced and adopted by some (usually large) private business enterprises and banks. Some large manufacturing firms introduced control accounts or subsidiary ledgers to control major cost and expense items, and expenses were classified according to their nature, such as manufacturing, selling, administration, financial, and overhead. “Estimated” (standard) costing was also introduced, and expenses were distinguished from work in progress and finished goods.

This evolution of management accounting over China’s long history did not occur without the promulgation of many accounting and finance writings and theories. The idea of “spending no more than income” was adopted during the Western Zhou Dynasty. During the Western Han Dynasty, the difference among profit, expense, cost, and principal was recognized. During the Song Dynasty, many articles were written on how to reduce redundant expenses, of which some proposed making use of accounting data. The scope of discussion was broadened in the Ming Dynasty to become a theory of broadening revenue sources and reducing expenditures. The Ming Dynasty also saw the development of warehouse management theory to include elements of accounting, cross-checking, auditing, and operations management. During the Qing Dynasty, there were debates over government budgeting and final accounts.

In summary, over the course of China’s history, the use of accounting in management had evolved to include multiple strands, encompassing

- internal checking,
- external auditing,

- design of accounts and reports,
- design of accounting and auditing organizations,
- bookkeeping methods,
- specific control methods such as budgeting and standard costing,
- financial management theories and principles, and
- stipulation of accounting, auditing and other economic and management regulations.

However, whatever were the management accounting practices historically, they were uprooted following the founding of the People's Republic of China.

### 3. Historic Background: Political and Economic Developments from 1949 to the Present

The People's Republic of China was established in 1949 when the army of the Communist Party of China (CPC) drove the Nationalist government into exile on the island of Taiwan. Thereupon the CPC embarked on a program of class struggle between the proletariat and the bourgeois. The defeat of capitalism by socialism was viewed both as the end and the inevitable law of social progress (Mao, 1954; Yu, 1998). Waves of class struggle movements were launched. These included the suppression of the remaining "counter-revolutionists" who were pro-Nationalist Party and capitalist countries, confiscation of private lands in 1950–1952, and the socialist transformation campaign between 1953 and 1957 during which private enterprises were transferred into public ownership (CPC, 1981). An anti-Rightists campaign was launched by the CPC in 1957. Following the disastrous Great Leap Forward movement (1958–1960) designed to speed up economic development; there was a 4-year Socialist Education Movement to reinfuse revolutionary fervor into the party. Class struggle reached a peak during the Cultural Revolution of 1966–1976, which sought to eliminate the remnants of what were regarded as surviving capitalist tendencies.

Concomitant with these mass movements, almost all other major social, political, and economic policies were aligned in support of class struggle. Relevant to the purposes of this chapter are policies that favored state ownership, central planning, and self-reliance (closed door). In 1952, there were nearly nine million self-employed businessmen representing 35.5% of the total urban labor force. This proportion had dropped to only 1.6% by 1978 (Expert Group, 1995, p. 103). The Chinese economy's isolation from the outside world can be seen from its ratio of total imports and exports to gross domestic product (GDP), which was only 9.80% in 1978. This was a very low figure even when compared to other Third World countries (Cannon, 1983).

Central planning was considered the linchpin of socialism from the 1950s to the 1980s (Yu, 1998, p. 167). China's first five-year national planning system was established covering the period 1953–1957, and it cascaded from central government (which fixed prices) to local government.

According to Lardy (1978, pp. 133–148), the plan provided most industrial firms with a range of targets, mainly: (1) gross value of industrial output, (2) value of commodity output, (3) volume of output, (4) technical and economic targets (targets for utilization of equipment capacity, targets for consumption of raw materials, targets for labor-force consumption, targets for product quality, and targets for the level of mechanization), and (5) the rate of utilization of production capacity. This planning system continued and evolved into the 1980s. By that time, industrial firms would be given such targets as volume of output, product quality, product mix, consumption of raw materials and energy, costs of production, wages and salaries, profits and the permitted amount of working capital (Hare, 1983).

Under the central planning system, both the supply of materials and finance and sale of products were handled by government departments. Because of this, the main targets were quantity measures rather than financial measures. Outputs rather than the ratio of outputs to inputs are the main concern. Under such a system, business enterprises were merely units for implementing central plans with very little autonomy, and the government and the CPC controlled the hiring and firing of managers who were considered government officials. Further, each enterprise typically operated in a narrowly defined industry sector. The main incentive was moral/political rather than material, as workers and managers were awarded such titles as model workers or excellent managers rather than given any financial or material reward (Expert Group, 1995, p. 27).

In the accounting field, the main effect of the class struggle primacy was a clear distinction between socialist accounting and capitalist accounting (Yu, 1964). Western management theories and techniques were regarded as part of capitalist ideology and treated with caution by Chinese academics and practitioners (Bromwich & Wang, 1991). According to Scapens & Meng (1993), during the Cultural Revolution all Western concepts and techniques of business management were rejected as capitalist ideology. Instead, China imported Soviet accounting, which was politically compatible with China's ideological position both internally and externally. The imports included not just a uniform accounting system for financial accounting, but also internal accounting

management and control techniques such as internal economic analysis and budgeting. Generally, accounting was seen as a tool for central planning. To facilitate central planning, the government enforced the adoption of a uniform accounting system on business enterprise. This system typically consisted of a chart of accounts, explanations of how to apply the specified accounts, a set of prescribed financial statements, and detailed regulations concerning depreciation, costing, and spending.

The biggest problem of nonprivate ownership was “the socialist iron bowl” (lifetime employment and social welfare), or the soft budget constraint as opposed to the hard budget constraint faced by capitalist enterprises (Kornai, 1980). Firms were evaluated by their outputs, not profitability, and profits were totally appropriated by the state. Public ownership also gave rise to “shanbufeng” (no separation of responsibilities between the CPC and the government, or between the government and the firm, or between the government as the owner and the government as the manager). Property rights relations were unclear (Yu, 1998), and the concept of economic agency was ill-defined at best, or even absent as lines of responsibilities were blurred.

Under “shanbufeng,” the soft budget constraint, and government plan-based resource allocation, there was little incentive for individual firms to adopt efficiency enhancing management techniques (Kornai, 1980). Firms did not have to worry about over-spending and loss-making because losses were borne by the state, managers had little discretion, and profits were claimed by the state (Xiang, 1999). This situation is captured by two popular Chinese sayings: “Rou Lanzai Tangli” (individuals’ interests depend on the wealth of the state) and “Chi Daguo Fan” (everyone gets an equal share from one big rice bowl). Under such circumstances, Chinese accounting was reduced to bookkeeping (Yang, 1998). If there was any use of cost or management accounting, the focus was on achieving planned output targets. In addition, initiatives for cost control most likely came from the state as macroeconomic concerns dominated enterprise concerns.

As recognition widened that the class struggle/collectivization approach was creating disastrous economic consequences (CPC, 1978; Expert Group, 1995), a switch to an economic development (productive forces) primacy was stipulated at the Third Plenum of the CPC’s 11th National Congress in 1978. The main social contradiction was considered to have shifted from that between classes to the tension between China’s increasing material and cultural demand and its relatively underdeveloped productive forces (Zhao, 1987). The architect and power behind this switch, Deng Xiaoping (1979, p. 231), argued that

political activities and economic reform should be judged according to whether or not they contribute to developing socialist productive forces. This criterion is captured in Deng’s famous slogan: “a good cat is one that catches mice, irrespective of whether it is a white cat or a black cat.” That is, any means can be used to develop socialist production forces.

The shift to economic development primacy was followed by the introduction of policies that encouraged an open door, mixed (i.e., both state and private) ownership, and marketization. Four special economic zones were created (in Shenzhen, Xiamen, Zhuhai, and Shantou), coastal, and then major inland cities were opened to foreign investors, Sino-foreign joint ventures blossomed, and there was a massive increase in international trade. A small number of companies began to experiment with the shareholding system in 1984, in which the state, institutions (state-owned or not), and individual investors held shares of the firm (Expert Group, 1995, p. 87). In 1988, private ownership secured the protection of China’s Constitution for the first time and in 1990 and 1991, respectively, the Shanghai and Shenzhen stock exchanges were established. By the end of 1999, there were over 1.28 million private firms employing 17 million people, and 31 million sole traders (Liu, 1999, p. 350). The opening of China’s economy was given a big boost by its entering the World Trade Organization (WTO) on December 11, 2001. The ratio of imports and exports to GDP, which had risen to 36.21% in 1997, grew further to 69.36% in 2004 and the use of foreign capital also rose dramatically, from US \$4.46 billion in 1985 to US \$60.63 billion in 2004. (Source: Website of the National Statistics Bureau of the People’s Republic of China; <http://www.stats.gov.cn>)

Concomitant with the opening of markets and the emergence of private ownership, reforms were undertaken to make SOEs economically more independent and responsible. Between 1978 and 1983, SOEs were given more autonomy and allowed to retain a share of profits and depreciation reserves. In addition, the source of working capital was changed from state injection to bank loans, and a tax on fixed assets was levied. One widely adopted structure was the “Economic Responsibility System,” which required the SOEs to guarantee the government’s profit share. Over 80% of industrial companies adopted some variant of this system (Wang, 1998). Between 1983 and 1986, SOEs were given greater autonomy in 10 areas: planning, sales, pricing, procurement, fund use, production decisions, organizational arrangements, personnel and labor management, salaries and wages, and cooperation. SOEs that failed to be self-sustaining were allowed to go bankrupt.



During 1987–1992, most small state-owned companies were sold or leased, while a contracted operational responsibility system was introduced to larger SOEs (Expert Group, 1995). This entailed extending the SOEs' economic responsibility beyond profit to also encompass major input and output measures. While many forms of this system existed, they shared the following features. First, all involved a contract-based relationship between the enterprise, usually represented by its top managers, and its supervisory state agency. Second, the managers faced substantial risks and rewards as a result of participating in these schemes, because their performance was linked to their enterprises' performance. Third, there was open selection of enterprise managers. Finally, most systems had multiyear targets and incentives in order to curb management myopia.

Thus, for both private and publicly owned enterprises, the 1980s saw a marked expansion in both the latitude and demand for practices to improve efficiency and effectiveness. Within SOEs, the "Economic Responsibility System" and "Contracted Operational Responsibility System" gave rise to "Internal Economic Responsibility Systems," whereby performance targets were set for various levels of managers and departments, and salaries and wages were linked to the attainment of such targets. In the private sector, there was increased scope for accounting to perform a contracting role and to support efforts at profit generation. The changes made it necessary for distributable profits to be determined more meaningfully than before. The experiments with the shareholding system that began in the middle of 1980s also raised the issue of maintaining shareholders' capital. More generally, the steady shift from a centrally planned to a market economy also increased business enterprises' exposure to competition and risk. Among such enterprises, the foreign invested firms were the first ones to adopt modern management accounting techniques, and played an important role in the propagation of such practices (Firth, 1996; O'Connor et al., 2004).

Further reforms were ushered in by Deng Xiaoping. In his well-publicized South China tour, he (Deng, 1992, p. 94) asserted that neither central planning nor the market is exclusive to either socialism or capitalism; hence the market mechanism can be used to develop socialist productive forces. These remarks set the stage for further acceptance of private ownership and the opening of markets (Jiang, 1992). Since 1993, economic reforms have focused on the establishment of a "modern enterprise system." This system was conceptualized in the Decisions on Issues Relating to the Establishment of Socialist Market Economy made at the Third Plenum of the 14th National Congress of the

CPC in 1993. It was considered to have four characteristics: clear property relations, well-defined responsibilities and duties, separation of government and enterprise, and scientific management. Joint-stock corporations were taken as the main form of modern enterprise system and increasingly, parts of large SOEs were carved out for listing on the Shanghai and Shenzhen stock exchanges. By the end of 2004, a total of 1,377 firms were listed on these exchanges, with a total market capitalization of US \$448.6 billion, or about 36% of China's GDP. (Source: Website of the Chinese Securities Regulatory Commission (CSRC); <http://www.csrc.gov.cn>)

As an increasing portion of the economy was pushed by market forces to adopt more sophisticated or effective management practices (including management accounting), impetus also came from initiatives of the Chinese regulatory bodies. For example, the Corporate Law of 1994 stipulated the establishment of new internal corporate governance mechanisms including shareholder meetings, a board of directors, and a supervisory board. In 2001, the CSRC issued Guidance on the Establishment of an Independent Directors Monitoring Mechanism in Listed Companies that required all domestic listed companies to appoint independent directors. In 2002, the CSRC and the State Economic and Trade Commission jointly issued Standard on Corporate Governance to regulate duties and obligations of boards of directors, senior managers, and supervisory boards.

About a decade ago, Scapens & Meng (1993) identified a list of barriers to the adoption of Western management accounting theories and techniques. These included state protection of bankruptcy, SOEs' dependence on state subsidies, the existence of non-economic goals for enterprises, the uniform accounting system unfamiliar to Western investors, and lack of training of most accounting personnel. As the preceding historical overview has shown, subsequently many of these barriers began to be dismantled, setting the stage for more extensive use of Western/modern management accounting tools in China.

#### 4. Management Accounting Practices from 1949 to 1997

Information on management accounting practices in the 1949–1997 period is available from a small number of studies. This section will briefly summarize these studies by further differentiating between the years up to 1978 and thereafter. In 1978, the third Plenary Session of the CPC's 11th National Congress officially adopted economic development primacy over an emphasis on class struggle, thereby opening

up the economy to the adoption of “capitalist” management techniques.

#### 4.1. Management Accounting Practices from 1949 to 1978

On the whole, management accounting practices from 1949 to 1978 were dominated by the needs of central planning, and were modelled on Soviet practices (Yang, 1998). Many of these methods had, in turn, been imported by the Soviet Union from the West in the 1920s and 1930s. Economic enterprises, all of which were state-owned and controlled, or collectively owned but managed as if they were state-owned, were subject to a set of industry-based uniform accounting systems. These systems included not just a chart of accounts, but also detailed prescriptions on depreciation rates, age and scrap value of fixed assets, standards of expenditure, and grades of salaries. Consistent with an emphasis on collectivization and state ownership, mass line accounting (or accounting based on group, shift, and counter)<sup>2</sup> was widely used in the 1950s and 1960s by enterprises (Maschmeyer & Yang, 1990; Skousen & Yang, 1988). Under this system, groups of workers were assigned planned production, cost, and profit targets. In contrast, top managements of these enterprises, who were typically appointed by the government and lacked decision-making authority, were only responsible for production quotas instead of financial targets.

To examine these developments in greater detail, the Chinese economy was on the brink of collapse at the end of the Civil War (1946–1949). There was high inflation, a serious shortage of materials and commodities, poor production capacity, and widespread economic and social disarray. To restore order to the war-torn economy, the central government issued “Decision on Unifying Fiscal and Economic Work” in 1950, requiring unified fiscal revenue and expenditure management, centralized material distribution, and cash flow control. It also promulgated a series of uniform accounting systems for government budgetary units and industries, which covered the preparation of financial statements, accounts, ledgers, documents, transaction processing procedures, and accounting systems flowcharts (Xiang, 1999). In addition, the government called for establishing a “business accounting system” with two central tasks: (1) appropriately define the relationship between the state and the firm with an emphasis on their accounting and financial management relationship (i.e., to make firms relatively

independent of the government in financial terms); and (2) normalize financial management and accounting and establish a financial and accounting order within and outside firms (Xiang, 1999). Under these policy initiatives, firms that already had some business accounting foundation were required to focus on factory cost control, fund management, and technology management, and to adopt piece rate pay; those with no business accounting foundation were asked to prepare production, operation, financial and cost plans, count and verify assets, and establish financial and cost management norms. These practices were guided by stipulations related to such aspects as the preparation of financial income and expenditure plans, the calculation and submission of depreciation, profit allocation and determination, assets and funds verification, how to determine the firm’s fund quotas, annual reporting, and the provision and use of incentive funds.

The state-owned enterprises under the Ministry of Railways were the first to implement the mandated business accounting system. All railway firms had adopted the system by 1955 and by 1958, had extended it to the level of workshops and groups/shifts. Firms under the Ministry of Trade started to adopt the system in 1952, and implementers were granted relative independence with a predefined quota of funds and autonomy within the limits of state plans, and could settle transactions through banks rather than internal transfers as practised before. Firms under other ministries followed after 1953. For example, the Ministry of Machinery Industry required that subordinate firms prepare and implement monthly revenue and spending plans, and specify performance indicators for workshops. In 1956, the ministry further required the general managers of these firms to directly manage finance and accounting, push implementation of the business accounting system to the level of shifts/groups and functional departments, improve original accounting records and basic accounting and statistical systems, establish a technoeconomic and financial analysis system, use technoeconomic and financial analysis meetings as a way to audit their firms’ final accounts, and strengthen daily control of fund use and expenses.

Adoption of the internal business accounting system redefined and clarified the financial and accounting relationship between the firm and the state. The firm must prepare its own production and financial plans, which must be approved by the government. These plans would be used to assess the firm’s annual performance. Depreciation allowances and profits must be submitted to the government, and additional funds must be obtained from the government or through temporary bank loans. A system of fund

<sup>2</sup>Many different terms are used to describe Chinese management accounting practices before the 1980s. Where possible, we adopt the terms defined in Lou and Farrell (1985).

management by norm was established under which quotas were determined for three categories of funds (fixed funds, current funds, and special purpose funds such as incentive fund and firm development fund) (Xiang, 1999). Accordingly, a fund accounting system was in operation (Zhou, 1988). The balance sheet was structured so that the total fund inflows equal total fund application. The former consisted of fixed fund sources, current fund sources, and special purpose fund sources, which were matched respectively with fixed assets, current assets, and special purpose assets. The three types of fund sources could not normally be used interchangeably. That is, fixed fund sources could not be used for the purchase of current assets. In consequence, the balance sheet consisted of three relatively independent sections on both sides: fixed assets and fixed fund sources (from the state and retained profits); current assets and current liabilities; and special purpose funds and assets for specific uses.

By 1957, implementation of the business accounting system was complete. This system was considered a major contributor to the rapid improvement of economic conditions during China's first Five-Year Plan which spanned 1953–1957: industrial gross product value increased at an annual rate of 18%, current asset turnover increased from 123.9 days to 82.7 days, and return on assets increased from 21.2 to 22.3%.

The business accounting system and more broadly, enterprise management was severely weakened by the Great Leap Forward Movement of 1958–1960 (Xiang, 1999). Many accounting regulations were cancelled and the accounting departments in many firms were dismantled because specialist accounting was labelled as being opposed to the masses. Incentive approaches such as piece rate pay were replaced by egalitarian incentive plans. Macrofinancial controls also were weakened. For example, it became acceptable to use current funds for infrastructure construction; materials could be freely transferred between government departments, between firms, and between government departments and firms; and banks gave loans to firms and finance bureaus approved spending without fulfilling strict procedures.

The Great Leap Forward was an economic disaster, and from 1961 to 1964, many measures were undertaken to repair the damage. These included restoration of the internal business accounting system and strengthening macromanagement of accounting and finance. For example, the State Economic Commission and the Ministry of Finance (MoF) imposed the requirement that all industrial and transport enterprises appoint a chief accountant. Many firms established and/or strengthened their three-level factory–workshop–group business accounting system. Skousen & Yang (1988)

and Maschmeyer & Yang (1990) characterize this as an “internal profit system.” According to these authors, each plant or workshop was considered a profit center and given responsibility for making a profit contribution to the enterprise, even though it was not given the authority to price or sell products. Functional departments were also assigned targets. In determining the profit contribution of each subunit, transfer pricing was used for intracompany transactions. Many enterprises adopted management accounting techniques relating to cost centers, including norm costing, inventory planning, and control. In addition, techno-economic analysis was undertaken to analyze usage (consumption) variances by integrating technical analysis with cost/economic analysis.

The use of accounting for management dealt with another major setback in the Cultural Revolution of 1966–1976 (Xiang, 1999). Profit was condemned as a corrosive that would destroy socialist production relations; accounting regulations were criticized as Revisionist Guan (monitoring), Ka (control), and Yan (suppression) and terminated; business accounting was attacked because “everything belongs to the whole people and thus there is no need for accounting”; many accountants were reassigned to production workshops; and accounting education was largely suspended. Although there were signs of recovery after 1972, management accounting applications remained depressed until the end of the Cultural Revolution.

Taking this period as a whole, Yang & Xu (1997) believed that despite the dominant roles of central planning and government regulation, a considerable range of management accounting techniques still managed to be developed and used. They suggested that many of these techniques (e.g., cost plan, financial plan, cost accounting, master budgeting, and internal appraisal) differed from ones in the developed Western economies only in name. Ji (2001) shared this view and classifies Chinese costing methods into two categories of Western costing approaches. First, similar to Western job-order costing, there were variety or assortment costing, group costing, and batch costing in China, the objects of which are a variety of products, a batch of products, and a group of products, respectively. Second, like Western process costing, parallel process costing and sequential process costing were practiced in China. Under the former, the proportion of the cost of finished goods is calculated for each production step and then transferred to finished goods. By contrast, under the latter, the cost of the semifinished goods rolls over to the next stage where new costs are added.

Ouyang (1998) also concluded that Chinese enterprises used a wide range of management accounting techniques in this period. He noted in particular five

features of these techniques. First was a comprehensive cost planning system and related preparation methods, especially a project forecasting method that distinguished past year cost reductions from planned savings in the planning period. Second was a set of cost control methods for various types of costs (material cost-capped material usage system, job and quota accounting methods; wages—labor quota, attendance rate, nonproduction hours, control of worker number; and expenses control—expense limit manual and factory currency). Third, China developed norm-proportion costing, simplified cost allocation between finished goods and work-in-process, and developed a parallel process cost allocation approach. Fourth, cost analysis had evolved to relate costs to production features of the firm; from actual vs. plan comparison, period-by-period comparison to comparing company against an industry standard; and from enterprise as the unit of analysis to internal units as the unit of analysis. Fifth, many Chinese enterprises made use of what he termed “democratic and mass line cost management.” Specific techniques included vertical and horizontal cost responsibility management which allocated cost targets to different departments, operating units, and individuals as responsibility centers; and shift-, group-, and workshop-based business accounting systems.

Regardless of the state of management accounting practices at this time, Maschmeyer & Yang (1990) gave several reasons why they may not have contributed to the effectiveness of Chinese enterprises. First, profit was not a major concern because almost all prices were dictated by the central government, rather than by demand and supply. Within this setting, enterprise managers had little decision-making authority beyond the narrow function of production. Even within this limited sphere of authority, managers' motivation to improve performance was undermined by the lack of tangible rewards for better performance.

#### 4.2. Management Accounting Practices from 1979 to 1997

Chinese management accounting practices from 1979 to 1997 were heavily influenced by changes in accounting institutions and regulations as a result of changes in economic policy. Below, we review these changes to provide a context for examining developments in management accounting practices.

##### 4.2.1. Changes in Accounting Institutions and Regulations

The CPC's adoption of economic development primacy in 1978 marked the beginning of many significant

changes in Chinese accounting. That year, the State Council issued Regulations on Rights and Duties of Accounting Personnel, which required enterprises to appoint a chief financial officer (CFO) or chief accountant at a level equivalent to a deputy general manager. The Accounting Society of China was established the following year. The Society is an academic association equivalent to the American Accounting Association and the British Accounting Association although many accounting and finance practitioners and policy makers also play an important role in it. At the inaugural meeting, an eminent professional leader and an eminent academic jointly made a forceful claim that accounting is a type of management activity rather than just a management tool (Yang & Yan, 1980). This proclamation stirred up wide debate and had a far-reaching impact on accounting theory and practice. This is evident from inclusion of the “accounting management” concept in the Accounting Law (1985) that is becoming a guiding principle for accounting reform (MoF, 1991).

In 1980, the China Association for Cost Research was established to promote research on cost management and control at both firm- and macro-levels; the first accounting firm also emerged. In the same year, China not only restored, but also expanded the uniform accounting systems by issuing a comprehensive Accounting System for Industrial Enterprises (The Chart of Accounts and Financial Statements) and Regulations on Fixed Asset Depreciation. In 1984, when the CPC Central Committee (CPC, 1984) issued an outline of economic structural reform, the State Council stipulated Regulations on Cost Management in State-Owned Enterprises to strengthen government control over costs. In 1985, the Accounting Law was promulgated. It granted accounting the highest possible legal recognition, required medium-sized and large firms to appoint a chief accountant, and legally recognized the emerging accounting firms. The Accounting System for Sino-foreign joint ventures also was established. This was a first step towards international harmonization by adopting many internationally prevailing basic accounting concepts.

The Chinese government continued to strengthen the uniform accounting system by issuing a set of Rules on Costing in State-Owned Industrial Enterprises in 1986. In 1988, the China Institute of Certified Public Accountants (CICPA) was established which is similar to the American Institute of Certified Public Accountants (AICPA) and Institute of Chartered Accountants in England and Wales (ICAEW). In 1992, the MoF issued: (1) the Accounting Standard for Business Enterprises, which became a framework for issuing specific accounting standards and 13 industry- and

ownership-based accounting systems; and (2) the Financial Standard for Business Enterprises as a guide to corporate financial management. Since 1993, the CSRC has developed a set of regulations on corporate disclosures by listed firms (Xiao, 1999). In 1994, the CPA Law was promulgated. In 1995, the MoF issued a set of measures for SOE performance evaluation including both financial measures and social contribution ratios. Also in 1995, the MoF began to issue Independent Auditing Standards which are drafted by the CICPA (Xiao et al., 2000). Two years later, the MoF issued the first of a series of specific accounting standards, such as The Disclosure of Related Parties and Their Transactions. Continuing into the post-1997 period, in 1998 the MoF established the Chinese Accounting Standards Committee. In 2000, the State Council issued Enterprise Financial Reporting Regulations, redefining financial statement elements in accordance with the conceptual framework of the International Accounting Standards Board. In the same year, the MoF issued an Enterprise Accounting System to replace the 13 industrial or ownership-based accounting systems that had been in place since the 1950s (Xiao et al., 2004).

It is obvious from the preceding discussion that policymaking in the accounting arena had focused on financial accounting, auditing, and reporting. The government did issue several regulations for cost control and accounting, but these were still underpinned by its macroeconomic management concerns. While it was inevitable for some attention to be paid to management accounting due to the link between management accounting and external reporting, both accounting practitioners and academics were preoccupied with digesting the financial accounting changes in this period (Jones & Xiao, 1999). This likely slowed the modernization of Chinese management accounting practices.

#### 4.2.2. Management Accounting Practices from 1979 to 1997

Adoption of economic development primacy opened the door for Western/modern management accounting methods to be openly introduced to China. Much of this started with the translation of Western textbooks in the late 1970s. Bromwich & Wang (1991), citing surveys undertaken in 1981, identified cost-volume-profit (CVP) analysis and responsibility accounting as the two techniques that received the highest levels of acceptance in practice around this time (79 and 54%, respectively). Other adopted techniques were standard costing (38%), capital budgeting (30%), and operational budgeting (3.7%). Focusing on the 1980s, Skousen & Yang (1988) claimed that the contribution margin concept and CVP technique were the most extensively applied.

Scapens & Meng (1993) observed that by 1993, a range of Western short-term and long-term decision-making and control techniques had been adopted. These included CVP analysis, responsibility accounting, standard costing, variance analysis, contribution analysis, variable costing, transfer pricing, and investment appraisal techniques. They noted, however, that the spread of these techniques and concepts was held back by a lack of knowledge on the part of average Chinese accounting personnel.

Despite some shared features with Western management accounting practices, Liu et al. (1998) held that Chinese practices had major differences from them. In particular, they argued that Western responsibility accounting is richer than that practiced in China, and that management accounting under the planned economy was far from perfect. Comparing Western master budgeting with China's technical and financial planning, they asserted that the latter starts from targets passed down from superiors while the former starts from market or sales forecasts; the former is authoritative and relates to compensation while the latter does not; the former involves the whole firm, its components, and their heads while the latter does not involve subunits and heads; the former emphasizes such value indicators as capital, cost, and profit whereas the latter stresses production and physical indicators.

Judging from the number of enterprises that adopted the "Economic Responsibility System" and "Contract Operational Responsibility System," it is likely that responsibility accounting had been adopted by a majority of industrial enterprises in the 1980s and 1990s. However, typical Chinese responsibility accounting practice differed in several ways from that described in Western textbooks (Bromwich & Wang, 1991). Most notably, the goals in Chinese firms were quantitative output in contrast to profit in Western firms. Also, Chinese responsibility accounting had a group orientation, compared with the individualistic orientation in the West. Another feature of Chinese responsibility accounting was that an internal bank was established as a center for internal transaction settlement, credit and funds use control, and responsibility management. Internal banking practices that emerged as early as 1970 were promoted by the State Economic Commission (which later became the State Economic and Trade Commission) in 1979, and became widely adopted in the late 1980s and early 1990s (Zhang, 1993).

During this period of evolution, successful adopters of new techniques were often held up as examples for others to follow. Prominent among these was the Handan Iron and Steel Co. (Hangang), which, among

other things, implemented a system of “market simulation-based accounting and cost negation” in 1991. Under this system, Hangang set internal transfer prices among branch factories by taking the average market prices of half-finished goods, adjusting these for market changes half-yearly or yearly. The transfer prices were included in calculating each factory’s manufacturing costs and gross profit, and administrative expenses and financial expenses were deducted from the latter to arrive at the profit figure. If a factory’s manufacturing cost was lower than the target set by the company, then there would be a reward. Otherwise, no reward would be forthcoming (a practice that was referred to as “cost negation”). A comparison between target profit and calculated profit was also used for determining incentives.

Hangang’s system was considered a major factor in the company’s economic success. Between 1990 and 2000, total assets grew from 187,681 to 2,011,522; profit from 100 to 51,146, and net assets from 59,391 to 769,880 (all in units of 10,000 Renminbi (RMB)). The company was visited by over 100,000 managers from 14,000 organizations in 22 industries and 28 provinces (Xu, 2002). In an analysis of Hangang’s system, Wang et al. (1997) isolated three primary characteristics: (1) the application of role theory and incentives theory, (2) the use of market pressures: market price replaces planned price, and (3) the existence of team spirit. Wang (1998) considered the Hangang system to be very similar to target cost management in Japan in the use of market price, backward calculation of cost target, widespread employee involvement, and the principle of cost negation. However, Sun & Cao (2000) disagreed. They pointed out that the focus of target costing is *ex ante* management of product design, whereas Hangang’s focus was *ex post* evaluation, as reflected in its “cost negation” principle. Sun and Cao also emphasized that target costing considers approaches to cost reduction via collaboration with business partners, whereas Hangang still was heavily internally focused. Thus, even in the case of an exemplary Chinese business enterprise, the application of management accounting techniques still lagged behind cutting-edge practice. However, Xu (2002) has reported that Hangang’s cost management system has evolved to place an increasing emphasis on *ex ante* cost design.

Broader-based findings on management accounting practices in the 1990s are reported by a number of survey studies. However, many did not provide sufficient details (e.g., instrument, procedures) for evaluating their face validity. Among those that seemed to be reasonably reliable, Feng (1997) investigated management accounting practices in Zhejiang Province,

and found responsibility accounting to be widely applied. Nanjing University International Accounting Department Project Group (Nanjing, 1997a, b) surveyed 105 Chinese companies about their application of management accounting techniques, with a response rate of 23%. They found that 11 out of 81 management accounting techniques were being used by 60% of companies, 13 by 40–59%, and 21 by less than 20%. The report also indicated that the most frequently used methods were closely related to financial accounting (e.g., financial and other statements such as cost, receivables, revenues, etc.), had a long history of practical use (e.g., divisional expense quota; expense management by category, etc.), were widely promoted (e.g., CVP), and were deemed to be suited to enterprise transformation (e.g., budget based on target profit and revenues). By contrast, the least frequently adopted techniques were relatively new (e.g., cash flow statements, ABC, and the widely touted Hangang’s cost-negation method), theoretically simple but practically complex (e.g., flexible budgeting and zero-based budgeting), lacked demand from management (e.g., operational leverage and “what if” analysis), or were difficult to use (e.g., decision tree and linear programming). The report, however, did not disclose usage rates for individual methods. Wang & Zhang (2000) asserted that in the 1990s, the most commonly adopted management accounting techniques included financial analysis, CVP, and methods for making capital expenditure decisions. Further, most companies’ information systems were designed for financial accounting rather than management accounting.

Several studies did report details for specific management accounting practices. Firth (1996) compared the adoption of cost accounting and control methods among 456 Sino-foreign joint ventures, 432 Chinese joint-venture partners, and 370 SOEs during the 1990–1993 period. Ji (2001) reported a survey in 1995/1996 of 150 financial managers, financial controllers or chief accountants of state-owned, private, or foreign invested enterprises in Shanghai, Nanjing, and Beijing, with 45 usable responses. Meng et al. (1997) surveyed accountants in one city in Shandong province and obtained 107 usable responses. These studies had samples with different attributes and different response rates. They also considered somewhat different subsets of management accounting techniques. These factors make it difficult to compare or aggregate across studies. Nevertheless, they do permit construction of a mosaic, which suggests a moderately increased usage of a range of management accounting techniques. Table 1 summarizes their major findings. The numeric figures in the table

Table 1. Chinese enterprises' management accounting practices: survey findings from the early-1990s to 1997 (percentage of respondents using each method).

	Firth (1996) <sup>a</sup>	Meng et al. (1997)	He (1997)	Ji (2001)
<i>Date of survey</i>	1990–1993	n/a	n/a	1995/1996
<i>Sample size</i>	1258	107	n/a	45
<i>Management accounting practices</i>				
<i>Product costing methods</i>				
Variable costing	54			100
Absorption costing	46			
Standard costing	89 <sup>b</sup>	17		33
<i>Cost allocation bases</i>				
Total expenses	28			
Direct labor				29
Direct materials				4
Labor hours				33
Machine hours				22
Production volume				7
Activity-based costing	17.2			
<i>Responsibility accounting</i>		10	50	76
<i>CVP analysis</i>		13	80	69
<i>Capital expenditure decisions</i>				
Decision by government authorities				69
Decision by board of directors				11
Decision by enterprise managers				18
NPV	46			2
IRR	41			
Payback period	47			
ARR	42			9
Return on investment				7
<i>Transfer pricing</i>				
Market-based transfer price				11
Cost-based transfer price				33
Negotiated transfer price				22
Actual or standard full cost transfer price				24
Transfer price at direct cost				2
<i>Operating budgeting</i>				
Cash/working capital budget	52			
Sales budget	53			
Profit budget	50			
Production budget	91			

<sup>a</sup>Statistics are based on the average of joint ventures, Chinese partners, and SOE control groups in Table 1 of Firth (1996).

<sup>b</sup>This was used for accounting for joint product costs.

represent the percentages of sample firms reporting use of a given technique.

First consider those techniques that had been reported as being extensively used in earlier periods. While there is some variation across studies, both CVP analysis and responsibility accounting seem to have continued their relatively high levels of application. Focusing on specific techniques, Lin & Wu (1998) indicate that job costing and process costing were quite prevalent, with some movement towards transaction costing (now more often referred to as

“activity-based costing”). Notably, Ji (2001) suggests that traditional, volume-based metrics (e.g., direct labor cost, machine hours) were the primary bases for allocating costs to products. Another finding of note is the dominant role of government authorities in capital expenditure decisions (Ji, 2001).

There also are some differences across studies. For example, Firth (1996) finds his sample firms to be split 54/46 between variable and absorption costing, whereas Ji (2001) reports that all of his sample firms use variable costing. While differences across studies

may be due to progress over time, they also could reflect differences in the nature of the samples. Prudence would suggest not trying to draw very specific inferences from combining the results of different studies, but only to infer general trends in practice.

Several studies have gone further to explore factors affecting management accounting technique adoption. Meng et al. (1997) reported the percentages of respondents identifying each of the following factors as hindering such applications: lack of top management attention (66%), unsuitable internal and external economic environment (56%), unusable financial accounting data (46%), poor operationality of techniques (23%), and accountants who are unwilling or unable to implement them (11%). Nanjing (1997a, b) found that both firm size and size of the city where the company is located had a clear effect on adoption. Also, profitable firms paid more attention to managerial control.

Firth (1996) found that SOEs which formed a joint venture with a foreign partner were more likely to adopt Western management accounting practices than ones without such collaborative arrangements. For He (1997), the factors that affected management accounting applications included the nature of the economic system (such as the contract responsibility system); the legal environment; the traditional cultural environment (e.g., the neglect of accounting and the prevailing officialism); decision makers having little knowledge of accounting and finance; low quality of accountants; low level of computer applications; and weaknesses in management accounting itself (e.g., untimely information; cost-centered evaluation techniques unsuited to markets that are characterized by product innovations, etc.).

Ji's (2001) finding of government domination in enterprises' decision making (at least in the case of long-term investments) suggests that the influences of central planning still existed. Zhang (2001) identified performance measurement practices, in particular, as being heavily affected by government mandates. First, the Basic Financial Standards for Business Enterprises of 1992 encompassed ratios meant to support central government control, including the ratio of debt to assets, current ratio, quick ratio, accounts receivable collection period, stock turnover, profit and tax over sales ratio, return on equity, and return on funds. Then in 1995, the MoF issued the (Trial) Measurement System for Enterprise Performance Evaluation. This System included the following indicators: return on sales, return on equity, capital maintenance and growth rate, debt to assets ratio, current ratio, quick ratio, accounts receivable collection period, stock turnover, social contribution ratio, and social accumulation rate. Here

social contribution rate is calculated as total social contribution made by the firm (i.e., salaries and welfare expenditure, net interest expenses, tax, and net after-tax profit) over average total assets while social accumulation rate is the total tax over total social contribution. Finally, in the 1995–1999 period, four government ministries (the MoF, the State Economic and Trade Commission, the Ministry of Personnel, and the State Development and Planning Commission) stipulated a new State-Owned Capital Performance Measurement System. (The MoF is empowered to manage accounting and finance matters, the State Economic and Trade Commission is a super ministry at the time managing the largest SOEs and stipulating and implementing national economic policies relating to industrial and trade enterprises, the Ministry of Personnel is responsible for appointing, monitoring, and dismissing key personnel in government departments and SOEs, and the State Development and Planning Commission is responsible for national economic planning.) This new System consisted of 32 items (e.g., return on equity, assets management, solvency, and growth potential) divided into three layers: basic indicators, moderating indicators, and expert review ratios. As such, it represented a shift similar to the West's increasing use of nonquantitative performance measures and an increased emphasis on systematically integrating different types of measures (e.g., the balanced scorecard (BSC)).

But the influence of the government extended beyond the passing of laws and regulations. Perhaps a more fundamental avenue whereby it could have affected management and management accounting practice is via enterprise ownership. Earlier we had noted the explosive growth in both the number and capitalization of listed enterprises since China's two stock exchanges were founded in 1990 and 1991. Most of these enterprises were carved out from wholly state-owned entities, and the state often retained dominant ownership. Even today, listed enterprises are mandated to have three separate classes of ownership shares. State-owned shares are held by the central government, government ministries, or provincial and municipal governments. These shares are prohibited from trading publicly. Institutional shares (also called legal person shares) are owned by separate legal entities, such as investment institutions, other enterprises, and the foreign partners of a corporatized joint venture. These shares also cannot be traded on China's two exchanges, though they can be sold to other legal entities by agreement and upon approval by the government. Finally, shares issued to individuals can be further classified into ones restricted to domestic trading by Chinese citizens ("A-shares"), and ones that can



be sold to foreign individuals and entities (“B-shares”). A small number of Chinese firms also are listed on Hong Kong and other foreign stock exchanges (e.g., New York).

As of the end of 2004, 46.85% of all listed firms’ shares were held by the state, 17.1% were held by legal persons, and individuals held the remaining 36.05% (Source: CSRC website.) Overall, the limited transferability of shares and the state’s dominant ownership are likely to depress enterprise managers’ incentives and ability to seek improved performance. This is because governmental shareholders tend to have objectives that deviate from profitability. For example, the state may place high emphasis on maintaining social order and effecting wealth redistribution, which may favor companies employing more workers than is dictated by efficiency considerations alone (Xu & Wang, 1999). In addition, they often have access to inside information (DeFond et al., 2004). This may reduce their demand for the transparency and formalization that come with increased use of modern management accounting techniques.

Regardless of why particular practices came to be used, a key question is whether they benefited enterprise management. Only a few studies have considered this question, and their results are not highly favorable. He (1997) found that only 30% of his respondents considered their enterprises’ current management accounting practices to be relatively good. Forty percent rated them as being “not so good” and the remaining 30% rated them as poor. A similar finding is reported by Nanjing (1997a, b). For example, the following percentages of respondents considered accounting information to be of support to these categories of decisions: material purchase (52%), product pricing (52%), market forecasts (29%), production restructuring (29%), investment project (37%), credit analysis (47%), financing (44%), product development (22%), and product design (28%).

Finally, it is instructive to consider several holistic assessments of how things were in this period. Meng (1999) critically reviewed management accounting research and application in China up to the 1990s, and observed a lack of interest in management accounting among researchers and practitioners. Wang & Zhang (2000) also noted the dearth of research and a lack of interest from enterprise managers, suggesting that the latter was driven by the absence of clearly delineated property rights. However, they acknowledged that a lot of effort had been made to promote successful foreign experiences and summarize and spread successful Chinese experiences, though the effort was restricted to technical procedures and a focus on internal cost management. Wang and Zhang also identified a

number of shortcomings concerning management accounting research and education as drivers of practice. First, there was a lack of synthesis and refinement of application experiences. Second, although there were instances where Western methods were successfully adopted to Chinese situations (e.g., responsibility accounting), most academic articles were introductory, focusing on operational procedures, lacking theorising and thus not effective for educational purposes. Third, management accounting was seen as a supplement to financial accounting, and there was little attention to designing management accounting education in its own right. Finally, academic research was focused on financial accounting, and the relevance of management accounting research was limited by a lack of field work. This last point was echoed by Zhang & Li (1999), who observed that management accounting research up to this point was almost exclusively arm-chair theorizing. Related, Li et al. (2000) pointed to the absence of professional or academic bodies that promoted management accounting research.

In summary, early management accounting practices after the founding of the People’s Republic of China were dominated by the need to support central planning. Around 1979, they entered a period of increased exposure and receptivity to Western/capitalist methods and by the late 1990s, quite a range of Western practices had been adopted by Chinese enterprises. Some of the practices were continuations of those under central planning (e.g., responsibility accounting) and were quite extensively used. Others had varying, and generally much lower, levels of adoption. In general, the adoption of Western approaches seemed to have been a deliberate rather than a haphazard process, as suggested by systematic differences across geographic regions and firm size.

Overall, the primary driver of this development was the government’s adoption of an economic development focus in 1978 and subsequent openness to Western and capitalist institutions and methods. In some cases (e.g., performance measurement), government edicts pushed practices closer to contemporary Western practices. In general, however, the government’s often dominant share ownership probably reduced enterprises’ incentives and ability to adopt Western management accounting techniques.

Towards the end of the 1990s, much room remained for increasing both the range and effectiveness of adopted techniques. Assuming, as we do, that Chinese enterprises can benefit from adopting modern management accounting techniques, but expanding such adoptions faced an array of obstacles. These included continued government domination of some areas of decision making, high levels of state ownership, unclear

property rights, management's lack of understanding of techniques, and the lack of requisite expertise among the accounting personnel. Progress likely was also hampered by lack of attention to management accounting education, and a shortage of quality management accounting researchers and research.

## 5. Management Accounting Practices from 1997 to the Present

### 5.1. Overview

In 1997, the Accounting Society of China, which hitherto had focused its activities on financial accounting and reporting, for the first time organized a national contest in management accounting research. The Society again organized a national best papers contest in 1999. That year, it also held a conference dedicated to management accounting, and established a Management Accounting Special Interest Section. These events suggest that finally, management accounting was emerging from the shadows of financial accounting to be recognized as an area worthy of attention in its own right.

In the meantime, regulations issued by various government agencies continued to create an environment conducive to the adoption of modern management accounting practices. In the area of corporate governance, for example, the CSRC issued Guidelines for Establishing an Independent Directors System for Listed Companies in August 2001 and the Standard on Corporate Governance for Listed Companies in China in January 2002. Among other things, the Guidelines and the Standard imposed explicit requirements for the appointment of qualified independent directors on corporate boards, prohibited the appointment of controlling shareholders and associated parties to be directors, conferred greater powers to the independent directors for monitoring related parties transactions and for the appointment and dismissal of auditors, directors, and senior executives, and required establishment of a number of committees (including audit, compensation, and nomination) with majority independent director membership. Since modern management accounting practices tend to increase transparency and formalization, their attractiveness probably increased with this increased emphasis on monitoring of management, quite apart from their potential benefits to the efficiency and effectiveness of resource use.

A number of surveys shed light on the state of Chinese management accounting practices in this period. These include Lin & Wu (1998), a survey of budgeting, cost management, responsibility accounting, and cost behavior analysis by a research team in Nanjing University (Nanjing, 2001a, b, c, d; Yang et al., 2001), O'Connor et al. (2004), Chalos & O'Connor (2004), and

O'Connor et al. (2006). While these studies added useful insights into the state of, and developments in Chinese management accounting practice, they also have some major limitations. In the case of Chalos & O'Connor (2004), the focus was limited to a set of controls usually restricted to Sino-foreign joint ventures. The other studies' data are a little dated. For example, Lin & Wu (1998) collected their data in 1998, and the Nanjing survey was conducted in 2000. O'Connor et al. (2004) used data from 1996 to 1999, Chalos & O'Connor (2004) collected data in 1997, while O'Connor et al. (2006) used data from 1999. These features of the prior studies leave room for updating and expanding the scope of investigation. For example, none of these surveys included more recent techniques like the BSC and economic value added (EVA) performance measures. In addition to the governance-related regulations mentioned earlier, China's entry into the WTO in 2001 brought requirements for increased openness and reduced government interference in enterprise management. Further increasing pressures to improve performance, mutual funds have become increasingly important players in the stock market since 2000.

These considerations led us to conduct our own survey of practice in the latter part of 2004. Below, we describe the content and procedures of our study. Then, we present both our findings and the major results of other studies.

### 5.2. Survey Instrument

Our instrument asked respondents to indicate the extent to which their enterprise applied each of the 23 practices noted in Section 1 of this chapter. Three features distinguished our instrument from those of the earlier studies. First, instead of simply asking for a yes/no answer about whether a particular practice was in use, we probed the extensiveness of application by using a 5-point response scale (1 = not at all; 5 = very extensively). Second, our list of practices was much more comprehensive. In addition to traditional topics (e.g., CVP analysis), we included both more recent additions to the management accounting toolkit (e.g., BSC) and practices that exceed the traditional boundary of management accounting work (e.g., ones related to strategic management such as environmental scanning, competitor analysis, and value chain analysis). Finally, we disaggregated most techniques into their component steps. For example, ABC was divided into three component steps: (1) operating processes are analyzed and decomposed into their component activities; (2) operating costs are explicitly traced to activities; and (3) product costs are determined using ABC. As explained further below, only firms with extensive adoption of all components of a technique are

classified as adopters. By using this approach, we reduced the potential of inaccurate answers due to respondents not understanding or misinterpreting labels.

### 5.3. Procedure and Sample

We distributed the questionnaire to all listed companies in seven areas of China: Guangdong, Fujian, Heilongjiang, Jiangsu, Shaanxi, Sichuan, and Tianjin. We chose listed companies because they are both more autonomous and more motivated to adopt management techniques beneficial to performance. We selected these seven areas because they represent different levels of economic development. Shaanxi and Sichuan are in the west of China while Heilongjiang is a traditional heavy industry base. Both areas have been identified by China's central government as being economically less advanced than the southern and eastern parts of China, where Guangdong, Fujian, Jiangsu, and Tianjin are located.

Questionnaires were sent to the chief accountant or financial controller of each of the 337 listed companies. E-mails were used in all areas except Shaanxi, where less developed telecommunications called for the use of hard copies. Distribution was in two waves. First, questionnaires were sent to the companies in Sichuan and Shaanxi at the end of June. The purpose was to allow feedback for determining if changes to the instrument were needed. No problems were reported, and the same questionnaire was sent to the other areas at the end of August. Completed responses were received up to the end of October.

Two hundred and thirty completed questionnaires were received. Deleting five that were nonusable for various reasons (e.g., many missing answers), the 225 usable responses represented a 66.77% response rate. This rate far exceeded both our expectations and those achieved in prior studies, though it varied considerably across the seven regions. The lowest response rate was 20% (from Shaanxi). It was over 50% in other areas, with the highest being 75, 78, and 90% in Sichuan, Jiangsu, and Fujian, respectively.

### 5.4. Descriptive Statistics about the Sample

Table 2 provides a profile of the respondents and their firms. Panel A shows how the 225 sample firms were distributed across the seven regions. In total, the relatively more developed regions (Guangdong, Fujian, Sichuan, and Tianjing) contributed 68% of the sample, as compared to 32% from the three relatively less developed areas. Panel B shows that the average total assets, net sales, and number of employees of the sample firms were RMB 5,073 million (US \$1 = RMB 8.2, approximately), RMB 1,374 million, and 2,715, respectively. Thus, on average the

sample firms were relatively large, though there was considerable variation within the sample on all three size measures. Finally, Panel C shows that about 57% of the firms were from the manufacturing sector. The second largest sector was information technology, contributing 10% of the sample firms.

Regarding the respondents, Panels B and D show that all but four are senior accounting or finance executives. The four exceptions also are senior executives, but not in the accounting or finance field. On an average, the respondents had worked at their current positions for 3.9 years and in their companies for nearly 9 years. These figures suggest that they would be sufficiently knowledgeable about their companies to provide informed answers.

### 5.5. Tests for Nonresponse Bias

Since only a subset of the sample returned completed questionnaires, we collected data from all 337 companies' publicly disclosed annual reports to test for differences between responding and nonresponding firms. The variables tested were company size (total assets), return on assets, and Tobin's Q, which is a commonly used proxy for firms' ability to create value (Khanna & Palepu, 2000; Whited, 2001). We also compared respondents and nonrespondents on a number of attributes suggested by prior research as having potential effects on management incentives and effectiveness. These were, respectively, the percentages of share ownership by the state, legal persons, foreign shareholders, and management (La Porta et al., 1999; Liu & Lu, 2002; McConnell & Servaes, 1990; Xu & Wang, 1999), leverage (Grossman & Hart, 1982; Jensen, 1986), proportion of tangible assets (Wang, 2003), number of board members, and the proportion of independent board members (Bhagat & Black, 1999; Eisenberg et al., 1998; Klein, 1998; MacAvoy & Millstein, 1999; Yermack, 1996; see Hermalin & Weisbach, 2003 for an overview). There was only one significant difference (at  $p = 0.05$ ) between the respondents and nonrespondents across the whole set of characteristics: responding firms had a higher proportion of legal person ownership than nonresponding firms (0.36 vs. 0.30). Thus, on the whole, there does not seem to be fundamental differences between the listed companies that did and did not respond to our survey. We do have to acknowledge, however, that prior research has reported a positive effect of legal person ownership on the performance of Chinese business enterprises (Sun & Tong, 2003). While we did not observe a significant difference on the performance measures, we cannot dismiss the possibility that our sample may be more representative of the better managed/performing listed firms than all such firms in general.

Table 2. Company and respondent profiles.

<b>Panel A: Location and response rate</b>						
Area	Total listed companies		Total responses		Usable responses	
	No.		No.	%	No.	%
Guangdong	75		43	57.33	43	57.33
Fujian	30		27	90.00	27	90.00
Haerbin	33		21	63.64	19	57.58
Jiangsu	87		70	80.46	67	78.16
Shanxi	25		5	20.00	5	20.00
Sicuan	64		48	75.00	48	75.00
Tianjing	23		16	50.00	16	50.00
Total	337		230	68.25	225	66.77

<b>Panel B: Descriptive statistics of companies and respondents</b>						
	No.	Min.	Max.	Mean	Median	Std. Dev.
Total assets (in 000)	225	112044	503893000	5073262	1292350	35813023
Net sales (in 000)	225	4011	22005135	1373504	598137	2658219
No. of employees	223	37.00	38411	2715.48	1335	4400.87
Years in current position	221	0.00	29	3.90	3.00	3.11
Years of work experience	222	0.17	39	8.87	6.00	7.54

<b>Panel C: Participating companies by industry (based on CSRC classifications)</b>			
Industry	No.		%
Agriculture	4		1.78
Mining	2		0.89
Manufacturing	128		56.89
Energy	4		1.78
Construction	2		0.89
Transport	10		4.44
Information technology	23		10.22
Wholesale and retail	13		5.78
Financial and insurance	3		1.33
Real properties	14		6.22
Social services	6		2.67
Media and culture	2		0.89
Comprehensive	14		6.22
Total	225		100

<b>Panel D: Respondent's position</b>		
Position	No.	%
Chief accountant	39	17.33
Financial controller	86	38.22
Head of finance department	83	36.89
Head of accounting department	13	5.78
Other (all high-level managers)	4	1.78
Total	225	100.00

### 5.6. Tests for Response Reliability

For survey studies in general, it is desirable to test for consistency across multiple informants from each organization, as well as consistency in responses across time. A further impetus for such an assessment is that on the whole, the use of modern management accounting techniques reported by our sample firms was much

higher than that reported by other surveys, and perhaps also surpasses what one might expect given China's current stage of development. To undertake such an examination, about 9 months after completion of the main survey we sent follow-up questionnaires to two groups of respondent firms in Guangdong. Group A consisted of seven firms that had reported generally

high usage of the relatively new management accounting techniques (e.g., ABM, BSC, and EVA). Group B contained seven firms that had reported relatively limited use of the same techniques. In each case, the questionnaire was addressed to the firm's financial controller.

The follow-up survey asked respondents to indicate the extent to which their firms were currently using the following seven management accounting techniques: ABC, ABM, competitor cost analysis, value chain analysis, EVA, BSC, and performance-based managerial and employee compensation. For each technique, the 5-point response scale (1 = not at all; 5 = very extensively) was the same as in the previous survey.

A total of 11 completed responses were received, 7 from Group A, and 4 from Group B. For seven of the firms (six from Group A and one from Group B), the reported usage levels of all seven techniques were identical to those in the earlier survey. Three Group B firms had generally higher reported usage rates than previously, and one Group A firm had lower reported usage for three techniques but identical answers on the other four methods. Overall, considering the elapsed time between the two surveys and the potential for different respondents within each firm, these findings suggest that the findings of the main survey are reasonably reliable.

### 5.7. Listed Chinese Firms' Current Management Accounting Practices

Recall that we had disaggregated many of the management accounting practices into components. A major reason was to reduce biases from respondents simply responding to labels rather than reflecting their companies' actual practices. Because this also increased the dimensionality of the data, it was desirable to assess whether sufficient consistency existed across components to aggregate them. Cronbach's (1970) alpha is above 0.70 for all practices except cost behavior analysis (0.64) and cost allocation (0.48). Nunnally (1978) had argued that an alpha value around 0.50–0.60 is acceptable for an exploratory study. Thus, our discussion will focus on the aggregated variables.

In this section, we first report our findings on the whole sample, and then compare across industries, sizes, and geographic regions because differences might exist within the sample on these dimensions. In examining the results, it is important to acknowledge that survey responses are subject to a number of potential biases. In particular, our findings may be subject to a social desirability bias. With our focus on modern management accounting techniques, respondents may bias their responses upwards to create an image of being on the cutting edge. A second potential bias is people providing answers to items for which

they lack knowledge. Safeguards that we had built into the survey instrument against the latter include a "no knowledge" option, the disaggregation of some techniques into their components, and limiting our targets to top-level accounting and finance managers. Regarding social desirability bias, some indication of its existence might be obtained from the cross-sectional tests. *A priori*, one might expect the economically more advanced regions and larger firms to have higher application levels of modern management accounting techniques. Also, firms in manufacturing might be expected to make heavier use of techniques with greater applicability to the manufacturing function. Finally, across the entire sample, one might expect lower adoptions of newer techniques (e.g., ABC, BSC, etc.) since it takes time for innovations to propagate. None of these measures or tests can establish the absence of bias, but they do provide some measure of comfort.

#### 5.7.1. Overview

Table 3 presents our findings on current management accounting practices. It also includes findings from Lin & Wu (1998), Nanjing (2000a, b, and d; 2003), O'Connor et al. (2004), Chalos & O'Connor (2004), and O'Connor et al. (2006). Not all respondents answered every question regarding the use of management accounting techniques. For each item in Table 3, we include as our sample size all firms that responded other than "no answer" or "no knowledge." A note about this table is that some items included in our survey are not part of these other studies, and vice versa.

Below are the techniques that have the highest levels of use by mean, median, and extent of use, as represented by the percentage of responses of 3 or above on a scale from 1 = not adopted at all to 5 = applied fully. For parsimony, we will refer to the percentage of responses of 3 or above as the "intensity index." It is shown as follows:

- Operating budgets for cash, sales, profits, and production (over 4, 4 or 5, over 90%)
- Performance bonus plus a fixed salary for employees and managers (4.05/3.84, 4, and 91.12/84.65%)
- Cost behavior analysis (3.88, 4, and 90.74%)
- Cost allocation (3.88, 4, and 88.78%)
- Responsibility accounting (3.77, 4, and 80.91%)
- CVP used in decision making (3.64, 4, and 81.9%)

By contrast, the following practices were reported to have the lowest levels of application:

- ABM (2.68, 2.87, and 50%)
- Kaizen costing (2.65, 3, and 53.27%)
- Use of information and communications technology (ICT; 2.58, 2.75, and 37.16%)

Table 3. Extent of implementation of management accounting techniques: survey findings on Chinese business enterprises for 1997–2004.

	Our Survey No.	Mean <sup>a</sup>	Median	Std. Dev.	≥ 3(%) <sup>b</sup>	Prior Surveys Lin & Wu (1998) (%)	Nanjing (2001) <sup>c</sup> (%)	Nanjing (2003) <sup>d</sup>	O'Connor et al. (2004) <sup>e</sup>	Chalos & O'Connor (2004) <sup>f</sup>	O'Connor et al. (2006) <sup>g</sup>
<i>Date of survey</i>	2004					1998	2000	2002–2003	1999	1997	1999
<i>Usable sample size</i>	225					188	234	93	82	262	502
<i>Management</i>											
<i>accounting practices</i>											
<i>Cost behavior analysis</i>	216	3.88	4	0.86	90.74		50				
<i>ABC</i>	205	3.01	3	1.30	60.00		9				
Operating processes are analyzed and decomposed into their component activities	211	3.18	3	1.40	70.62						
Operating costs are explicitly traced to activities	213	3.19	3	1.42	69.95						
Product costs are determined using ABC	209	2.71	3	1.41	55.02						
<i>ABM</i>	204	2.68	2.87	1.23	50.00						
Decisions about products are based on activity-based product costs	210	2.88	3	1.91	58.57						
Activity cost information is used to manage production costs	209	2.70	3	1.31	56.00						
Activity cost information is used to manage nonproduction costs	207	2.42	2.00	1.22	46.38						
Activity cost information is used for preparing budgets	213	2.74	3	1.39	56.81						
<i>Cost allocation</i>	205	3.88	4	1.03	88.78						
<i>Product life-cycle accounting</i>	215	3.23	3	1.42	70.23						
<i>Environmental accounting</i>	199	2.23	2	1.26	36.18						

Table 3. (Continued)

	Our Survey No.	Mean <sup>a</sup>	Median	Std. Dev.	≥ 3(%) <sup>b</sup>	Prior Surveys Lin & Wu (1998) (%)	Nanjing (2001) <sup>c</sup> (%)	Nanjing (2003) <sup>d</sup>	O'Connor et al. (2004) <sup>e</sup>	Chalos & O'Connor (2004) <sup>f</sup>	O'Connor et al. (2006) <sup>g</sup>
<i>Competitor analysis</i>	218	2.74	3	1.10	56.42						
<i>Cost benchmarking</i>	218	3.09	3	1.42	66.06						
<i>Standard costing</i>	208	2.61	2.80	1.09	44.71	63	22				
<i>Target costing</i>	215	3.35	3.33	1.19	74.42		37				
<i>Kaizen costing</i>	199	2.65	3	1.22	53.27						
<i>Quality cost reporting</i>	207	3.07	3	1.25	62.32		36				
<i>Value chain analysis</i>	207	3.07	3	1.16	62.32						
<i>Operating budgets</i>								2.82	4.89		
Budgets are prepared for cash/working capital	224	4.1	4	1.05	91.52		29				
Budgets are prepared for sales	225	4.27	5	0.96	95.56		84				
Profit budgets are prepared	225	4.36	5	0.88	97.78						
Production budgets are prepared	224	4.24	5	0.99	95.09		79				
Budgets are revised frequently	224	3.39	3	1.16	78.13						
Flexible budgeting are used	218	3.03	3	1.35	64.68						
Budgets with a multiyear horizon are prepared	217	2.92	3	1.30	59.91						
Participative budgeting	223	3.26	3	1.31	72.20						
<i>Decision techniques</i>											
CVP used in decision making	221	3.64	4	1.21	81.90	50	50				
“ <i>What if</i> ” analysis used in decision making	208	2.83	3	1.24	57.69		13				
Decision trees used in decision making	204	2.43	2	1.27	45.59						
<i>Capital budgeting</i>											
NPV methods	212	3.24	3	1.35	72.17	19					
IRR	210	3.08	3	1.38	66.67	5	61				
Payback	216	3.50	4	1.28	79.17	27					

ARR	211	3.16	3	1.29	69.19	4	
Profit volume						18	
<i>Performance measures</i>							
EVA	205	3.10	3	1.14	62.93		
Return on investment	211	2.97	3	1.38	62.56	7	
Residual income	202	2.33	2	1.22	43.56		
Target profit							73
<i>Transfer pricing</i>							
Market based	209	3.11	3	1.52	65.55	20	42
Cost based	214	3.09	3	1.49	65.89	30	28
Negotiated	208	2.58	3	1.38	51.44	14	18
Actual or standard full cost transfer price						24	
Use of an internal bank for intraorganization transactions	212	2.12	1	1.46	33.02		
<i>Use of information and communications technology</i>							
Responsibility accounting	220	3.77	4	1.09	80.91		28
Subunits of the company are clearly defined as responsibility centers	222	3.90	4	1.20	86.49		
There is a formal system/process for measuring the extent to which subunits have fulfilled their defined responsibilities	222	3.70	4	1.28	82.88		
Managers' total compensation is tied to/coupled with fulfillment of their defined responsibilities	222	3.83	4	1.19	85.14		
Non-manager employees' compensation is coupled with fulfillment of their responsibilities	223	3.62	4	1.21	81.17		



Table 3. (Continued)

	Our Survey	Mean <sup>a</sup>	Median	Std. Dev.	≥ 3(%) <sup>b</sup>	Prior Surveys					
	No.					Lin & Wu (1998) (%)	Nanjing (2001) <sup>c</sup> (%)	Nanjing (2003) <sup>d</sup>	O'Connor et al. (2004) <sup>e</sup>	Chalos & O'Connor (2004) <sup>f</sup>	O'Connor et al. (2006) <sup>g</sup>
<i>BSC</i>	187	3.45	3.54	0.85	71.70						
Use of financial measures	222	3.97	4	0.85	90.09						
Use of customer measures	208	3.08	3	1.09	60.02						
Use of internal process measures	202	3.09	3	1.10	60.89						
Use of learning and growth measures	210	3.02	3	1.10	58.10						
Performance measures are explicitly linked across levels of the company's hierarchy in a systematic way	219	3.70	4	1.20	82.19						
Managers' performance evaluations are used to determine total compensation, promotions, and other benefits	221	3.88	4	1.11	89.59						
Managers' performance measures are explicitly designed to contain a mix of leading and lagging indicators	210	3.40	4	1.24	76.67						
Managers' performance measures are explicitly tied to the company's competitive strategy	214	3.29	3	1.16	78.04						

<i>Subjective performance evaluation</i>	214	2.85	3	0.95	63.08			53.79%
<i>Environment scanning</i>	209	2.90	3	1.11	66.51			
<i>Performance-based compensation system</i>							4.12	2.92
Managers in top 25% paid > those in the bottom 25%	202	3.28	3	1.22	75.74			52.19%
Performance bonus plus a fixed salary for managers	214	4.05	4	1.11	91.12			
Performance bonus plus a fixed salary for employees	215	3.84	4	1.18	84.65			
Long-term performance-based plans						34		
Bonus schemes						15		
Stock options						1.8		
Not adopted any						39		
Performance targets (e.g., use of budget goals for rewarding employees)							3.92	
<i>Product costing methods</i>								
Job costing						44	6	
Process costing						30	42	
Transaction costing						10		
<i>Cost allocation bases</i>								
Total expenses						35		
Direct labor						24	19	
Direct materials						13		
<i>Other control and management practices</i>								
Financial analysis								3.09
Accounting monitoring								2.82
Financial performance evaluation								2.46
Working capital management								3.39

Table 3. (Continued)

	Our Survey No.	Mean <sup>a</sup>	Median	Std. Dev.	≥ 3(%) <sup>b</sup>	Prior Surveys Lin & Wu (1998) (%)	Nanjing (2001) <sup>c</sup> (%)	Nanjing (2003) <sup>d</sup>	O'Connor et al. (2004) <sup>e</sup>	Chalos & O'Connor (2004) <sup>f</sup>	O'Connor et al. (2006) <sup>g</sup>
Formal procedures for operating activities and decision making									4.94		
Approval procedures for hiring new employees, spending, and committee meetings									5.29		
Total quality control procedures									4.54		
Number of expatriates										29.95	
Socialization practices										4.46	
Communication with parent companies										3.05	
Decision-making responsibility of managers										4.40	
The extent of delegation of authority to cost/ profit centers from the general manager											2.94

<sup>a</sup>Min. = 1 and Max. = 5 in all items in our survey. Only the firms that answer all component items under a management accounting topic are included. Those with no response or responding with “not knowledgeable” (n/k) are not included.

<sup>b</sup>Proportion of firms whose extent of implementation is equal to or greater than 3.

<sup>c</sup>Nanjing (2001) is a combination of Nanjing (2001a, b, c, and d) and Yang et al. (2001) because all these publications were based on the same survey. Statistics are based on “yes” or “no” responses.

<sup>d</sup>Statistics are based on a 5-point scale of time and effort spent by accountants in a type of accounting and finance work: 1 = less than 1%, 2 = 1–5%, 3 = 6–10%, 4 = 11–20%, and 5 = greater than 20%. Therefore, a figure of 3.39 can be interpreted as just under 15% of the time and effort committed to working capital management.

<sup>e</sup>This is based on a 7-point Likert Scale. Each management accounting or control technique consists of multiple items. The figures displayed in this table are the means per item.

<sup>f</sup>This is based on a 7-point Likert Scale (with 1 = extremely low and 5 = extremely high). The index consists of three items and thus the range of the responses was 3–21 for three items as a whole, or 1–7 for each item. The number 4.12 is the mean per item. There were 117 responses for US partners and 145 for Chinese partners.

<sup>g</sup>Performance-evaluation subjectivity is based on a range of 1% to 100%, while delegation and compensation system are based on a 5-point Likert scale. The displayed numbers are the means per item.

- Negotiated transfer pricing (2.58, 3, and 51.44%)
- Standard costing (2.61, 2.80, and 44.71%)
- Use of residual income performance measures (2.33, 2, and 43.56%)
- Environmental accounting (2.23, 2, and 36.18%)
- Internal bank for intraorganizational transactions (2.12, 1, and 33.02%)

To make our results more conservative and likely more reliable, for management accounting practices with multiple components, we also differentiated between firms that answered 3 or above on all the components, and those that have below 3 answers to some components. We labeled the former adopters, and Table 4 reports the proportion of the sample so classified as well as their means and medians of the extent of implementation. Using ABC and ABM as examples, a firm was classified as having adopted ABC only if it had scored 3 or above in all three components of ABC: (1) decomposing processes into activities, (2) tracing costs to activities, and (3) using activity costs to determine product costs. Thus, if a firm had scored 3 or above on two of these items, but only 2 or 1 on the third, it was not classified as an ABC adopter. Similarly, a firm was considered an ABM adopter only if it had scored 3 or above on all four ABM components: (1) basing decisions on activity-based product costs, and using activity costs to (2) manage production, (3) nonproduction costs, and (4) preparing budgets. Using this approach, the number of firms classified as having adopted ABC (ABM) are 107 (76), or 52.20% (37.25%) of the responding firms. These figures are shown in the rows headed by ABC (ABM) in Table 4. In comparison, if we had simply used the average of the three components' responses rather than imposing a separate hurdle for each component, then ABC and ABM would have intensity indices of 60 and 50%, respectively as indicated in the rows headed by ABC (ABM) in Table 3. The same approach was used for differentiating adopters and nonadopters of all the other management accounting practices that were decomposed into constituent components, such as cost behavior analysis, use of BSC, and EVA.

The following management accounting techniques reportedly enjoyed both the highest percentages of adopters and the highest means of implementation by adopters. Note that for single-item management accounting techniques, the intensity index equals the percentage of adopters under our classification scheme:

- Operating budgets for cash, sales, profits, production, frequent revision, and participative budgeting (over 90% for the first four practices and 78.14 and 72.20% for the other two practices, respectively;

- over 4.33 for the first four practices and 3.86 and 3.93 for the other two, respectively)
- Performance-based compensation practices (75.74–91.12%; 3.84–4.31)
- CVP used in decision making (81.9%; 4.08)
- Cost behavior analysis (77.31%; 4.18)
- Payback period method in capital budgeting (79.17%; 4.03)
- Cost allocation (70.73%; 4.39)
- Responsibility accounting (73.64%; 4.28)

By contrast, the following practices were reported to have either the lowest percentages of adopters or the lowest means of implementation by adopters:

- Use of information and communications technology (8.74%; 3.95)
- Standard costing (24.04%; 3.78)
- Environmental accounting (36.18%; 3.69)
- ABM (37.25%; 3.73)
- BSC (39.04%; 4.14)
- Value chain analysis (48.31%; 3.97)
- Use of residual income performance measures (43.56%; 3.55)
- EVA (48%; 3.93)
- Internal bank for intraorganizational transactions (33.02%; 4.01)

Both the proportion of adopters and the mean, median, and intensity index broadly identify the same management accounting practices as being the most often used. However, the adopter rate produces a rather different list of least used management accounting practices. This list seems to have greater face validity than the one based on the mean, median, and intensity index. It contains more of the management accounting practices with more recent vintage, although it also shows two traditional techniques (i.e., internal banks and standard costing) as being among the least applied.

It is informative to compare our findings with those of prior studies. The other surveys in Table 3 had asked respondents to provide dichotomous (yes/no) answers to current use of each technique. If we interpret an intensity index of 50% or above as being equivalent to a “yes” answer to the earlier surveys, then the impression from the comparison is a general increase in the levels of adoption. This is also true when we use the percentages of adopters.

### 5.7.2. Detailed Analysis

More detailed highlights of our findings include the following:

5.7.2.1. *Cost Behavior Analysis.* We asked about the extent that each firm distinguished fixed from variable

Table 4. Management accounting technique adopters: survey findings on listed Chinese enterprises for 2004<sup>a</sup>.

	Our survey No.	Mean <sup>b</sup>	Median	Std. Dev.	Adopters as a % of all respondents for this technique <sup>c</sup>
Date of survey	2004				
Usable sample size	225				
<i>Management accounting practices</i>					
<i>Cost behavior analysis</i>					
<i>ABC</i>	167	4.18	4.33	0.63	77.31
Operating processes are analyzed and decomposed into their component activities	107	3.99	4	0.71	52.20
Operating costs are explicitly traced to activities	149	3.96	4	0.80	70.62
Product costs are determined using ABC	149	3.99	4	0.79	69.95
<i>ABM</i>	115	3.83	4	0.81	55.02
Decisions about products are based on activity-based product costs	76	3.73	3.63	0.66	37.25
Activity cost information is used to manage production costs	123	3.89	4	1.89	58.57
Activity cost information is used to manage nonproduction costs	117	3.69	3	0.78	56.00
Activity cost information is used for preparing budgets	96	3.54	3	0.75	46.38
<i>Cost allocation</i>	121	3.79	4	0.79	56.81
<i>Product life cycle accounting</i>	145	4.39	4.5	0.67	70.73
<i>Environmental accounting</i>	151	4.03	4	0.78	70.23
<i>Competitor analysis</i>	72	3.69	4	0.76	36.18
<i>Cost benchmarking</i>	123	3.54	3	0.68	56.42
<i>Standard costing</i>	144	3.83	4	1.13	66.06
<i>Target costing</i>	50	3.78	3.80	0.68	24.04
<i>Kaizen costing</i>	138	4.00	4	0.73	64.19
<i>Quality cost reporting</i>	103	3.64	3.50	0.70	51.76
<i>Value chain analysis</i>	121	3.92	4	0.77	58.45
<i>Operating budgets</i>	100	3.97	4	0.69	48.31
Budgets are prepared for cash/working capital	205	4.33	4	0.75	91.52
Budgets are prepared for sales	215	4.4	5	0.74	95.56
Profit budgets are prepared	220	4.43	5	0.74	97.78
Production budgets are prepared	213	4.38	5	0.77	95.09
Budgets are revised frequently	175	3.86	4	0.81	78.13
Flexible budgeting are used	141	3.88	4	0.80	64.68
Budgets with a multiyear horizon are prepared	130	3.82	4	0.81	59.91
Participative budgeting	161	3.93	4	0.82	72.20
<i>Decision techniques</i>					
CVP used in decision making	181	4.08	4	0.80	81.90
“What if” analysis used in decision making	120	3.73	4	0.77	57.69
Decision trees used in decision making	93	3.61	3	0.79	45.59
<i>Capital budgeting</i>					
NPV methods	153	3.93	4	0.83	72.17
IRR	140	3.89	4	0.85	66.67
Payback	171	4.03	4	0.82	79.17
ARR	146	3.87	4	0.81	69.19
Profit volume					
<i>Performance measures</i>					
Economic value added (EVA)	108	3.93	4	0.71	48.00
Return on investment	132	3.88	4	0.82	62.56
Residual income	88	3.55	3	0.68	43.56
Target profit					
<i>Transfer pricing</i>					
Market based	137	4.08	4	0.81	65.55
Cost based	141	4.02	4	0.85	65.89
Negotiated	107	3.77	4	0.78	51.44
Actual or standard full cost transfer price	70	4.01	4	0.91	33.02

Table 4. (Continued)

	Our survey No.	Mean <sup>b</sup>	Median	Std. Dev.	Adopters as a % of all respondents for this technique <sup>c</sup>
Use of an internal bank for intraorganization transactions					
<i>Use of information and communications technology</i>	16	3.95	4	0.81	8.74
<i>Responsibility accounting</i>	162	4.28	4.50	0.64	73.64
Subunits of the company are clearly defined as responsibility centers	192	4.06	4	0.81	86.49
There is a formal system/process for measuring the extent to which subunits have fulfilled their defined responsibilities	184	4.16	4	0.82	82.88
Managers' total compensation is tied to/coupled with fulfillment of their defined responsibilities	189	4.22	4	0.77	85.14
Non-manager employees' compensation is coupled with fulfillment of their responsibilities	181	4.08	4	0.79	81.17
<i>BSC</i>	73	4.14	4.17	0.53	39.04
Use of financial measures	200	4.17	4.33	0.62	90.09
Use of customer measures	129	3.77	3.67	0.66	62.02
Use of internal process measures	123	3.81	3.67	0.66	60.89
Use of learning and growth measures	122	3.80	3.75	0.65	58.10
Performance measures are explicitly linked across levels of the company's hierarchy in a systematic way	180	4.14	4	0.78	82.19
Managers' performance evaluations are used to determine total compensation, promotions, and other benefits	198	4.15	4	0.80	89.59
Managers' performance measures are explicitly designed to contain a mix of leading and lagging indicators	161	3.95	4	0.80	76.67
Managers' performance measures are explicitly tied to the company's competitive strategy	167	3.77	4	0.76	78.04
<i>Subjective performance evaluation</i>	135	3.45	3	0.61	63.08
<i>Environment scanning</i>	139	3.55	3	0.69	66.51
<i>Performance-based compensation system</i>					
Managers in top 25% paid > those in the bottom 25%	153	3.84	4	0.77	75.74
Performance bonus plus a fixed salary for managers	195	4.31	4	0.75	91.12
Performance bonus plus a fixed salary for employees	182	4.22	4	0.80	84.65

<sup>a</sup>Adapters of a management accounting technique are firms whose responses to *all* component items under that management accounting technique are equal to or greater than 3.

<sup>b</sup>Min. = 1 and Max. = 5 in all items in our survey. Only the firms whose responses to *all* component items under that management accounting technique are equal to or greater than 3 are included.

<sup>c</sup>Number of firms whose responses to all items under a management accounting technique are equal to or greater than 3 divided by the number of firms responding to all items under that management accounting technique. For example, among 205 firms responding to all three items of ABC (see Table 3), there are 107 firms whose responses to all three items of ABC are equal to or greater than 3 ( $107/205 = 52.20\%$ ).

costs for production costing, and for decision making, and whether they used variable costing. For all three questions, the mean is over 3.80, the median is 4, and over 88% of responses were 3 or above. This indicates that cost behavior analysis is widely adopted. In comparison, Yang et al. (2001; part of Nanjing, 2001) find

that 50% of their responding firms adopted variable costing while the figure is 100% in Ji's (2001) sample.

5.7.2.2. *ABC/ABM*. Taken together, the questions on ABC attained a mean, median, and intensity index of 3.01, 3, and 60%. The corresponding figures for ABM

are 2.68, 2.87, and 50%. The latter's lower figures make sense since ABC is needed to practice ABM. Of the component steps, the most frequently practiced are tracing operating costs explicitly to activities, and analysing and decomposing operating processes into their component activities. Between 46 and 59% of respondents gave an answer of 3 or higher in relation to the use of ABC/ABM to determine product costs, make product decisions, manage product costs, manage nonproduct costs, and prepare budgets (see Table 3).

As reported earlier, the number of firms classified as adopters of ABC and ABM are 107 and 76, or 52.20 and 37.25%, respectively, of the responding firms. Even with this conservative approach, the adoption rate for ABC still is much higher than those reported by earlier surveys. Firth's (1996) survey of management accounting practice during 1990–1993 found that 17.2% of responding firms used activity bases to allocate fixed manufacturing costs to products, while Nanjing (2001b) found only a 9% adoption rate for ABC. A similar comparison for ABM was not feasible because none of the earlier studies had included this practice.

*5.7.2.3. Other Costing Practices.* Our survey asked about the use of standard costing, target costing, and Kaizen costing for performance evaluation, budget preparation, product decisions, and financial statement preparation. Their levels of use are 44.71, 74.42, and 53.27% and the percentages of adopters are 20.04, 64.19, and 51.76%, respectively. In comparison, Nanjing (2001b) reported an implementation level of 22% for standard costing. Lin & Wu (1998) reported an adoption rate of 63% for standard costing, which is higher than both the intensity index and the adopter rate in our survey. Based on the relatively higher use of target costing in our survey, a possible reason for this difference may be firms switching from standard costing to target costing subsequent to the time that Lin and Wu conducted their survey. Nanjing (2001b) found that target costing was adopted by 37% of their responding firms, a level lower than that identified in our survey. We also asked about the use of cost allocations for determining product costs and computing performance, and found the levels of both to be high. The first purpose had a mean of 4.32, a median of 5, and an intensity index of 92.76%, while the statistics for the second purpose are 3.46, 4, and 71.36%, respectively.

While prior studies had not explored the purposes of adopting these costing methods, they do provide information on more detailed technical issues such as the types of cost drivers used for cost allocation. Nanjing (2001b) found that the top three techniques

for allocating mixed costs were account analysis (62%), technical identification (21%), and contracted amount or ratio (17%). Nine percent of the sample firms used the high–low method and 4% used regression analysis. Lin & Wu (1998) found that the most commonly used bases for allocating costs were total expenses (35%), direct labor (24%), and direct materials (13%). In Nanjing (2001b), the most often used bases for allocating manufacturing expenses are labor hours (54%), production volume (33%), and direct-labor hours (19%).

Concerning quality cost reporting, the mean, median, and intensity index for tracking quality cost are 3.17, 3, and 67.45% while for use of quality cost information for operations management, the figures are 2.98, 3, and 61.54%, respectively. The adoption level for product life cycle costing also seems high, with a mean of 3.23, a median of 3, and an intensity index (and adopter rate) of 70.23%. By contrast, environmental cost accounting is far less adopted, with a mean of 2.23, a median of 2, and an intensity index and adopter rate of 36.18%.

Finally, we found moderate level of value chain analysis with its mean, median, intensity index, and adopter rate being 3.07, 3, 62.32%, and 48.31%, respectively. The respective means for its three components, tracing the cost of value chain components, tracking customer profitability, and tracking total costs from different suppliers were 3.31, 2.85, and 3.04, and the intensity indices were 72.56, 59.52, and 65.73%.

*5.7.2.4. Competitor Analysis.* Our results showed that competitor analysis, cost benchmarking, and environmental scanning attained means of 2.74, 3.09, and 2.90, intensity indices and adopter rates of 56.42, 66.06, and 66.51%, respectively. These figures seem to indicate only a moderate degree of attention to factors external to the enterprise.

*5.7.2.5. Budgeting.* All four types of budgets listed in our survey (sales, cash/working capital, profit, and production) are prepared by over 90% of responding firms. About 78, 60, and 65% of the responding firms frequently revised their budgets, adopted a multiyear time horizon, and prepared flexible budgets, respectively. Overall, these adoption levels seem to be in line with those from prior studies. Nanjing (2001a) found that the top three budget authorities were the CEO (43%), board of directors (30%), and a special budget unit (17%). They also reported that the most commonly prepared budgets were the administrative budget (89%), sales budget (84%), financial expenses

budget (80%), production budget (79%), sales expense budget (73%), and manufacturing expense budget (71%). Less than half of the firms prepared a capital expenditure budget or investment revenue budget, while 45% of the respondent firms prepared budgeted balance sheets and 29% prepared cash flow budgets. They also found that the most popular starting point for budget preparation was target profit (65%), followed by sales, production volume, and targets set by superiors. The last listed was used by 81% of their responding firms.

**5.7.2.6. Decision-Making Techniques.** Our respondents indicated that CVP analysis was quite commonly used. Its mean, median, and intensity index are 3.64, 4, and 81.90%, respectively. In comparison, “what if” analysis and decision trees are less frequently used, with corresponding statistics of 2.83, 3, and 57.69%, and 2.43, 2, and 45.59%, respectively. As a point of reference, Nanjing (2001d) had found CVP to be used by 50% of their sample, and a 13% usage of “what if” analysis.

**5.7.2.7. Capital Budgeting.** Our results show that payback period, net present value (NPV), and accounting rate of return (ARR) are used slightly more widely than internal rate of return (IRR). However, the mean is 3 or above and the intensity index is above 66% for all of them. These findings are consistent with research from those firms using a multitude of techniques rather than just one. They also are consistent with the findings of Lin & Wu (1998) and Firth (1996), although the level of adoption identified in our study is higher than theirs.

**5.7.2.8. Performance Measures.** Only firms that scored 3 or above on both components of EVA were classified as adopters. This resulted in 108 firms (or 48% of the responding firms) being classified as EVA adopters, which was somewhat surprising given the relative newness of this approach to performance measurement. In comparison, the use of return on investment (ROI) and residual income were lower, with a mean below 3 for both.

**5.7.2.9. Transfer Pricing.** Market-based and cost-based transfer pricing methods are more widely adopted than negotiated pricing methods with the means being 3.11, 3.09, and 2.58, respectively. These results are in line with those of Lin & Wu (1998) and Nanjing (2001c). We also found that about 33% of

the firms have an internal bank for settling internal transactions.

**5.7.2.10. Use of Information and Communications Technology (ICT).** Unlike prior surveys, we included ICT due to its increasing importance in the business world. The findings for different uses of ICT were the following (mean, median, and intensity index):

- Data collection and analysis (3.02, 3, and 65.85%)
- Supporting product costing (2.75, 3, and 56.65%)
- Support decision making (2.51, 3, and 51.52%)
- Support planning and control (2.69, 3, and 55.50%)
- Support firm-wide communications (2.87, 3, and 60.59%)
- Support interfirm communications (3.05, 3, and 67.65%)
- Support business processes (2.70, 3, and 54.95%)
- A chief information officer (CIO) is in place (1.51, 1, and 13.78%)
- An Enterprise Resource Planning system (ERP) is in operation (2.34, 2, and 42.65%)

Overall, these results suggest that ICT is not yet heavily used by Chinese enterprises, though the level of ERP use appears to be moderate (42.65%).

**5.7.2.11. Responsibility Accounting.** In contrast to prior studies that had used a blanket term, our survey distinguished four aspects of responsibility accounting: whether organizational subunits are clearly defined as responsibility centers, whether there is a system/process for measuring responsibility fulfillment, whether managers' compensation is tied to responsibility fulfillment, and whether employees' compensation is tied to responsibility fulfillment. All four items attained a mean of over 3.62, a median of 4, and at least an 80% intensity index. Applying the criterion of 3-or-above answers to all four components of responsibility accounting, the adopter rate for the practice as a whole is 73.64% and the mean and median for the adopters were 4.28 and 4.5, respectively (see Table 4). These high figures suggest that responsibility accounting is still widely adopted. Their consistency with surveys from earlier periods and expectations based on evolution of public regulations and policy, adds to our comfort about the validity of the responses to our survey.

Nanjing (2001c) provides further details about the use of responsibility accounting in China. It reports that the lowest level of cost center was set at the level of production group by 36% of responding firms, at the level of factory workshop in 32%, and at the level



of individuals in 21%. The lowest level at which administrative expense centers were established was functional department (67%) or individual (22%). Nanjing (2001c) further found that the lowest levels at which cost centers' cost performance indicators were set were as follows: individual (37%), work group (33%), and factory workshop (22%). The most important performance indicators for cost centers are the ratio of actual cost to budget (target) cost (72%), actual cost (26%), and the ratio of actual cost to historical best (16%). The most important performance indicators for profit centers were IRR (61%), market profit ratio (26%), amount of funds occupied (14%), and return on investment and residual income (just over 10%).

5.7.2.12. *Balanced Scorecard (BSC)*. Table 3 shows the multiple questions relating to BSC usage. Across the sample firms, financial measures have the highest level of application with a mean score of 3.97. By contrast, learning and growth measures and internal process measures are least used, with means of 3.02 and 3.09, respectively. In addition, performance measures are explicitly linked across levels of the company's hierarchy in a systematic way (mean = 3.70), performance evaluation are used to determine total compensation, promotion, and other benefits (mean = 3.88), and performance measures consist of both lead and lagging indicators (mean = 3.40). However, only 73 firms (or 39.04% of the sample) had answers of 3 or above to all BSC components (see Table 4).

Even though 39.04% is not a particularly high figure, we still felt surprised because like EVA, the BSC has a relatively recent genesis, and it usually takes some time for new practices to be widely adopted. While we are not ready to deny the possibility of Chinese enterprises being fast learners, we surmise that another powerful influence was the government. Recall from our earlier discussion of developments in government policies and regulations that in 1995, the MoF issued a set of performance measures for SOEs, which encompassed both financial measures and social contribution ratios. Subsequently in 1999 the MoF, jointly with the State Economic and Trade Commission, the Ministry of Personnel and the State Development and Planning Commission stipulated the following set of regulations bearing on performance evaluation:

- Regulations on evaluating the performance of state-owned capital
- Rules for implementing standards for evaluating the performance of state-owned capital

- Explanations of evaluation measures for the performance of state-owned capital
- Scoring methods for evaluating the performance of state-owned capital
- Reference standards for evaluating and appraising the performance of state-owned capital
- Basic industry classifications for enterprise performance evaluation

Table 5 summarizes the performance measures stipulated by these regulations, which have since been widely adopted in state-owned or controlled firms (Zhang, 2003). The substantial overlap between these measures and the four dimensions of BSC suggests that the Chinese government has played an important role in promoting a performance measurement system that resembles BSC.

5.7.2.13. *Performance-Based Compensation Plans*. In our survey, we asked about the extent to which (1) managers whose performance is in top 25% are paid more than those whose performance is in the bottom 25%; (2) managers' total compensation consists of performance-based bonus plus a fixed salary; and (3) other employees' total compensation consists of performance-based bonus plus a fixed salary. For the first item, the mean, median, and intensity index are 3.28, 3, and 75.74%, respectively. The corresponding figures for the second and third items are 4.05, 4, and 91.12%, and 3.84, 4, and 84.65%, respectively. These figures suggest that performance-based compensation has found root in Chinese enterprises.

The topic of compensation plans has not been well researched in the prior surveys. Only Lin & Wu (1998) included this topic in their survey. As shown in Table 3, they found that 34% of their sample firms had long-term performance-based compensation plans, 15% had bonus schemes, 1.8% made use of stock options, and 39% of the sample did not have any managerial incentive schemes. Comparing these figures to the findings of our survey, it seems that performance-based compensation is in ascendancy among Chinese business enterprises.

5.7.2.14. *Unique Management Accounting Practices*. In response to an open-ended question asking whether their firm had unique management accounting practices different from usual practice, 78 respondents provided positive responses. Unfortunately, they did not go beyond naming the practice that they saw as being unique. Hence, Table 6 is limited to showing the distribution of responses across practice areas. The top two relate to budget management and the use of CVP.

Table 5. Government defined and promoted performance evaluation system for state-owned enterprises.

Content	Basic measures	Modifying measures	Qualitative measures	
Financial return	Return on net assets	Capital value added	Market share	
	Return on total assets	Return on sales	Customer satisfaction	
Efficiency of asset use	Total asset turnover	Total profit over total costs and expenses	Internal management quality	
		Stock turnover		
Ability to repay debts	Total debt over total assets	Debtor collection period	Employee quality	
		Nonperforming asset ratio		
		Current asset turnover	Asset loss ratio	Technology and equipment quality
		Times interest covered	Current ratio	
Growth	Capital accumulation rate	Quick ratio	Influence in industry and region	
		Cash flow to current liability ratio		
		Capital employed over long term assets		
Growth	Sales growth rate	Total asset growth rate	Management and growth strategies	
		Capital accumulation rate		Three year average capital growth rate

Table 6. Number of firms identified by their managers as having unique management accounting practices.

Area of unique management accounting practice	No.	%
Budget management	15	19.23
CVP	11	14.10
Target costing	7	8.97
Responsibility accounting	6	7.69
Cost management/control	4	5.13
Standard costing	3	3.85
Others (each mentioned once)	32	41.03
Total	78	100.00

### 5.8. Contribution of Management Accounting to Management Efficiency and Effectiveness

Respondents were asked to identify the two management accounting practices that would make the greatest contribution to management efficiency and effectiveness. Table 7 summarizes these responses (some respondents did not identify any technique, while some identified only one). Budget management, performance evaluation, ABC, responsibility accounting, use of information and communications technology, target costing, and value chain analysis were all named by at least 20 respondents.

### 5.9. Cross-Sectional Differences in Management Accounting Practices

We also examined whether the application of management accounting techniques varies across firms from different regions, industries, or were of different sizes. Comparing the economically more advanced regions to the less advanced ones only yielded one

significant (at  $p = 0.05$ ) difference: firms from the more advanced areas have greater adoption of performance-based compensation schemes.

Table 8 shows the significant differences across six industries, between manufacturing firms and non-manufacturing firms, and between the large and small firms in the sample as demarcated by the median. Since Table 8 is rather self-explanatory, we will focus on the industry effects. The six industries in our comparison are manufacturing, information technology, real properties, wholesale and retail, comprehensive, and "others." This last category aggregates eight other industries whose representation in the sample ranged from 2 to 10 firms. This analysis shows significant differences across industries in the adoption of the following practices:

- Cost allocation
- Target costing
- Preparation of production budgets

Table 7. Management accounting practices that managers think would make the greatest contribution to management efficiency and effectiveness<sup>a</sup>.

Management accounting practice	Number of times mentioned	%
Budget management	37	11.64
Performance evaluation	32	10.06
ABC	26	8.18
Responsibility accounting	24	7.55
Use of information and communications technology	22	6.92
Target costing	20	6.29
Value chain analysis	20	6.29
Performance measures	17	5.35
Cost improvement	11	3.46
Capital spending	7	2.20
Performance-based compensation plan	7	2.20
Enterprise resource planning	7	2.20
Cost management/control	7	2.20
Competitor analysis	6	1.89
Quality costing	6	1.89
Standard costing	6	1.89
Cost behavior analysis	5	1.57
Others (each mentioned once)	58	18.24
Total	318	100.00

<sup>a</sup>Each respondent was asked to identify the two practices with the greatest contribution. Only those practices named by at least two respondents are specified. Some respondents did not name any, while some only named one.

- Use of balance scorecard, internal process measures, learning, and innovation measures for performance evaluation
- Linking performance measures across levels of the firm hierarchy

As compared to nonmanufacturing firms, those in the manufacturing sector report significantly more use of the 13 techniques: cost behavior analysis, target costing, quality cost reporting, sales budgets, production budgets, CVP, the ARR in capital budgeting decisions, market-based and cost-based transfer pricing, balanced scorecard, internal process and learning and innovation performance measures, and linking performance measures across levels of the firm hierarchy. Of these, at least two: quality cost reporting and production budgets, seem to be relatively more applicable to manufacturing than nonmanufacturing entities. As such, their significantly higher reported use by the former could be seen as supporting the validity of our responses. Also consistent with our expectation, there are even more differences due to firm size, with larger firms being more extensive users in each case.

#### 5.10. Factors that Affect the Adoption of Management Accounting Techniques

The survey listed 32 factors that can facilitate or impede the adoption of new practices. This list was based on an extensive review of prior studies on the spread of

innovation (e.g., Damanpour, 1991; Firth, 1996; Groot & Merchant, 2000; Ittner & Larcker, 1995, 1998; Kimberly & Evanisko, 1981; Krumwiede, 1998; O'Connor et al., 2004; Peng & Heath, 1996; Shields, 1995; Shields & Young, 1989, 1994; Sunder, 1997). Respondents were asked to rate each factor on a -2 to +2 scale, where -2 indicates greatly impeded, 0 = no effect, and +2 means greatly facilitated. Table 9 summarizes the results. This table also reports findings on a similar question from several other surveys.

As may be expected, Table 9 shows that each listed factor is seen as a facilitator in some companies and an obstacle in others. The five factors with the highest proportions of ratings above zero (thus, being seen as a facilitator) are members of the board of directors in general, independent board members in particular, along with top management attitudes, supervisory board members, and stockholders. Their percentages of above-zero responses are, respectively, 74.55, 70.64, 69.55, 61.29, and 59.81%. By and large, this finding suggests that the push for modernizing management accounting practices most often comes from outside of the company, though the receptivity of top management to change also plays an important role. The rather positive view of the board of directors and supervisory board suggest that recent government initiatives to expand the powers of these two governance bodies could help to speed up modernization of management practices among Chinese enterprises.

Table 8. Cross-sectional differences in management accounting practices<sup>a</sup>.

Management accounting practices	Among six industries	Manufacturing vs. Nonmanufacturing firms	Large vs. Small firms
		<i>p</i> -value	
Cost behavior analysis	0.237	0.084*	0.071*
<i>ABC</i>	0.414	0.627	0.943
<i>ABM</i>	0.657	0.206	0.634
<i>Cost allocation</i>	0.075*	0.203	0.358
<i>Standard costing</i>	0.750	0.329	0.031**
<i>Target costing</i>	0.004***	0.004***	0.423
<i>Kaizen costing</i>	0.653	0.630	0.260
<i>Quality cost reporting</i>	0.111	0.004***	0.086*
<i>Value chain analysis</i>	0.446	0.129	0.366
<i>Operational budgeting</i>			
Budget is prepared for cash/working capital	0.467	0.333	0.030**
Budgets are prepared for sales	0.261	0.045**	0.016**
Profit budgets are prepared	0.839	0.250	0.006***
Production budgets are prepared	0.001***	0.003***	0.006***
Budgets are revised frequently	0.637	0.280	0.202
Flexible budgeting are used	0.668	0.924	0.296
Budgets with a multiyear horizon are prepared	0.279	0.560	0.000***
<i>Decision-making techniques</i>			
CVP is used in decision making	0.105	0.004***	0.164
“ <i>What if</i> ” analysis is used in decision making	0.224	0.382	0.000***
Decision trees are used in decision making	0.753	0.280	0.012**
<i>Capital budgeting</i>			
Use of NPV	0.862	0.995	0.003***
Use of IRR	0.535	0.588	0.002***
Use of payback period	0.164	0.134	0.004***
Use of ARR	0.302	0.096*	0.023**
<i>Performance measures</i>			
Use of EVA in performance measurement	0.991	0.997	0.010**
Costs of equity capital are deducted	0.967	0.709	0.074*
Adjust for GAAP-based financial numbers	0.960	0.610	0.007***
ROI is used in performance evaluation	0.559	0.347	0.003***
Residual income is used in performance evaluation	0.104	0.351	0.818
<i>Transfer pricing</i>			
Market-based price is used	0.222	0.043**	0.614
Cost-based price is used	0.248	0.022**	0.199
Negotiated price is used	0.675	0.868	0.211
An independent “ <i>Internal Bank</i> ” is used for clearing internal transactions	0.701	0.928	0.303
<i>Use of information and communications technology</i>	0.194	0.221	0.231
<i>Responsibility accounting</i>	0.475	0.286	0.017**
<i>Performance evaluation</i>			
Use of Balanced Scorecard (BSC)	0.013**	0.003***	0.057*
Use of financial measures	0.155	0.361	0.030**
Use of market-based measures	0.348	0.294	0.020**
Use of internal process measures	0.000***	0.000***	0.052*

Table 8. (Continued)

Management accounting practices	Among six industries	Manufacturing vs. Nonmanufacturing firms	Large vs. Small firms
		<i>p</i> -value	
Use of learning and innovation measures	0.003***	0.000***	0.067*
Performance measures are linked across levels of hierarchy	0.044**	0.057*	0.708
Performance evaluation is related to compensation, promotions and other benefits	0.361	0.184	0.028***
Use a mix of leading and lagging indicators	0.267	0.357	0.034**
Comparing measured performance to a preset standard	0.731	0.469	0.027**
Performance measures are tied to the company's competitive strategy	0.680	0.994	0.048**
<i>Performance-based compensation system</i>			
Managers in top 25% paid > those in the bottom 25%	0.601	0.665	0.009***
Performance bonus plus a fixed salary for managers	0.988	0.598	0.001***
Performance bonus plus a fixed salary for employees	0.907	0.905	0.044**

<sup>a</sup>The six industries are manufacturing, information technology, real properties, wholesale and retail, comprehensive, and others. Industries with less than 13 firms in the sample are combined into "others." Firm size is measured as total assets. The median is used to split the sample into large vs. small firms. The comparison is based on ANOVA.

\* *p*-value < 0.1

\*\* *p*-value < 0.05

\*\*\* *p*-value < 0.01

Eight other factors also had over 50% of responses above zero: in-house training, consulting provided by domestic consulting companies, training by local/domestic organizations, services of employees with information technology (IT) expertise, expertise or knowledge of new employees, training provided by local/domestic universities, customers, competitors' practices, and domestic professional journals/research reports. Relating to obstacles, the two factors with the highest proportions, by far, of responses below zero are the company's current management system and process flow (47.27%), and the expertise or knowledge of existing employees (41.36%).

It is of interest to examine the findings of other surveys on this topic. Table 9 shows that in Yang et al. (2001), professional or academic organizations, top management attitudes, accountants' (lack of) capability, and methods being detached from practice all are considered impediments to management accounting application. O'Connor et al. (2004) found training, joint venture experience, being listed on a

stock exchange, age of the enterprise, and market competition all help to promote the adoption of modern management accounting techniques, while impediments include threats to the Chinese way of doing things and lack of managerial ability. Chalos & O'Connor (2004) found that equity ownership, joint-venture partner knowledge, and asset specific investments have significant effects on the use of controls by Sino-foreign joint ventures such as expatriate staffing, socialization practices, delegated decision-making responsibilities, parent company communications, and management incentives. Finally, O'Connor et al. (2006) found that there were significant effects from stock exchange listing, industry level growth, export sales, and enterprise size.

Returning to our own survey results, we found the facilitating role of consultants to be interesting. Sixty four percent of the responding firms claimed that they had used consultancy in the past 3 years. Seventy-six respondents indicated the nature of the consulting engagements. The most numerous were, in descending

Table 9. Factors facilitating or obstructing adoption of management accounting techniques by Chinese business enterprises.

	Our survey						Other surveys			
	No. <sup>a</sup>	Mean <sup>b</sup>	Median	Std. Dev.	<0(%) <sup>c</sup>	>0(%) <sup>d</sup>	Yang et al. (2001) <sup>e</sup>	O'Connor et al. (2004) <sup>f</sup>	Chalos & O'Connor (2004) <sup>g</sup>	O'Connor et al. (2006) <sup>h</sup>
<i>Period covered</i>	2004						2000	1999	n/a	1999
<i>Sample size</i>	225						234	82	262	502
<i>Expertise or knowledge of employees</i>										
Expertise or knowledge of existing employees	220	-0.07	1	1.02	41.36	32.73				
Expertise or knowledge of new employees	217	0.43	0	0.81	13.82	52.53				
<i>Availability of resources</i>										
Availability of financial resources	220	0.33	0	1.08	19.09	43.64				
Availability of equipment resources	218	0.33	1	0.94	20.18	46.33				
<i>Top management attitudes</i>	220	0.85	0	1.15	16.82	69.55	-47.9%			
<i>Employees' attitudes</i>	219	0.31	0	1.01	22.37	44.29				
<i>Company's current management system and process flow</i>	220	-0.08	0	1.11	47.27	37.73				
<i>Relationship with other organizations</i>										
Existing working relationship with external organizations	217	0.28	0	0.79	13.36	38.25				
Existing working relationship among internal units	218	0.20	1	0.93	27.06	42.66				
<i>Services of employees with IT expertise</i>	218	0.40	1	1.20	28.44	54.13				
<i>Training</i>										
In-house training	220	0.45	1	1.07	25.45	57.27				
Training provided by local/domestic universities	201	0.43	0	0.83	13.43	52.24				
Training provided by foreign universities	177	0.19	1	0.84	12.99	31.07		.431*** (68.75%)		
Training by local/domestic organizations	202	0.47	0	0.80	13.37	55.45				
Training provided by foreign organizations	174	0.21	1	0.79	11.49	33.33				
<i>Consultancy</i>										
Consulting provided by domestic consulting companies	195	0.49	0	0.83	11.79	55.90				
Consulting provided by foreign consulting companies	173	0.29	1	0.76	8.09	35.26				
<i>References</i>										
Domestic professional journals/research reports	203	0.48	0	0.62	4.43	50.25				
Foreign professional journals/research reports	189	0.32	0	0.62	4.76	35.98				
<i>Joint-venture partners</i>	187	0.28	0	0.63	4.81	27.81		.419***	Sig.(+)	
<i>Professional or academic organizations</i>	205	0.32	0	0.61	5.37	35.61	-54.9%			

Table 9. (Continued)

	Our survey						Other surveys			
	No. <sup>a</sup>	Mean <sup>b</sup>	Median	Std. Dev.	<0(%) <sup>c</sup>	>0(%) <sup>d</sup>	Yang et al. (2001) <sup>e</sup>	O'Connor et al. (2004) <sup>f</sup>	Chalos & O'Connor (2004) <sup>g</sup>	O'Connor et al. (2006) <sup>h</sup>
<i>Political constraints</i>										Sig.(-)
Government agencies	212	0.21	0	0.80	16.51	32.55				
Regulations	207	0.18	0	0.89	19.81	31.40				
Political mind set	204	0.11	0	0.74	17.16	26.96				
<i>Market forces</i>										
Stockholders	214	0.71	0	0.80	3.74	59.81				
Creditors	210	0.31	0	0.68	5.71	32.38				
Suppliers	211	0.18	1	0.72	15.64	33.18				
Customers	208	0.44	1	0.82	13.46	50.96				
Competitors' practices	211	0.31	1	0.96	22.27	51.18				
<i>Corporate governance</i>										
Board of directors members	220	1.00	1	0.81	3.64	74.55				
Independent board members	218	0.93	1	0.76	1.83	70.64				
Members of supervisory committee	217	0.80	0	0.79	2.30	61.29				
<i>Other factors</i>										
Accountants' capability							-29.65%			
Methods being detached from practice							-38%			
Stock exchange listing								.254***		Sig.(+)
Enterprise age								.304***		
Threat to Chinese way of doing things								-75%		
Lack of managerial ability								-75%		
Market competition								+75%		
Equity ownership										Sig.(+/-)
Joint-venture partner knowledge										Sig.(+/-)
Asset specific investments										Sig.(+/-)
Industry-level growth										Sig.(+)
Export sales										Sig.(+)
Enterprise size										Sig.(+/-)

<sup>a</sup>Only the firms that provide answers are included. Those with no response or responding with "not knowledgeable" (n/k) are not included.

<sup>b</sup>A 5-point scale was adopted with Min. = 1 and Max. = 5.

<sup>c</sup>Proportion of firms whose responses are -1 or -2.

<sup>d</sup>Proportion of firms whose responses are +1 or +2.

<sup>e</sup>A negative number indicates a barrier to management accounting application.

<sup>f</sup>The percentages were based on the number of cites over total number of interviews. A negative percentage indicates a barrier to management accounting application.

<sup>g</sup>The sample size was 117 for US partners and 145 for Chinese partners of Sino-foreign joint ventures. These factors can either be positive or negative varying between accounting and management controls.

<sup>h</sup>Sig. denotes that the factor is significant. These factors can either be positive or negative varying between accounting and management controls.

\*\*\*  $p < 0.01$

order, finance and investment, management and strategy, ERP/information systems (IS), and taxation.

### 5.11. *The Role of Accounting Education in Management Accounting Practice*

Of the factors identified as facilitators of management accounting modernization, two seem to rather directly involve Chinese management accounting education and educators: expertise or knowledge of new employees, and training provided by local/domestic universities. In addition, educators in tertiary institutions often staff in-house training and training courses of local/domestic organizations. Thus, we considered it relevant to explore factors related to educators' ability to facilitate management accounting modernization.

The method we used to collect data was a survey. A questionnaire was designed for university faculty who mostly teach management accounting courses. There were questions about the materials used (e.g., textbooks, other reading materials), pedagogy (e.g., lectures, open discussion), and publications within the past 3 years. Respondents also were given the list of management accounting practices in the practitioner survey, and asked to indicate the amount of in-class time devoted to each topic (1 = not covered, 2 = 0–1 h, 3 = 1–2 h, 4 = 2–3 h, and 5 = over 3 h).

The questionnaires were sent to the heads of accounting departments at 115 universities, who were asked to direct the survey to a faculty member who had heavy or primary teaching responsibilities in the management accounting area. The 115 universities consist of ones directly supervised by the Ministry of Education, and ones that are either under the control of other ministries (e.g., the China Academy of Sciences and the Commission of National Science, Technology and Defence), or specialist business universities highly likely to offer management accounting to business students. Complete anonymity to the respondents was guaranteed, and envelopes were provided for directly returning the surveys to us. In total, 39 completed surveys were received.

#### 5.11.1. *The Delivery of Management Accounting Education*

One indication of the role of accounting education in management accounting practice is the correlation between the extent to which techniques are taught and the extent that they are used by business enterprises. Table 10 shows the mean ratings of each topic's level of use and its extent of coverage in management accounting courses. The two columns of figures have a correlation coefficient of 0.39, which is significant at  $p = 0.018$ . We also find two overlaps

among the top five topics for practitioners and educators (i.e., cost behavior analysis and budgeting for cash/working capital). Overall, these findings suggest that management accounting courses are somewhat supportive of the needs of practice. This interpretation, however, must be tempered by the caveat that not all topics require the same amount of class time to cover well, such that the educators' ratings may not reflect the adequacy of class coverage or the importance being placed on a given topic.

In addition, the extent to which students develop mastery of a topic depends on the way that class time is used, as well as the materials used for explicating the topic. Table 11 shows the following:

- Most (35 out of 39) instructors are assigning Chinese textbooks
- The most weight tends to be placed on the textbook(s), with moderate weights being placed on articles in Chinese academic and practitioner journals
- Class instruction is primarily based on the one-direction delivery mode of lectures by the instructor, though there is some time devoted to open discussion

Overall, these statistics suggest that management accounting education in China has not caught up with developments in the more advanced countries, where a rather broad-based movement has been underway for the past decade towards interactive modes of learning.

## 6. Summary and Discussion

This chapter has sought to (1) examine the extent of modern management accounting applications by Chinese business enterprises, with particular attention to the period from 1997 to the present; (2) identify unique features of Chinese management accounting practices; (3) identify factors that facilitate or hinder the application of modern management accounting techniques; and (4) suggest possible future directions for the evolution and understanding of China's management accounting practices. To accomplish this purpose, an extensive review of historical accounts and prior studies was combined with surveys that the authors specifically conducted on the topic.

We started by reviewing the long history of management accounting developments in China. In ancient China, the use of accounting in management was mostly focused on government institutions and enterprises. It was not until the Ming Dynasty (1368–1644 AD) that private commercial and industrial enterprises came to rival government entities in their



Table 10. Comparison of management accounting technique usage and coverage in Chinese universities' management accounting courses.

	Mean level of use as rated by managers	Mean level of coverage in management accounting courses as rated by educators
Management accounting practice		
<i>Cost behavior analysis</i>	3.88 (rank: 5)	2.88 (rank: 2)
<i>Activity-based costing</i>	3.01	2.28
<i>Activity-based management</i>	2.68	2.05
<i>Cost allocation</i>	3.88 (rank: 5)	2.31
<i>Life cycle accounting</i>		
Systematic tracking life cycle product costs	3.23	1.55
<i>Environmental accounting</i>		
Systematic tracking environment costs	2.23	1.55
<i>Competitor analysis</i>		
Systematic effort to analyze competitors' costs	2.74	1.66
<i>Cost benchmarking</i>		
Costs are evaluated against best practices benchmarks	3.09	1.62
<i>Standard costing</i>	2.61	2.39
<i>Target costing</i>	3.35	2.03
<i>Kaizen costing</i>	2.65	1.54
<i>Quality cost reporting</i>	3.07	1.82
<i>Value chain analysis</i>	3.07	1.99
<i>Operating budgets</i>		
Budget is prepared for cash/working capital	4.10 (rank: 4)	2.43 (rank: 5)
Budgets are prepared for sales	4.27 (rank: 2)	2.18
Profit budgets are prepared	4.36 (rank: 1)	2.21
Production budgets are prepared	4.24 (rank: 3)	2.18
Budgets are revised frequently	3.39	1.96
Flexible budgeting used	3.03	2.14
Budgets with a multiyear horizon are prepared	2.92	1.93
<i>Participative budgeting</i>		
Employees encouraged to participate in setting budgetary goals	3.26	1.59
<i>Decision-making techniques</i>		
CVP used in decision making	3.64	2.93 (rank: 1)
"What if" analysis used in decision making	2.83	2.59 (rank: 3)
Decision trees used in decision making	2.43	2.03
<i>Capital budgeting</i>		
Use NPV	3.24	2.55 (rank: 4)
Use IRR	3.08	2.41
Use payback period	3.50	2.07
Use ARR	3.16	2.03
<i>Performance measurement</i>		
EVA	3.10	1.90
ROI used in performance evaluation	2.97	2.31
Residual income used in performance evaluation	2.33	n/a

Table 10. (Continued)

	Mean level of use as rated by managers	Mean level of coverage in management accounting courses as rated by educators
<i>Transfer pricing</i>		
Market-based price is used	3.11	2.04
Cost-based price is used	3.09	2.11
Negotiated price is used	2.58	2.11
An independent "Internal Bank" is in operation	2.12	1.96
<i>Information and communications technology</i>	2.58	1.41
<i>Responsibility accounting</i>	3.77	2.14
<i>Performance evaluation system</i>		
BSC	3.45	1.75
Comparing measured performance to a preset standard	3.28	1.66
Discretion in evaluating subordinates' performance	2.85	1.55
<i>Environmental scanning</i>	2.90	1.45
<i>Managerial and employee compensation system</i>	3.73	1.64
<i>Correlation</i>	R = 0.39, p = 0.018	

management accounting applications. This period also saw an increased infusion of foreign influences.

Moving forward to the twentieth century, the first three decades following founding of the People's Republic of China in 1949 were marked by an emphasis on class struggle and the attendant collectivization of economic activities. Whatever practices were inherited from China's past were uprooted and replaced with Soviet-style accounting focused on supporting a central planning approach and public ownership dominance. During this period, management thought and practices that were viewed as capitalist were repressed or rejected unless they were introduced through the former Soviet Union. Nevertheless, there still emerged some innovations in management accounting practice, including internal business accounting systems, workshop accounting, group accounting, and techno-economic activity analysis. Receptivity to capitalist/Western management and management accounting practices was reopened in 1978, when the government switched its emphasis from class struggle to economic development. This openness to capitalist/Western techniques was further strengthened by policy announcements of the central government in 1992 and 1997 reaffirming its commitment to privatization and the further opening of markets.

From 1978 to the late-1990s, the adoption of Western, or "modern" management accounting practices

gradually increased, though the pattern of adoptions was not uniform. Practices that related to economic reform or were promoted by government regulations were more widely adopted (e.g., responsibility accounting and internal banks). But as enterprises and their managers were granted increased autonomy as part of the movement towards marketization, they also increased experimentation with and use of new management accounting methods. The system adopted by the Handan Iron and Steel Co. (Hangang) is a particularly well-publicized example of success with such initiatives.

The use of modern management accounting practices has further expanded from the late-1990s to the present. Much of the adopted practices during this period seem to be focused on internal control processes for increasing efficiency and effectiveness. This inference is supported by anecdotal evidence, as well as our survey finding that practices with an external focus, such as competitor analysis and environmental scanning, are less frequently adopted. In a statement on management accounting practice, the [International Federation of Accountants \(1998\)](#) identified four stages in its development in the West: (1) cost determination and financial control (prior to 1950); (2) provision of information for management planning and control (by the mid 1960s); (3) emphasis on reduction of waste in business processes (from the mid-1980s to the mid-1990s); and (4) a focus on the creation of firm value (since the mid-1990s). Our survey

Table 11. Management accounting teaching materials and methods.

<b>Panel A: Nature of assigned materials</b>						
Textbooks	No. of universities					
Books in English	4	10.25				
Books in Chinese	35	89.75				
Reading assignment allocation (%)	Mean	Std. Dev.	Min.	Max.	<i>n</i>	
Textbook(s)	71.95	18.90	20	100	39	
Articles: foreign academic journals	3.64	10.31	0	50	39	
Articles: foreign practitioner journals	2.08	3.92	0	80	39	
Articles: Chinese academic journals	13.36	14.46	0	10	39	
Articles: Chinese practitioner journals	6.64	5.72	0	20	39	
Others	2.33	6.15	0	20	39	
<b>Panel B: Class time allocation</b>						
Class time allocation (%)	Mean	Std. Dev.	Min.	Max.	<i>n</i>	
Lecture	72.56	12.72	30	95	39	
Open discussion of readings from the text	4.12	4.62	0	20	39	
Open discussion of homework problems/exercises	7.27	5.29	0	20	39	
Open discussion of homework "cases"	6.74	7.32	0	40	39	
Open discussion of readings outside of the text	2.29	3.28	0	10	39	
Oral presentations by students or student teams	2.83	4	0	15	39	
Tests and exams	4.06	4.31	0	20	39	
Lectures by invited speakers	0.08	0.48	0	3	39	
Other	0.05	0.32	0	2	39	
Total	100					

findings, together with those of other studies, indicate that current management accounting practices in China have at best only reached the third stage, although some elements of the fourth stage are beginning to emerge.

Integrating our analysis of past developments with ongoing economic and policy changes in China, we foresee a period of vibrant growth for management accounting, both in the number of users and the scope of practices. A major impetus is increased privatization and marketization of the economy. China is said to have reached 69% of marketization following the market-oriented economic restructuring of the past two decades or so (Institute for Economic and Resource Management Research, 2003). Although state ownership of enterprises is likely to remain strong in the foreseeable future, the Chinese central government has embarked on a program of converting state-owned and nontradable ownership shares into privately-owned and tradable shares. As state-ownership declines, enterprise managers should have increased latitude and incentives to adopt practices helpful for facing an increasingly competitive market place. China's accession to the WTO implies that competition will come not only from other domestic enterprises, but also

large and aggressive foreign firms. And as Chinese enterprises increasingly interact with their foreign customers, suppliers, competitors, and partners, their familiarity with, and capacity for adopting modern management accounting techniques also should increase.

Use of ICT also can be a positive influence. While the relatively low level of current ICT use by Chinese enterprises places them at a disadvantage vis-à-vis their international competition, the absence of a burden from legacy systems also makes them more nimble in adopting cutting edge systems.

In a study of firms in the US and UK, Burns et al. (2003) found that ICT facilitates the computerization of routine management accounting and control techniques, thereby freeing up management accountants for less structured and more strategic tasks in teamwork with specialists from other disciplines. This finding suggests that as Chinese enterprises increase their ICT applications, they will face similar opportunities (and concomitant challenges) in changing the nature and scope of their management accounting function. In turn, this development can have important implications for China's management accounting education and educators.

Our surveys suggest that Chinese management accounting educators do have some awareness of enterprise managers' current concerns, though there also are significant gaps. Our findings also suggest that management accounting education in China still lacks emphasis on cutting-edge course materials, and the classroom experience remains heavily based on the one-directional approach of lectures by the instructor.

Another factor likely to impede the advancement of management accounting practice in China is the lack of a separate professional designation equivalent to the qualifications offered by the Chartered Institute of Management Accounting (CIMA) in the UK or the certified management accountant (CMA) in the US. Currently, China's Ministry of Finance operates an accounting examination office which administers qualifying examinations for accountants in industry and commerce, while the Chinese Institute of Certified Public Accountants administers the CPA qualifying examinations. Both sets of examinations tend to focus on technical accounting topics, with little coverage of such broader issues as strategy, organizational changes, and ICT. Our surveys found that at present, only an average of 2.36% of total required credits for undergraduate accounting students is devoted to the management accounting subject. This could further limit Chinese management accountants' ability to go beyond addressing narrow, technical issues. We see an urgent need for reassessing the current institutional arrangements to ensure that management accounting education in China can keep pace with the needs of its exploding numbers of business enterprises.

In addition to advancing such aspects of accounting education delivery like cutting-edge materials and modes of instruction, research also can help to advance both management accounting education and practice in China. A fundamental aim of research is to uncover general principles, such as those underlying the practices of different enterprises, and how they affect operations and results. Insights of this type can improve understanding of how current practices affect management effectiveness, thereby guiding efforts to improve current practice and to develop and implement new practices. The findings of research also can enrich the content of management accounting education. Finally, engaging in research can help faculty to remain intellectually agile and to keep up with cutting-edge developments, so that they can better teach students "how to fish," instead of just being able to "give them a fish."

We see several promising directions for future research into China's management accounting

practices. First, much insight into Chinese enterprises' practices and problems can be gained via frequent and in-depth interactions with enterprise managers, including consulting assignments. In undertaking such interactions, however, it is important to balance their time demands and their potential benefits to teaching and research. There also is a need to be on guard against faddishness in selecting the topics for investigation (Hopwood, 2002; Ittner & Larcker, 2001).

Second, reviews of management accounting research conducted outside of China can be a useful source of potential topics. For example, Shields (1997) has called for research on horizontal accounting, organizational accounting, and virtual accounting, while Ittner & Larcker (2001) have identified a range of under-researched areas from an EVA perspective. These include simultaneous determination of objectives, strategies, and organizational design; organizational design choices; executional cost drivers in addition to structural cost drivers; cost drivers throughout the value chain (interfirm management accounting); and evidential effects of management accounting as opposed to perceptual effects. Prior research also has suggested the relevance of factors like the environment, technology, and strategy to companies' management accounting practices. These issues have rarely been touched in published management accounting research conducted in China.

Third, there is room for further understanding the facilitators and barriers to Chinese enterprises' adoption of modern management accounting practices. Our surveys and a number of other studies have suggested a range of such variables for careful monitoring and rigorous examination. For example, how does the current program of reducing state ownership in SOEs affect the adoption and effects of management accounting techniques? Are their impacts conditional on characteristics of the enterprise, such as its competitive strategy, industry, and size? In exploring issues like these, it is important to recognize that China is still transitioning from a command to a market economy, and that it has a unique national culture. These attributes make it possible, perhaps even likely, that the effects of given management accounting practices may differ from those found in studies of other countries or settings. In the case of national culture, for example, a large body of research has found that people of different national origins often have very different work-related cultural values, which in turn affect their preferences for, and reactions to, specific management practices (e.g., Harrison & McKinnon, 1999; Hofstede, 1980, 1991; Ronen & Shenkar, 1985; Schwartz, 1994; Smith et al.,

1996; Trompenaars, 1994). Thus, practices that work well in other (e.g., Western) national settings may be ineffective, or even dysfunctional, if applied by Chinese enterprises without change. In the specific case of individuals of Chinese ethnicity, “guanxi,” or interpersonal relations, has long been identified as a key factor in business dealings (Fock & Woo, 1998; Park & Luo, 2001). Studies comparing individuals of Chinese and Anglo-American cultural backgrounds have found, for example, that they differ in such aspects as the willingness to accept the performance dictates of superiors (Chow et al., 2001), the relative preferences for team-based vs. individual-based performance evaluation and rewards (Awasthi et al., 2001), and their propensity to openly share information with others within the firm (Chow et al., 2000). Differences like these can have important implications for the effectiveness of different management accounting practices in China, as well as the most effective ways to implement them.

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# The Development of Cost and Management Accounting in Britain

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**Abstract:** This chapter surveys the history of cost/management accounting (C/MA) in Britain from medieval times to 1970. C/MA is the arena within which the 'right way' of studying accounting history has been the subject of vigorous debate. We therefore commence our investigation with a consideration of the ways in which scholars, of various theoretical persuasions, have applied their analytical lenses to the study of C/MA's history. In this context, we also reflect on the significance of burgeoning research findings for our understanding of accounting's past, while drawing attention to disagreements over what the available evidence actually means. Our chapter is further contextualised through an examination of the various sites in Britain where C/MA has been practised during our study period and, from our principally economic rationalist standpoint, through a rehearsal of factors judged to have influenced the development of C/MA. We then move on to examine the development of C/MA theory as exemplified in the literature published, within and outside accounting treatises, from the late-seventeenth century onwards. We draw attention to the upsurge in writing about C/MA following the so-called 'costing renaissance', c. 1870, and assess the significance of both the scientification and professionalisation of accounting during the early decades of the twentieth century. We reveal, in the post-World War II period, a growing focus on C/MA narratives as an aid to management, as epitomised by writings on standard costing, budgetary control, uniform costing and marginal costing. Our study of British C/MA practice also follows a temporal pattern. The plethora of material now available and changes in the nature though not necessarily the purposes of C/MA have encouraged us to survey, separately, practices employed during the pre- and post-costing renaissance periods. Indeed, the explicit theme underpinning this part of our chapter is that calculative techniques have been used for centuries for the common purposes of planning, decision making and control. The growing formalisation of C/MA processes, as the discipline became increasingly professionalised during the twentieth century, is illustrated through a re-examination of the four key areas focused on in the contemporary literature. Given its great significance for British industry, British society and, for some, British C/MA practice, the impact of World War I is also singled out for particular attention. Finally, the chapter explores (briefly) the relationship between C/MA theory and practice, concluding that, despite the wealth of research findings available compared to many other aspects of accounting's past, on this, as with many other issues, the 'jury is still out'.

## 1. Introduction

Accounting is a discipline which, at any point in time, encompasses

a body of ideas, a number of conventions, a set of available tools/techniques and a variety of actual practices. (Boyns & Edwards, 1997a, p. 21)

The same is of course the case for any subset of accounting, such as cost/management accounting (C/MA), with the ideas, conventions, techniques and

practices changing over time. In this chapter, which focuses principally on business entities, broadly defined,<sup>1</sup> we will also show that the accumulation, via accounting practices, of relevant costs by owners and managers for the purposes of planning, decision making and control has a long history that reaches

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<sup>1</sup>Some attention is given to monasteries and manors; none to local and central government.

Table 1. *Development of accounting as an instrument of management.*

Financial accounting	The ascertainment of total results analysed in relation to external factors and groups of individuals
Cost ascertainment	The allocation of expenditure to specific activities, processes or products
Budgeting	The planning and controlling of the whole of the financial activities of an enterprise
Standard costing	The utilisation of the whole accounting technique to locate errors and inefficiencies at the source, by setting up standards as a basis for judging actual operating performance

Source: ICAEW (1947, p. 12).

back long before the Industrial Revolution (1760–1850).<sup>2</sup>

The precise nature of the accounting tools and techniques used in business enterprises has changed dramatically over the years, and there continues to exist major differences between the C/MA systems used by different entities today due to, for example, variations in size and business environment. Different images of the nature of management accounting exist, and one which focuses on some (but by no means all) of the topics discussed in our historical survey is presented in Table 1. Taken from a report published by the Institute of Chartered Accountants in England and Wales (ICAEW), just after World War II, Table 1 summarises what the ICAEW's cost accounting sub-committee considered to be four key phases in the development of accounting as an instrument of management in the first half of the twentieth century.

The period covered by this chapter stretches from medieval times to 1970, with the cut-off date justified by the historians' claim to require a reasonable interval between the event and writing about it in order to enable a more objective and balanced assessment to be made. We first contextualise this chapter using sections dealing with some disagreements between accounting historians concerning the history of C/MA and how it should be studied; a consideration of the sites where C/MA has been practised and an examination of factors affecting the development of C/MA. Next, we review the development of C/MA theory, as exemplified by the literature, and practice. We then comment on the changing relationship, over time, between C/MA theory and practice and, finally, present our concluding remarks. We acknowledge the fact that it is impossible, in a single chapter, to do full justice to this substantial topic, for example, in terms of presenting the findings of earlier research, drawing out the

significance of their messages and presenting our own ideas and assessments.

## 2. Contextualising the Development of C/MA

### 2.1. *Historians in Discord*

C/MA is a thriving area of historical research and the site for much of the debate concerning different ways of achieving a better understanding of accounting's past. Three provocative and scholarly papers, each published in *Accounting, Organizations and Society*, stand out: Anne Loft's (1986) investigation of cost accounting in Britain during and immediately following World War I; Hopwood's (1987) encouragement to study the preconditions of accounting change, the process of change and its organisational consequences; and Hoskin & Macve's (1988) study of the connection between West Point and the Springfield Armory. It was also, within this 3 year period, that Johnson and Kaplan's thought-provoking book *Relevance Lost* appeared in print. The significance of these publications can be inferred from Salvador Carmona's (2003) study which ranks them all within the top seven 'most influential works' based on citations in the 1990s accounting history research literature.

As writers sought to understand, challenge and confirm new ideas, a vigorous, and sometimes combative, literature developed which continues to expand. The debate has taken two forms; the nature of the appropriate methodological approach to be used, and the questioning of established conventional wisdoms concerning the role of C/MA.

#### 2.1.1. *Diverse Theoretical Standpoints*

The prior work of accounting historians was the subject of stinging criticism from Anthony Hopwood in 1987. His classic essay entitled 'The archaeology of accounting systems' argues that accounting historians had, up to that time, adopted a mundane technical perspective

delineating the residues of the accounting past rather than more actively probing the underlying processes

<sup>2</sup>We recognise the fact that accounting data preparation often becomes no more than a ritual, and that the information generated might not be used by management but instead remain in the 'right hand drawer'.

and forces at work. (Hopwood, 1987, p. 207; see also Hopwood, 1983)

Hopwood encouraged, instead, examination of the dynamics of accounting over time through consideration of

the preconditions for such change, the process of change or its organisational consequences. (Hopwood, 1987, p. 207)

Case studies are presented by Hopwood to demonstrate his ideas focusing, in particular, on circumstances that succeeded in 'putting accounting where accounting was not' (Hopwood, 1987, p. 214). These sentiments were echoed by Miller, Hopper and Laughlin in an editorial to a special issue of *Accounting, Organizations and Society* (Miller et al., 1991; pp. 5, 6), with the term 'new accounting history' used to describe the outputs of critical accounting historians that were then beginning to emerge. 'New accounting history' studies are not confined to C/MA, of course, but it is the subset of accounting that, so far, has provided the most promising material for academic debate between historians from diverse methodological persuasions.

Loft's (1995) survey of the history of management accounting elucidates five distinctive approaches to the study of past events. First, there are the 'traditional historians' who are seen to be preoccupied with tracing accounting's history as one of continuous evolution, technical elaboration and improvement towards its present state. This school has been criticised by the new accounting historians (see Miller & Napier, 1993) for the limitations of their historical analysis. Loft's second group, the neo-classicists, comprises historians who have revised and developed the findings of the traditional school. Although agreeing that such researchers bring more of the organisational context into their studies, neo-classicists are seen to share with the traditionalists

a rather passive view of cost and management accounting as a set of techniques serving the goals of the organisation and ... progressing in an evolutionary way, becoming constantly better over time. (Loft, 1995, p. 25; see also Napier, 2001)

Johnson & Kaplan (1987), presumably because their book *Relevance Lost* had produced such a furore in the years immediately prior to when Loft put pen to paper, are allocated a substantial section of their own ('The Johnson and Kaplan approach'), although many would put them in the neo-classical camp in view of their Chandlerian-based analysis of the role of accounting's development within large-scale enterprises.

The remaining sections of Loft's paper cover the contributions to our understanding of C/MA's development supplied by two schools of thought from within the 'new accounting history'. The labour process approach is structured on the theory that organisational control systems are not neutral mechanisms for making production more efficient, and is promoted as a counterpoint to explanatory frameworks employed by researchers discussed in the preceding paragraph. According to Marxist historians (e.g. Armstrong, 1985; Braverman, 1974; Bryer, 2000a, b, 2005; Hopper & Armstrong, 1991; Hopper et al., 1987), an accounting system is a practical mechanism that aids management in its endeavour to exploit labour on a day-to-day basis in order to extract surplus value. Marxist historians therefore characterise the development of management accounting as a tool in the armoury of capitalists in the class struggle over the distribution of income and wealth.

Michel Foucault has inspired a related but different line of thinking in the historiography of management accounting. The French philosopher did not himself address directly accounting matters, but his ideas have been applied in an imaginative manner drawing on his concern with the central role played, within modern society, by techniques aimed at watching and controlling what individuals do. The Foucauldians have, accordingly, attributed management accounting's development to the need for managers of corporations to control and discipline by rendering actions visible and calculable.

The appearance of critical scholars, presenting their ideas in a vigorous and creative manner, resulted in clashes both between themselves and with neoclassical accounting historians (Fleischman & Radcliffe, 2005). Much more important, their arrival helped to extend significantly the range of scholarship applied to the debate about accounting's past, particularly in the area of C/MA. The mid-1990s saw a reaction against what threatened to become an increasingly confrontational methodological debate (Fleischman et al., 1996; Funnell, 1996). Funnell (1996) demonstrates both the differences between the traditional and new accounting historians and how they complement and add value to one another by interpreting the same events in different ways. Funnell (see also Fleischman & Parker, 1997, Chapter 9) argued against polarisation amongst accounting historians and in favour of tolerance. The last 10 years has seen, importantly, a continued exchange of views and ideas,<sup>3</sup> and also historians with

<sup>3</sup>See for example the 'Historiographic Perspectives' section of the *Accounting Historians Journal*, June 2000.

differing methodological standpoints collaborating to examine the effect of applying their distinctive lenses to interpret the significance of archival material jointly studied (e.g. Bryer et al., 2005; Fleischman et al., 1995; Fleischman & Macve, 2002). This period has also seen individuals applying more than one paradigm to the analysis of their evidence (Oldroyd, 1999). Implying the need for tolerance and respect for, though not necessarily acceptance of, the work of other researchers from whatever historical paradigm, the observation by A. J. P. Taylor is worth repeating in this context:

We know that our version, being set into words, is itself false. We are trying to stop something that never stays still. Once written, our version too will move. It will be challenged and revised. It will take on appearances that we did not expect. We are content to repeat the words with which Gayl finished his book on Napoleon: 'History is an argument without end.' (Taylor, 1976, p. 17)

### 2.1.1.2. *Questioning Conventional Wisdoms*

The work by Edwards (1937), Urwick & Brech (1948–1949), Solomons (1952), Yamey (1962) and Pollard (1968) had, by the 1970s, produced the broad conclusion that meagre developments in costing had taken place up to about 1870 when there occurred what Solomons (1952, p. 17) labelled 'a costing renaissance'. This bleak assessment of C/MA's history is famously encapsulated in the following remark from the economic historian Sidney Pollard:

The practice of using accounts as direct aids to management was not one of the achievements of the British industrial revolution; in a sense, it does not even belong to the later nineteenth century, but to the twentieth. (Pollard, 1968, p. 288)

Chandler (1977) moved things back a bit in time, at least in the US context, when *The Visible Hand* argued that the rise of the large-scale business enterprise, from around 1850, had a positive impact on the development of cost accounting. Given that industrialisation occurred earlier on this side of the Atlantic, and the fact that at least some business enterprises were large scale, we might intuitively expect C/MA developments in Britain to have pre-dated US initiatives. Indeed, by the time Chandler wrote, researchers had already begun to reveal that this was in fact the case (e.g. Burley, 1958; McKendrick, 1970; Rimmer, 1960; Stone, 1973), and these findings were significantly added to by the early 1990s (e.g. Edwards, 1989; Fleischman & Parker, 1990, 1991; Jones, 1985; Marshall, 1980).

The outcome of such work, and of more recent research, has been that earlier assessments of the

availability and use of C/MA techniques for purposes of planning, decision making and control, and their possible contribution to economic development up to the end of the industrial revolution, are now substantially discredited.<sup>4</sup> Until recently, however, much less archival research had been conducted for the period since 1870, where most historians based their assessments of accounting *practice* on the content of the Anglo-Saxon accounting *literature*. Chatfield (1977), Locke (1979) and Sowell (1973) have emphasised the shift of leadership in respect of the English language costing literature away from Britain, which was ahead up to about 1900, and towards America. Whether there was a similar shift in respect of C/MA practice is unclear. Given the supposed more rapid adoption of the M-form company in America, with which many of the major developments in C/MA practice during the twentieth century have been closely tied (Chandler, 1962, 1977, 1990), it is perhaps unsurprising that writers like Ashton et al. (1995, p. 2) have suggested that British developments lagged those in America. Edwards & Boyns (1997a), however, have warned against assuming that there was a single Anglo-Saxon pattern of C/MA development.

Nevertheless, views based on conceptualisations of developments in America, have become implicitly accepted and often repeated as if they applied also to Britain. Recent surveys of British contemporary literature and archival research into British practice, however, enable some of these views to be questioned in this chapter, namely

- C/MA was initially carried out separately from the mainstream double entry-based financial accounting system, not least because it was developed by engineers rather than accountants (Wells, 1977), with integration of the two accounting functions only being achieved in the twentieth century (Johnson & Kaplan, 1987);
- World War I brought the practice of cost accounting and the profession of cost accountancy 'into the light' (Loft, 1986, 1990, 1995).
- C/MA remained principally backward looking and concerned with the identification of 'accurate or precise costs' until World War II (Scapens, 1991, p. 8).
- Forward-looking methods such as standard costing and budgetary control were not adopted on a

<sup>4</sup>Bryer (2005, p. 36) believes, quite probably correctly, that economic historians continue to accept Pollard's assessment, and a significant part of his paper (especially, pp. 36-44) is devoted to a critique of Pollard's analysis and understanding of accounting.

widespread scale until the 1950s (Scapens, 1995) or even the 1960s (Armstrong, 1993, p. 6).

- From the early twentieth century, British developments increasingly lagged behind those in America (Ashton et al., 1995; Locke, 1979).

In addition to our main theme that C/MA was developed in many companies well before the end of the nineteenth century, we will argue the following:

- C/MA was sometimes integrated within the double entry-based general/financial accounting system very early on.
- Although World War I clearly helped the cost accounting profession to come into the light, evidence of the war having a major impact on costing practices is negligible, not least because of the far wider existence of costing amongst businesses in certain industrial sectors before the war.
- Forward-looking techniques were the essence of accounting from medieval times, and formalised systems of standard costing and budgetary control were well developed within certain businesses by World War II.
- British developments did not obviously lag behind those of the US or, at least, not to the extent normally believed, especially when one takes account of the far higher number of large companies in the US consequential upon that country's greater size.

## 2.2. Sites for the Practice of C/MA

We know that accounting, in the form of the written record, emerged in thirteenth-century Britain in what were then the large-scale organisations engaged in business activity—the monasteries and the manors (Harvey, 1994). The centuries that followed saw the development of an agricultural economy dominated by estates that generated income for the landowner without his having to undertake day-to-day managerial duties that were instead delegated to stewards and bailiffs.

A landed estate typically consisted of a manor and several tenant farms but, given the aim of self-sufficiency, the activities undertaken were unlikely to be confined to the strictly agricultural. The estate might also be involved in extracting materials from the land, for example for fuel, and with processing its produce, for example wheat into flour and bread. Over time, landed estates also became proto-capitalistic enterprises, with the outputs from the land used as a means of obtaining income through manufacture and trading with the world outside the manor. Such an estate naturally exhibited many different features from an industrial concern, but there were also

numerous similarities. In both cases, there was the need to control the activities of agents and employees. Moreover, in an estate of any size, a number of activities were likely to be undertaken, requiring choices to be made, and, therefore, causing their relative cost and profitability to be of interest to the owner.<sup>5</sup>

Industry, when defined as 'the organized action of making of goods for sale' (<http://www.thefreedictionary.com/industrialization>), had its origins on the landed estates but became increasingly visible as a purely capitalist endeavour. The 'spirit of capitalism' (Sombart, 1902; Weber, 1958; Winjum, 1972) is manifested in the emergence of the domestic or 'putting-out' system during the sixteenth century in place of the declining guild system. Under the putting-out system, which dominated the production of cottons and woollens, lace, hosiery, glovemaking, straw-plaiting and all types of metalwares from nails to trinkets, the merchant capitalist distributed raw materials to families who were paid on a piece-rate basis for their labour. The worked materials were sometimes then the subject of further processing by a different set of individuals, with such transfers needing to be carefully tracked and accounted for.

The transition from the domestic to the factory system resulted from a process of trial and error that started in the seventeenth century in an endeavour to develop more efficient production procedures (Beckett, 1977). Certain important characteristics of the modern factory were present in what has been described as the 'proto-factory'. These included a significant investment in tools and implements, a labour force assembled within the 'factory' to enable its close supervision, the division of labour and the development of production methods designed for 'flow production' (Mephram, 1988a, pp. 57–58). Each of these features was present, for example, in a number of Scottish linen 'manufactories' by the year 1700 (Marshall, 1980, Chapter 6). The best known of these is the Newmills Cloth Manufactory, Haddington, established in 1681, which is described as one of a number of 'communal work stations' that preceded the emergence of the 'true factory' (Marshall, 1980, p. 142). It is the silk-throwing mill, constructed by John Lombe near Derby in 1717, that is generally considered to be the first example of a factory in the modern sense of the word. It was 500 feet long and five or six stories high, resembling

a huge barracks ... with its automatic tools, its continuous and unlimited production, and the narrowly

<sup>5</sup>For example the Bowes Estate, 1700–1770 (Oldroyd, 1999); the Mackworth Estate, 1759–1760 (Jones, 1985, pp. 52–72).

specialised functions of its [300] operatives. (Mantoux, 1928, p. 199)

Other early signs of industrialisation, of a different type, occurred in Wales and are associated with the extraction of metalliferous ores and the manufacture of metal products. Progress occurred first in copper smelting, which made great strides between 1700 and 1730. Iron making remained of relatively little significance until after 1750 when it began to develop, first slowly, but later at an enormous pace, along the northern outcrop of the South Wales coalfield.

Despite these clear signs of industrialisation, the phenomenon known as the industrial revolution is judged to have commenced around 1760, encouraged by a series of major technical innovations that created machinery well suited to large-scale, factory-based production. The entrepreneur whose capital was tied up and at risk was also naturally concerned to ensure the safety of the machinery that he owned and, through surveillance of the work force, that available capacity was fully utilised. It remained the case, however, that huge initial capital investments were not usually required, with businesses developed from the 'ground up' on the basis of reinvested profits, by taking in partners and through borrowing (Fleischman & Parker, 1991, p. 368). A classic example of a company growing on the basis of reinvested profits was the Dowlais Iron Company. Allegedly, the largest ironworks in the world in the 1840s, it engaged at least 5,000 workers and, in 1846, reported a profit of £172,747 (Edwards & Baber, 1979, pp. 139–149; Jones, 1987, p. 107).<sup>6</sup>

The method of funding corporate activity began to change with the advent of the railways, in the 1830s, the construction of which required a hitherto unimaginable level of initial capital investment and, as a result, substantial reliance on funding provided by absentee investors. Indeed, it was the railways that began to transform the London Stock Exchange from a capital market that dealt principally in government stocks to one also trading significantly in corporate securities. The mobilisation of surplus funds available for investment was further facilitated by the establishment of stock exchanges in a number of provincial cities between 1836 and 1845 (Gourvish, 1980, pp. 16–17). The second half of the nineteenth century saw stock market activity based on a growing range of corporate securities. The first major surge in stock market activity took place between 1863 and 1866 when 900 of the 3,500 companies registered offered

their shares to the public. This reflected, in part, the growth in initial investment requirements that accompanied the rising number of capital-hungry technological innovations. In steel making, for example, the Bessemer steel making process (1856) and the Siemens open-hearth process (1868) were significant events of this genre.

Early, large business entities, such as the chartered trading companies and iron-making companies, often faced complex accounting problems related to the planning and control of multiple agents, numerous scattered plants and/or overseas activities. The rise of the modern corporation, and more especially the modern multinational enterprise of the twentieth century, brought such issues increasingly to the fore. The move from the U-form structure to the decentralised M-form encouraged the development of new accounting tools for measuring performance, including return on investment (ROI), and budgetary control and standard costing for planning and control. The increasing role of the state in economic activity, albeit to a limited extent in the nineteenth century, but more so during the twentieth century (Tomlinson, 1994), also had accounting implications. Indeed, accounting played a role in the regulation of 'private sector' utilities in the nineteenth century, the rise of public corporations between the two world wars and the nationalisation of whole industries after World War II, though sometimes not always to the extent, or in the way, which might have been expected.

### 2.3. Factors Affecting the Development of C/MA

In this section, we consider factors that affect the nature of a C/MA system and cause it to change over time.<sup>7</sup> When designing the accounting system to be operated by an organisation, consideration may be given to the identification of the most important 'contingent' variables. As Emmanuel & Otley put it:

The contingency approach to management accounting is based on the premise that there is no universally appropriate accounting system applicable to all organisations in all circumstances. Rather a contingency theory attempts to identify specific aspects of an accounting system that are associated with certain defined circumstances and to demonstrate an appropriate matching. (Emmanuel & Otley, 1985, p. 47)

<sup>7</sup>For a different perspective on factors producing accounting change, see Hopper & Armstrong (1991, p. 405), where they argue that 'accounting controls were not a consequence of economic or technological imperatives, but rather were rooted in struggles as firms attempted to control labour processes in various epochs of capitalistic development'.

<sup>6</sup>Guest & John (1989, p. 123) suggest that as many as 7,300 were employed by 1845.

The accounting history literature reveals the following factors as having been important in affecting the development of entities and their accounting systems: business size and organisational structure, technology, strategy, competition and market demand and agents of change.

### 2.3.1. Business Size and Organisational Structure

In the small business, the need for accounting information is at a minimum, since managers can manage through observation of performance. In larger businesses, the separation of management from operating activity occurs both within and between workplaces, giving rise to the need for reports that enable 'managing by the numbers' (Ezzamel et al., 1990, p. 161; Geneen & Moscow, 1984). It happened on estates in medieval times (Harvey, 1994; Noke, 1981), under the domestic system in the late-middle ages, within the great international trading concerns like the Hudson Bay Company by the seventeenth century (Sprakman & Wilkie, 2000), in the modern business enterprises that began to emerge during the nineteenth century like the Dowlais Iron Company (Boyns & Edwards, 1997a) and in the twentieth century with the development of the parent/subsidiary arrangement (e.g. Imperial Tobacco Co. Ltd.) and the multidivisional format for business organisation (e.g. GKN, ICI and British Insulated Callenders' Cables Ltd (BICC)).

As the modern business enterprise has developed, the managerial arrangements have become more complex, and the need for C/MA has increased. History shows that developments in the range of activities in which an organisation is engaged, and changes in the way in which production is organised, have influenced this process. As landed estates became larger and/or involved in making more products, and as merchants traded in an ever more diverse range of goods, those engaged in such activities increasingly maintained separate records of the cost, revenues and profits associated with the different activities. As industrialisation gained pace in the seventeenth and early-eighteenth centuries, organisations initially remained relatively small scale, and scattered, selling partly processed goods to one another for further work to be done. A good example is the charcoal-based iron industry which consisted of independently run furnaces, forges and rolling mills. As these arrangements coalesced into regional partnerships (e.g. South Yorkshire Ironmasters' syndicate of the seventeenth/eighteenth century), however, market transactions were replaced by accounting numbers constructed to enable the relative profitability of each physically separate entity to be assessed (Edwards & Boyns, 1992).

The development of factory or other worksite-located operations, in place of the former domestic system, created a whole host of additional accounting problems that needed to be resolved. The centralised production units brought together workers whose performance required monitoring, while also resulting in rising levels of overhead costs, the commercial significance of which needed to be understood (Boyns & Edwards, 1997a; Chandler, 1962, 1977; Fleischman & Parker, 1992, pp. 154–155; Johnson, 1972). As the size and complexity of business units increased, especially in relation to multiplant and multinational enterprises, the uniformity of C/MA systems became an important issue, as exemplified during the late nineteenth century and first half of the twentieth century by a number of companies in the chemical industry, including Albright & Wilson (Matthews et al., 2003), United Alkali (Boyns et al., 2004) and ICI (Percy, 2001, Chapters 9 and 10). Other issues, such as the treatment of joint costs and how transfers of goods and services should be priced, have naturally become ever more pressing. Concerns over transfer pricing, however, are nothing new—raising issues which were addressed by integrated iron and steel producers like the Consett Iron Company and Pearson & Knowles in the second half of the nineteenth century (Boyns & Edwards, 1995; Boyns et al., 1999).

### 2.3.2. Technology

Fleischman and Parker's study of industrial revolution iron companies led them to conclude that

technological innovation was clearly related to the owners' assessment of the impact on overall process costs. (Fleischman & Parker, 1992, p. 155)

The same researchers (Fleischman & Parker, 1991, p. 370) consider the level of technical sophistication to be a signal of 'firm complexity', arguing that this explains the greater attention devoted to cost analysis by iron making as compared with textile manufacturing companies. In his study of the nineteenth-century Sunderland shipbuilding industry, McLean (1995) draws attention to the difficulty, within early records, of finding explicit evidence of cause and effect. But there are other sources of illumination and McLean uses these to justify his conclusion that:

the weight of evidence in the contemporary literature suggests that it is highly likely that a major factor [causing accounting innovation within shipbuilding] was the need for more extensive cost analysis in order to provide information for pricing decisions in a competitive environment during a period of technological and organizational change. (McLean, 1995, p. 142)



An example of the impact of technological and organizational change in the late nineteenth century is that of the chemical company, Albright & Wilson. In the early 1890s, this Oldbury (Birmingham) based company was introducing new electrolytic methods for producing phosphorous and exploring the potential of hydroelectric power at Niagara Falls. Although not a large business by Chandlerian standards, the technological developments which turned this company into a multinational enterprise were associated with organisational changes, including the appointment of a professional, salaried manager, from outside the ranks of the two owner families. Given these interrelated changes, during the 1890s and early 1900s the company developed the use of accounting methods, including cost standards, for monitoring and controlling the performance of its overseas plants (Matthews et al., 2003).

### 2.3.3. Strategy

Major strategic decisions like whether to continue in a particular line of business (Boyns & Edwards, 1995), where to locate planned productive activity (Jones, 1985, pp. 25–32) and whether to renew a lease or acquire a new business (Pitts, 2001) required the development of new and imaginative valuation procedures and ways of measuring expected future costs and profits. It was also of course the case that strategic investment decisions resulting in a heavy expenditure on fixed assets could stretch available financial resources, highlighting the need for tight control as occurred at Boulton and Watt between 1800 and 1803 (Fleischman & Parker, 1990, 1991, p. 368).

### 2.3.4. Competition and Market Demand

Factors that are judged to have given rise to a demand for improved C/MA systems include declining market prices, growing competition and slackening demand (McLean, 1995; Spraakman & Wilkie, 2000; Wells, 1977, pp. 49–50). Naturally, these factors could affect different industries at different times in different places. For example, the iron industry suffered from a lengthy period of declining prices between 1808 and 1830. Competition is thought to have squeezed profits in, for example, the Scottish iron industry in the 1790s (Fleischman & Parker, 1990), at Boulton and Watt's engineering operations in the early nineteenth century (Roll, 1930), in the Welsh iron industry during the 1820s (Raistrick, 1970) and in the Yorkshire flax spinning industry during the second quarter of the nineteenth century (Rimmer, 1960). It was also a downturn in demand that caused the potter Josiah Wedgwood to carry out

a costing exercise designed to identify the relative profitability of his various product lines in the 1770s (McKendrick, 1970; see also Burley, 1958, p. 58; Edwards et al., 1990, p. 64).

### 2.3.5. Change Agents—Individuals and Firms

We know that developments in C/MA occurred, and we have considered some of the factors that gave rise to the need for change to take place. But what *enables* change to occur, and from where do the ideas come? Although in one sense begging the question, it is certainly the case that the written word, in the form of books and journal articles, has been a source of illumination to accountants and managers keen to improve their C/MA systems; the literature available to them is considered later in this chapter. The focus here is on the 'actor' (Yamey, 1981, p. 131) as an agent of change (Parker, 1979), such 'actor' possibly being an individual, a firm (e.g. a consultancy firm) or an institution (for example, a government department). In common with many other aspects of historical enquiry, explicit evidence of the exact nature of the contribution of such 'actors' is often difficult to obtain. It is therefore sometimes necessary to rely as much on circumstantial evidence as on 'hard facts'. Pollard acknowledges that innovation can occur independently of *external* change agents when asserting that it might take place in response to

the practical needs of the firms concerned, innovating as they went along, normally without knowledge of similar forward probings elsewhere. Mostly, there was in any case no qualified accountant, and the entrepreneur kept his own books, as the need arose. (Pollard, 1968, p. 251; see also Edwards et al., 1990, p. 65; Fleischman & Tyson, 1993, p. 511)

Jones (1985, p. 193) has suggested that industrial bookkeeping and accounting techniques had their origins in the experience and knowledge that proprietors and their agents brought with them to their new businesses. In their study of the dissemination of accounting technology in Wales' basic industries c. 1750–1870, Boyns & Edwards (1996) provide a degree of confirmation for this hypothesis, drawing attention to the significance of the movement of personnel, e.g. clerks, agents, managers and bookkeepers, within the South Wales iron industry. Individuals like Gilbert Gilpin (the clerk of the Bersham ironworks in North Wales between 1786 and 1796), for example, seem to have played an important role in disseminating information throughout the late eighteenth century iron trade, his papers evidencing

the extent to which a geographically dispersed trade was bound together, however imperfectly, by a

single, distinctive 'corporate culture'. (Evans, 1990, p. 30)

Gilpin's letters also reveal that ironmasters were

a group united by common economic purpose, linked by ties of kinship, involved in shared financial and marketing circuits, and bound by a high regard for the protocols of the trade. (Evans, 1990, p. 36)

Probably, the most significant way in which ideas and techniques were disseminated, at least up to the latter decades of the nineteenth century, was through on-the-job experience and the movement of personnel between firms and industries, taking with them the ideas and techniques that they had gained.<sup>8</sup> This process undoubtedly continued well into the twentieth century, despite an increasing institutionalisation of the process of change through the advent of organisations dedicated thereto, such as management consultancy and accountancy firms. To give one example, according to the business historian Jonathan Boswell (1983) and, indeed, the company's managers, standard costing and budgetary control procedures were introduced at the United Steel Companies Ltd., in the 1930s, as part of a determined endeavour on the part of the newly appointed chief executives (Sir Walter Benton Jones and Captain Robert Hilton) to impose, through strict centralised control, efficiency and order on that 'heterogeneous conglomerate' (Edwards et al., 2002, pp. 37–38). An important role in developing and implementing the new approach was undoubtedly played by Roland Dunkerley, who had initially learnt about and experienced standard costing and budgetary control at Hans Renold Ltd.

There is also evidence of British industry benefiting from the international transfer of accounting technology early on through, for example, the German engineer and manager Daniel Hechstetter who leased a copper works in Keswick in 1580. In this case, there is evidence of industrial accounting emerging out of merchant accounting, as postulated by Pollard (1968, pp. 246–248), emanating from Hechstetter's involvement with his family's merchant business and his association with other Augsburg merchants (Edwards et al., 1990, p. 63; see also Garner, 1954, pp. 4–7). Without doubt, Daniel Hechstetter and his German associates in Britain were convinced of the importance of accounting. During the 1570s, they pressed their English partners in the Mines Royal Co. for the appointment of an honest person with knowledge of accounts to assist them in their negotiations for

obtaining wood, peat and charcoal, insisting that the 'longer the appointment of such an accountant was delayed, the greater the loss' (quoted in Jones, 1985, p. 6).<sup>9</sup>

Over time, there also emerged groups of specialist business advisors that are likely to have helped bring about the dissemination of ideas and practices. Oldroyd (1996) has shown that colliery viewers were instrumental in disseminating mining expertise and quite possibly cost accounting practices among eighteenth century coal companies, located in the north-east of England, known as the 'Grand Allies'. Oldroyd notes a similarity between the costing techniques employed by the viewers to help appraise the viability of new ventures and those subsequently employed for the purposes of measuring and assessing subsequent performance. It is difficult to be certain about the direction in which the transfer of accounting technology occurred, but Oldroyd's examination of the dating of available accounting records causes him to conclude that it was from the viewers to the Grand Allies (Oldroyd, 1996, pp. 18–19).

Surveyors like the consultant mining engineer William Armstrong were in a position to fulfil a similar role. Armstrong is alleged to have been 'engaged in nearly all the important valuations in the [coal, iron and steel] trade' dating from about 1850 (quoted in Pitts, 2001, p. 36). According to Pitts, he

routinely employed modern valuation techniques such as discounted cash flows at risk adjusted discount rates almost a century before these became standard practice for British accountants and some 30 years before the first book was published on the use of annuity factors in mining valuation. (Pitts, 2001, p. 37)

His reports contained sufficient detail to enable companies to replicate his methods for future internal use, though the extent to which this happened remains at present unknown.

The twentieth century saw the emergence of consultancy firms, while accounting practices also increasingly came to provide specialist advice for clients (Matthews et al., 1998, pp. 112–119). Thus, in the early years of the twentieth century, Hans Renold Ltd. employed A.H. Church as a consultant to develop a new costing system for the company; this

<sup>8</sup>For a discussion of the issues associated with learning-by-doing, see Polanyi (1958).

<sup>9</sup>Further evidence of a recognition of the importance of engaging an accountant, and some indication of the contribution he might be expected to make to the efficient conduct of business operations, is contained in a set of 'Hints' (quoted in Jones, 1985, p. 247) written by Lord Anglesey's chief agent, John Sanderson, in 1802.

probably being the first application of his method of overhead apportionment using scientific machine rates (Boyns, 2003). In the late 1930s, BSA engaged the consultant F.W. Ayers, subsequently appointing him as managing director of their car subsidiary, Daimler, to help oversee the introduction of budgetary control and standard costing; the latter being implemented by an American, J.J. Lestro (Boyns et al., 2000). Similarly, standard costing and budgetary control were introduced at the engineering company F.H. Lloyd & Co. Ltd. by the consultants Stevenson, Jordan & Harrison between 1938 and the early 1940s (Smith & Boyns, 2005).

Companies also looked to their auditors for advice on the adoption of new procedures; Jones (1981) has revealed the fact that, during the 1950s, accountancy firms increasingly developed costing and budgetary systems for their clients. Moving forward one decade, we find GKN relying on the accountants Cooper Brothers for this purpose (Edwards et al., 2002, p. 29). Indeed, the rapporteur's summary of papers entitled *The Accountant in Industry* presented at the Sixth International Congress of Accounting in 1952, having drawn attention to the growing amount of professional work available in the area of management accounting, observed that this was encouraging the movement of accountants into business

to perform functions on a full-time basis, which were formerly carried out by professional accountants on a consultancy basis. (*Accountant*, 1952, p. 668)

Not all companies were overly keen to use outside consultants, however, even in the early to mid-1950s. Thus BICC, a large, multinational company employing c. 40,000 workers, preferred to use in-house expertise in developing standard costing and budgetary control in conjunction with moves to divisionalise its production activities (Boyns, 2005a).

### 2.3.6. Change Agents—Institutions

World War I is often seen as having had a dramatic effect on the nature and status of C/MA practices and practitioners (Armstrong, 1993; Loft, 1986). Loft claims that her research has shown that

during the turbulent period of the First World War and the years immediately following, ... the practice of cost accounting spread rapidly. (Loft, 1995, p. 38)

In part, Loft sees this development as being an unforeseen consequence of the impact of the Ministry of Munitions and the development of cost-plus methods for pricing contracts for war materials. The Ministry regarded the corporate need for improved C/MA practices as crucial to the war effort, and its officers

included accountants who took steps to ensure that necessary improvements were made. Some believe that, as the result of these initiatives, costing 'came into its own' (Elliot, 1921, p. 461), though we will see that the available evidence is by no means unambiguous. The war and its immediate aftermath also saw C/MA 'Coming into the Light' (Loft, 1990) at the practitioner level, following the formation of the Institute of Cost and Works Accountants (ICWA) (1919) whose functions have been summarised as follows:

first, [for cost accountants] to be accepted as 'professional' accountants like the members of the Chartered and Incorporated bodies from which they were excluded; and second, to further the spread of 'scientific' costing techniques in British industry. (Loft, 1995, p. 39)

Also, during the interwar period, trade associations played an increasingly prominent part in bringing about accounting change, especially in periods of adverse trade. The British Federation of Master Printers (formed 1901) is renowned for initiatives designed to encourage its members to adopt uniform costing procedures, interpreted by Mitchell & Walker (1997, p. 97) as 'a convenient device for promoting tacit cartelisation and encouraging the cooperation of employers in the quest for collective socio-economic advancement'. Initiatives in this area culminated in the publication of the 1913 costing manual entitled *The Printers' Cost Finding System*. For many years, uniform costing was also the principal accounting concern of the British Iron and Steel Federation (formed 1918) (Edwards et al., 2003), with practices recommended for the corporate adoption detailed in *The Iron and Steel industry. Uniform Cost System* (BISF, 1935).<sup>10</sup> Edwards et al. (2003) further reveal the political role played by uniform costing systems in negotiations between the BISF and the government; the former was seeking industry protection through import duties and the latter desiring relevant information on which to base decisions concerning whether and where to finance modernisation.

In the endeavour to further improve C/MA throughout the iron and steel industry, the British Iron and Steel Federation advocated the adoption of standard costing procedures by its members in 1967 (BISF, 1967, p. 7). Standard costing, together with budgetary control, had become the 'hot' topic in accountancy by the 1950s; professional accounting bodies were also active in supplying material to help enable accountants advise

<sup>10</sup>Numerous other schemes were devised by trade associations for the use of their members, though Solomons (1952, p. 52) informs us that not all the schemes launched survived.

and implement such systems. Thus, just after World War II, the ICAEW published *Developments in Cost Accounting* (1947). The Foreword, contributed by the Institute's president, states:

In our view standard costing is the most important development in accounting technique, which enables the accountant to provide management with vital information essential for day-to-day control of a manufacturing organisation. As such, it merits the closest study not only by accountants engaged in industry but also by practising accountants who are or may be required to advise their clients on this subject of cost accounting. (ICAEW, 1947, p. 44)

Initiatives of this type were more naturally the prerogative of the ICWA. Before World War II, the ICWA's attempts to influence theory and practice were usually enshrined in papers presented, on behalf of the council of the ICWA, to the organisation's annual National Costing Conferences (e.g. Todman, 1922). After the war, it also began to produce booklets, including *Uniform Cost Accounting and the Principles of Cost Ascertainment* (ICWA, 1947) and *A Report on Marginal Costing* (ICWA, 1961).

A final institutional factor which might be mentioned is associated with government decisions to take certain industries under state control. The nationalisation of the coal industry in 1947, for example, was followed by the development of uniform costing systems to enable the results of collieries to be made available on a comparable basis (Boyns, 1997). The steel industry was also nationalised immediately following World War II, but it was not until after re-nationalisation in 1967, and its major reorganisation on a divisional basis as part of the British Steel Corporation, that a fully effective uniform costing system, incorporating standard costs, was installed under the leadership of John Spooner, formerly of the United Steel Companies Ltd. (Pugh, 2001).

### 3. C/MA Literature

#### 3.1. Early Developments

It is generally accepted that the development of a C/MA literature, in Britain, dates from the late nineteenth century. Edwards (1937) and Solomons (1952) drew attention to the fact that only a small number of authors of early treatises gave any attention to costing matters (e.g. Collins, 1697; Dodson, 1750; Thompson, 1777). The most important early publications to pay attention to costing issues were those of Hamilton (1777–1779)<sup>11</sup> and the agriculturalist Arthur Young

(Young, 1770, 1797). Nineteenth century works that addressed certain aspects of the problems faced by manufacturers, in a brief and rudimentary manner, include Cronhelm (1818), Jackson (1836), Krepp (1858) and Sawyer (1862) (Boyns et al., 1997).

Naturally, the costing and costing-relevant literature that did exist covered numerous issues, with the following problematic aspects of cost calculation receiving some attention: whether depreciation and imputed interest should be recognised; and how overheads should be apportioned and transfers of goods valued in a multiproduct enterprise.

Young's (1797) conviction of the need to provide farmers with 'an accurate record of all farm costs' caused him to recommend the inclusion of a charge for 'wear and tear expenses' (harness, blacksmith, wheelwright, etc.). He was also keen to 'divide them properly' across the produce of a farm applying differential absorption rates:

the arable lands will absorb the greatest part of these expenses – mowing grass very little – and feeding grounds, still less'. (quoted in Juchau, 2002, p. 376)

The need to make a charge for wear and tear, and the reason why, is stressed by Charles Babbage, Lucasian professor of mathematics at the University of Cambridge from 1828 to 1839:

it is of great importance to know the precise expense of every process, as well as of the wear and tear of machinery which is due to it ... [because] One of the first advantages which suggests itself as likely to arise from a correct analysis of the expense of the several processes or any manufacture, is the indication which it would furnish of the course in which improvement should be directed. (Babbage, 1832, p. 203)

The need to account for imputed interest as a business cost, to produce a figure for residual income that is analogous to ROI, is stressed by Hamilton (1777–1779):

the merchant's gain should only be estimated by the excess of his gross profits above the interest of his stock .... [further observing that] if the profit of his trade be less than his stock would have yielded at common interest, he may properly account it a losing one. (quoted in Mephram, 1988a, p. 64; see also pp. 346–352)<sup>12</sup>

Turning to the internal transfer of goods requiring further processing, Collins (1697) demonstrates the application of double entry bookkeeping to issues of raw materials from a stock account to a process account, whereas Dodson (1750) and Thompson (1777)

<sup>11</sup>Without explanation, most of the costing material was omitted from the second edition published in 1788.

<sup>12</sup>See also Young (1770) quoted in Mephram (1988b, p. 344).

(whose comments are illustrated, respectively, by reference to the businesses of a shoemaker and a thread-hosiery) deal with the transfer of goods by merchants to households under the domestic system. In each of these three cases, transfers are made at cost. Hamilton (1777–1779) is considered distinctive in proposing that transfers should be made at market price so as to reveal ‘the gain or loss by dressing flax’, ‘the gain or loss by spinning’ and to enable ‘a comparison of the profit obtained by selling the linen, white or brown’ (quoted in Mephram, 1988a, p. 60). Twenty years later, Young recommended the application of similar procedures to agricultural activities (Juchau, 2002, p. 377).

In addressing these costing-related issues, the above texts are considered to have been exceptional; most other pre-1887 texts that have been the subject of study continue to focus exclusively on merchant accounting, with a dominant emphasis on external transactions entered into by the firm. We can therefore conclude that, up until the late-nineteenth century, British businesspersons might have been able to find some information relevant for managerial purposes amongst the treatises on double entry book-keeping that had been published, but it did not amount to very much and they would have had to look hard for it.

The year 1887 marked a turning point, seeing the publication of *Factory Accounts. Their Principles and Practice*, authored by Emile Garcke and J. M. Fells; a publication which is today widely acknowledged as the earliest standard text on cost accounting. Given its diverse contents, the work’s initial appearance was not welcomed by the professional accounting press. *The Accountant*, first published in 1874, dismissed it as

more in the nature of a work on political economy than an ordinary every day business treatise. (quoted in Parker, 1969, p. 20)

R.S. Edwards perceives an important change in attitudes towards cost accounting and costing theory by the early twentieth century. Although Edwards considers the fifth edition of *Factory Accounts* (1902) to comprise substantially the same material as the first edition,<sup>13</sup> he notes that it was welcomed by *The Accountant* as possessing ‘the material advantage of being founded upon practice rather than theory’ (quoted in Edwards, 1937, p. 344). As Edwards puts

it: ‘The scoffers had been silenced and cost accounting had come to play’ (Edwards, 1937, p. 344).

As a very broad generalisation, the C/MA literature displays, over the period 1887–1970, a transition from a focus on the identification and classification of costs to their use as an aid to management. One can observe, below, a broad fit between the content of that literature and what the ICAEW believed to be the main management accounting developments during the first half of the twentieth century (Table 1).

In the remainder of this section, we first draw attention to the fact that different occupational groups had a vested interest in the development of C/MA and that relationships between them were not always harmonious. We then consider the struggle to identify the broad principles underpinning the nature of cost accounting in order to help guide its development. Next, we consider the focus, principally from the 1870s through to the 1920s, on the determination of ‘true’ costs and the relationship between cost and financial accounting. Finally, we consider the growing emphasis on costing as an aid to management, during the twentieth century, and what that transition entailed.

### 3.2. *Fighting for Turf*

The question of who were the proper people to operate the C/MA function surfaced during the latter decades of the nineteenth century, and this debate was linked to the question of whether contemporary arrangements constituted ‘proper’, systematic costing and whether the cost accountant was accorded sufficient recognition within the business community.

Criticisms of cost accounting practices were normally underpinned by the observation that, prior to World War I, there was a lack of involvement on the part of qualified accountants; cost calculation being essentially the preserve of engineers. Clearly issues of professional rivalry were involved concerning the perceived limits of competence of, or spheres of influence claimed by, different groups. Accountants largely decried the efforts of engineers, arguing that their costing systems were incomplete, not least because their cost calculation methods were often of an *ad hoc* character and were carried on outside the financial accounting-oriented double entry bookkeeping framework. An 1894 editorial in *The Accountant* dismissed costing ‘systems’ designed by practical people rather than accountants on the grounds that they produced results that were often ‘inaccurate in detail, and not infrequently defective in principle’ (*Accountant*, 1894, p. 655). Further, because the cost accounts were not integrated with the financial accounts, they failed to yield the ‘true results of manufacture [as]

<sup>13</sup>The main changes were designed to cover ‘some matters of factory routine and registration’ (Garcke and Fells 1902, note to fifth edition).

shown by the financial books' (*Accountant*, 1894, p. 655). Not all chartered accountants were so categorical, with Bardsley acknowledging the fact that 'some good and effective cost accounts ... have been designed by engineers' (Bardsley, 1902, p. 1,055). While the leading chartered accountant Mark Webster Jenkinson admittedly a provocative as well as multi-talented individual, stated that

the most ignorant manufacturer knows more about costing in his own business than any average Chartered Accountant. (quoted in *Accountant*, 1907, p. 549)

The notion that only professional accountants could devise efficient cost systems had diminished by the 1920s. A leading article in *The Accountant* stated:

A properly designed costing system must necessarily be the result of a partnership between operating managers and skilled accountants. (*The Accountant*, 1919, p. 151)

Bird (1921, p. 745) noted that cost accounts should combine theory and practical common sense and, while acknowledging the fact that the cost accountant was there to help the engineer, Boyd (1919, p. 39) suggested that the former was two-thirds a technical person and one-third an accountant. The switch from a prewar position of antagonism towards the involvement of non-accountants in establishing costing systems seems to have coincided with attempts to apply the notion of scientific management to accountancy, and may also reflect the growing status, and confidence, of costs and works accountants consequent upon the establishment, in 1919, of the ICWA.

The ICWA, formed to represent accountants working in industry and commerce, might be expected to have recognised the importance of harmonious relations with their members' fellow employees. But its creation also heightened tensions between cost accountants and the already professionalised chartered accountants. These tensions surfaced at the institutional as well as at the individual level. In 1923, the ICWA attempted to obtain a royal charter to help embellish the claim of cost accountants to be perceived as members of a profession. The attempt proved abortive, not least because of opposition from the chartered bodies and from the Society of Incorporated Accountants and Auditors (Loft, 1990; Parker & Boyns, 2004).

Cost accountants therefore pursued their professional project (Larson, 1977) without chartered status. Addressing the ninth National Costing

Conference, W.B. Walker, FCWA, concluded that the cost accountant faced an important choice: he

can *choose* between being a master of BOTH cost and budgetary accounting; a specialist in detecting waste and inefficiencies; a consultant on ways and means of improving the profit ratio; OR, he can miss his opportunity, lose his status and undo most of what has been done. (Walker, 1930, p. 152—emphasis in original)

Just 2 years later, Ewing (1932) argued that developments in cost calculation had meant that the cost accountant had moved from being a separate producer of costs, to become the co-ordinator of a homogeneous accounting scheme and now the financial controller of business. And only 8 years further on, Garnham (1940) claimed that the cost accounting function was increasingly triumphing over the financial accounting function, and hence that, within the business world, cost accountants were becoming more important than the, often chartered-qualified, financial accountants.

It is likely that Ewing and Garnham were overstating the position. There is no doubt that the star of the cost accountant was rising, but there remained far more chartered accountants working in business, even at the end date for this chapter, than there were qualified cost and works accountants, and it was almost certainly the former who were dominant in heading up the finance function and in filling general managerial positions.<sup>14</sup> It remains clear, however, that a growing concern was being expressed by businesspersons, during the 1930s, that financial accountants were not supplying managers with the information they required for decision-making purposes, thus allowing scope for cost accountants to make their mark. T.G. Rose responded to *The Accountant* leader-writer's claim that businesspersons seemed keen to attack the 'accounting citadel' with the following words:

The criticisms you mention come, I think, largely from the fact that the industrialist ... finds it difficult to see what he is doing from the standard accounting statements which have for so long represented the conclusion of the accountant's work. He feels that something simpler and better should be available for use in managing the business.... (*Accountant*, 1939, p. 170)

<sup>14</sup>See Matthews et al. (1998, pp. 62, 138 and 233). Like many issues raised in this chapter, this is a matter that would warrant further and more detailed research.

The growing importance of the cost accountant was also emphasised by H.D. Jack, who argued that:

- (a) cost is the predominant factor in every activity of life today; and
- (b) the trained cost accountant is the man to collect, record, collate and present the facts likely to affect cost, which are affecting cost, and which have affected cost. (*Cost Accountant*, 1932, p. 191)

The lower perceived status of cost accountants nevertheless continued to rankle. In commenting on the use of the term 'cost accounts', Scott-Maxwell noted that

[s]ome authorities take exception to the term Cost Accounts because this term is apt to suggest that costing is more a function of the accountant than the production manager, and of secondary importance to the financial accounts. Accountants are not likely to quarrel with such a suggestion, and even the commercial managers and directors of manufacturing concerns, have viewed cost-accounting as a very secondary affair when compared with the financial accounts. (Scott-Maxwell, 1923, p. 4)

Scott-Maxwell drew attention to the paradox of balancing the financial accounts to the last penny, while not knowing if hundreds or thousands of pounds were being lost due to manufacturing inefficiencies.

Such a degree of accuracy in the financial accounts, and such ignorance in the factory is psychologically very bad, as it destroys a true sense of proportion and responsibility. (Scott-Maxwell, 1923, p. 5)

Although Scott-Maxwell did not go so far as to suggest that cost accounts were *more* important than the financial accounts, a decade later Young referred to the fact that

when the paramount importance of the cost records is borne in mind, it will be realised that the financial accounts should be designed so as to ensure the accuracy of the former. (Young, 1932, p. 9)

A few years later, Garnham suggested that the

dividing line between Financial and Cost Accounting is rapidly disappearing, and what was formerly spoken of as Financial Accounting has become part of Cost Accounting. (Garnham, 1940, p. 174)

Another writer to stress on the primacy of cost accounting within the firm was Sermon, who commented that:

Since the function of Cost Accounting is to determine cost and to express in terms of profit and loss the result of each individual trading transaction, Cost Accounting is of primary importance in the scheme

of Accounting. When it is employed as an integrant of the Accounting system and with due regard to its importance, the constant and ready ascertainment of the 'state of affairs' is assured routinely, and the production of the Balance Sheet – usually so difficult and troublesome a matter that it is rarely undertaken more frequently than once a year – is reduced to a simple normal monthly process. (Sermon, 1943, p. xii)

The upward trajectory of an occupational group based on public esteem depends not only on the work it does, but how that group presents itself. It was for this reason that, in late 1933, Lyndell Urwick, director of the International Management Institute in Geneva, urged members of the ICWA to drop the term 'accountants' from their title. In his view, the term implied 'old-time functions' of checking accountability from the outside, rather than being on the inside (Urwick, 1934, p. 331). Although not going quite so far, it is likely that similar sentiments underpinned Ede's recommendation that the ICWA should rename itself as the Institute of Industrial Accountants (1949, p. 66); a proposal made during a phase in the development of the C/MA profession when the ICWA's members were making use of the term 'industrial accounting' to help emphasise their conviction that the past organisation of accounting had been wrong, and that what was required was a focus on an integrated whole (Ede, 1949, p. 66). An ICWA council member spoke in similar terms:

with this homogeneity [of a single accounting system] we have imposed the healthy discipline of debit and credit bookkeeping upon what once was called costing - and which hitherto [sic] should be known as industrial accountancy. (Brown, 1949, p. 17)

What was needed, according to Brown, was

'Accountancy', without institutional caste or artificial barriers ... 'Accountancy' - simple and realistic - one and indivisible. (Brown, 1949, p. 18)

One year later, in 1950, the report of the management accounting team established under the auspices of the Anglo-American Council on Productivity (AACP) provided an impetus towards the development of management accounting in Britain. According to the leader of the management accounting team, the chartered accountant and consultant Ian Morrow, the team's report 'had a profound effect on management and accounting thinking' (Morrow, 1992, p. 77). It was from this time that the term 'management accounting' became increasingly used within Britain, a fact reflected in the decision by the ICWA to change the title of its monthly journal from the *Cost*

*Accountant to Management Accounting* in 1965. Seven years later, in 1972, the institute itself changed its name to the Institute of Cost and Management Accountants, obtaining a Royal Charter in 1975 (Banyard, 1985, introduction and pp. 63–64).

### 3.3. Costing Principles and Scientific Costing

The cult of science, as applied to various aspects of business, was prevalent in the early twentieth century. Cost accountants embraced this in the form of scientific costing which was considered by many to be a corollary of the development of scientific management and Taylorism. We can see the term science intruding into costing terminology in the formulation of new techniques and as part of the discourse surrounding the professionalisation of the cost accounting craft.

Wright (1962, pp. 3–4) has argued that the application of science to cost accounting dates from 1875 when Walker developed a system for allocating overheads on the basis of prime costs. But it was another quarter of a century before the scientification of cost accounting in Britain really began. Church's system of overhead allocation, based on 'scientific machine rates' (Solomons, 1952, pp. 25–30), entered the literature (Church, 1901) at a time when a number of writers were beginning to advocate a more methodical approach towards business management. For example, the chartered accountant Harvey Preen criticised the practice of fixing selling price by making an estimate of direct costs and then adding some guessed percentage to represent estimated fixed charges, and a further guessed percentage to represent profit. Preen had pointed out that 'adding a bit' was unscientific, and that the 'necessity for accuracy cannot be too strongly insisted on' (Preen, 1907, p. 69).

According to Jenkinson (1914, p. 582), the development of new production methods and the adoption of new forms of business organisation, in the years leading up to World War I, emphasised the need for more scientific accounting. In costing, part of this process of scientification, especially in the years immediately following the end of World War I, involved a concern with the development of *principles* of costing. This preoccupation was particularly manifest amongst active members of the Institute of Cost and Works Accountants; individuals who might naturally have been keen to emphasise the existence of an abstract knowledge base for their new 'profession' (Abbott, 1988). The titles of the following three papers signal the concern with the need for principles: 'Some principles governing the ascertainment of cost' (Fells, 1919b); 'The general principles of costing' (Cathles, 1920) and 'Costing-principles and practice'

(Bird, 1921). The desire to establish scientific principles extended to textbook writers of this era. For example, Strachan notes that

The scientific application of accounts to the ascertaining of the cost of production is one of the greatest needs of our time. (Strachan, 1920, p. 6)

Newman (1921, p. 2) suggests that the increased interest in scientific costing arose from a 'general desire amongst manufacturers to abandon methods which do not promote' business efficiency and stability. Hazell, reflecting on the importance of scientific costing to the future health of the nation's economy, argued that

Scientific costing is one of the simplest and cheapest aids to efficiency, and the manufacturer, industry, or nation which employs these modern methods will be able to withstand more easily the stress and strain of the coming years. (Hazell, 1921, p. 11)

Although emphasising the need for principles, few writers attempted to elucidate these principles and, even those who did, made little headway. Thus, while Cathles (1924, preface) promised a text that would set out 'the fundamental principles of cost accounting', his book simply describes the nature of costing and how it should be conducted (see also Newman, 1921). In a similar vein, Bird (1921), although supplying a subsection entitled 'The principles of costing', offers nothing more than a long-winded definition of costing.

Despite the failure to construct coherent costing principles, the drive to develop a scientific costing approach received a degree of momentum from conferences held around this theme. One such event was organised by E. Miles Taylor in 1919, on his return to Britain having spent some years in America.<sup>15</sup> Although the precise impact of Taylor's conference is difficult to assess, most delegates were agreed on the need for a standardisation of costing terminology or, as some put it, a 'scientific nomenclature' (Loft, 1986, p. 159). Loft has suggested that, soon after its formation in 1919, the ICWA's *raison d'être* had become the advance of 'scientific costing' (Loft, 1986, pp. 160–161). Certainly, the term began to find wide currency in the early editions of the ICWA's official mouthpiece, the *Cost Accountant*, which began publication in June 1921 (Editorials, February 1922, pp. 155, November 1923, p. 181; Evans, 1923; Gill, 1925, p. 62; Jenkins, 1924, p. 109; Todman, 1922, p. 179; Jones, 1926, p. 6; Kirkaldy, 1925, p. 376; Wild, 1921–1922;

<sup>15</sup>Loft (1986, p. 159) attributes to Taylor the first use of the label 'scientific costing', though an earlier application can be found in Preen (1907, p. 65).



Wilmot, 1926, p. 122). Reflecting on recent past developments, Stelling argued that cost accounting had developed beyond

the mere recording of time, material and an empirical figure of expense. It has become a science, with its own technique, its fundamental principles, and its accepted good practice. (Stelling, 1924, p. 278)

But the precise nature of those principles, in common with the meaning of the term scientific costing, remained opaque.

### 3.3.1. *Towards a Definition of Scientific Costing*

An attempt to attach meaning to the term scientific costing is contained in a paper delivered by Todman on behalf of the executive committee of the council of the ICWA at its first National Costing Conference held in February 1922. Todman (1922, p. 179) identified the following five key aims of scientific costing:

1. Determination of true cost.
2. Provision of a reliable basis for estimates.
3. Control of stocks and work in progress.
4. Valuation of work in progress and semi-finished products.
5. Provision of statistical information for the guidance of management.

It seems clear from other remarks made in the paper that the common thread between the above aims was the concept of standardisation. Attention was drawn to three kinds of standardisation: of terminology; of costing within individual industries (i.e. uniform costing) and of general principles. Although Todman believed that standardisation of terms and general principles was undoubtedly feasible, he recognised greater difficulties in relation to costing methods, where he thought standardisation would be 'strictly limited' owing to 'the diversity in the methods employed in actual production' (Todman, 1922, p. 182).

Although it is reasonable to assume that Todman's paper represented the views of most of the ICWA's leadership, it was the subject of critical comment from council member A.R. Stelling on the precise grounds that no clear definition of the term scientific costing had been provided. Two years later, Stelling (1924, p. 278) tackled this issue himself, identifying the following five functions that a scientific cost accounting system should fulfil:

1. To report continuously upon the effect of fluctuating market prices of raw materials upon the values of work-in-progress, finished stock, factory profit and current cost of the product.

2. To present comparative information relating to operating efficiencies and preventable waste.
3. To present frequently or continuously the effect of volume of output and orders in hand upon the recovery of establishment charges.
4. To report the effect of all the varying conditions of manufacture upon the 'normal cost' of the product.
5. Finally, to enable a periodical (perhaps monthly) statement of profit and loss and financial position to be rendered so that management might exercise the closest possible control over financial and general policy.

In place of the phrase 'scientific costing', Stelling suggested the use of an alternative phrase, 'standardised costing'. The meaning of the latter is made clear when Stelling reflects on the costing requirements of three leading Sheffield-based industries, namely, steel, cutlery and silver. Arguing that their requirements would be best served by the use of standard costs in conjunction with standardised costing, he posed the following rhetorical question:

Does not standard cost, scientifically calculated ... form the finest basis possible for uniform costing? (Stelling, 1924, p. 281)

Stelling therefore defined scientific costing as the use of standard costs in conjunction with standardised (uniform) costing.

### 3.4. *Absorption Costing and the Determination of 'True' Costs*

The major topic of debate up to World War I, reprised in the 1990s with activity-based costing (ABC), concerned the appropriate method for allocating overheads to products in order to determine their 'true' cost. Writing at the beginning of the 1890s, John Mann Jr. noted that, in theory, direct overheads varied directly with the labour time occupied on a job and inversely to wages paid (Mann, 1891, p. 635). While noting that the basis of allocation should be labour time rather than wages paid—a view echoed 10 years later by Cowan (1901, p. 90)—Mann accepted that for

nearly all practical purposes, however, the *direct expenses may be safely applied in proportion to the wages paid.* (Mann, 1891, p. 635—italics in original)

He went on to note that, in practice, direct expenses were often loaded on to both materials and labour. Writing around the same time, Mann (1903, p. 207) enumerated five different methods used to spread the expense burden over current work: (1) a rate varying with quantity of material handled, i.e. the unit system;

(2) a percentage on cost of wages and materials; (3) a percentage on wages alone; (4) a percentage on time; and (5) the tool basis or machine rate.<sup>16</sup>

Alexander Hamilton Church is credited with being the most influential early thinker on the issue of overhead recovery, with his ideas presented in a six-part article published in *The Engineering Magazine*. Church believed that

we must seek a method capable of recording [cost] with approximate accuracy under the most complex and difficult conditions. (Church, 1901, p. 729)

For him, ‘the business of costs [is] to represent facts and nothing but facts’ (Church, 1909/1910, p. 26). Noting that, in real life, workshops or factories were often complex entities with different types of machinery and different qualities of labour employed, the percentage-on-wages and hourly-burden systems would not, he believed, produce correct product costs. His solution was the machine-rate method. Church’s ideas were taken up by Urie (1902) and Bardsley (1902), with his concern to determine true costs also resonating through the years preceding World War I and during its immediate aftermath. For example, Elbourne (1919, p. 51)—‘the necessity for accurate costing is obvious’; Newman (1921, p. 3)—the goal is ‘accurate’ not ‘fictitious’ cost; Hazell (1921, p. 36)—‘The costing system should give “the truth, the whole truth, and nothing but the truth” about the costs of production’ and Glover & Williams (1934, p. 1—italics in original)—‘any system of cost accounts must be *accurate*’. Although accepting the objective of ‘true’ cost, some writers acknowledged the fact that complete accuracy was impossible. For example, Scott-Maxwell (1923, p. 7) believed that cost accounts were an ‘approximation to the truth and seldom can be the exact truth’, though every attempt should be made to make them as accurate as possible, ‘consistent with a certain standard of simplicity’ (Ainsworth, 1924, p. 7; see also Hazell, 1921, pp. 35–36).

One area of debate which rumbled on throughout the early decades of the twentieth century was the issue of whether imputed interest on capital should be treated as a cost. Views ranged from those who rejected its inclusion because of the need to focus on ‘actual’ not ‘fictitious’ costs (Newman, 1921, p. 3;

Parkes, 1922, p. 66) to those who claimed its inclusion was essential for the identification of true cost (Hazell, 1921, pp. 63–64; Strachan, 1920, pp. 44–47). In the first edition of his *Dictionary of Costing*, Ryall argued that the inclusion of imputed interest was legitimate ‘when dealing with *cost estimating* for the purpose of comparing the cost of one operation or method of manufacture with another’ (Ryall, 1926, p. 167), but not for the purpose of cost finding because no expenditure was actually incurred. This view continued to manifest itself in the third edition of his *Dictionary*, published in 1952, suggesting that this may have become a widespread opinion.

### 3.5. The Relationship Between Cost and Financial Accounts

An important factor affecting the accuracy of the cost accounts was considered to be their relationship with the general, or financial, accounts of the business. This was also an issue central to the status of costing, and therefore the cost accountant, given the already prestigious standing of the financial accounting function within the firm. Looking back in time, the chief cost accountant of Ferranti Ltd. E.F. Brown suggested that cost accountancy had passed through five phases up to 1949.<sup>17</sup> These are set out in Table 2.

Brown commented on phase 2 as follows:

Costing was the vocation of a cost clerk - a man released at large to collect as many of the bricks which made up the company accounts as either he could find or were not hidden from him. He picked them up very much at random and it was remarkable indeed if he picked them up at all. (Brown, 1949, p. 16)

Ede (1949, p. 66; see also de Paula, 1950, p. 237) argued that costing had originally been developed by engineers, outside of the financial books, due to the ‘lack of interest or lack of time on the part of professional accountants’.

An early advocate of the need for some connection between cost and financial accounts was Plumpton, who argued that:

The only true and correct system of Cost Accounts is that worked out on double entry system. (Plumpton, 1892a, pp. 269–270)

<sup>16</sup>A similar five-fold classification was presented by Mark Webster Jenkinson (1914, p. 569) just before the outbreak of World War I: (1) a percentage on prime cost; (2) a percentage on the cost of labour; (3) a fixed sum for each hour of time worked by each man; (4) a fixed sum per hour for each machine; and (5) a fixed sum per unit of weight or quantity.

<sup>17</sup>We do not accept these phases as a fair depiction of the history of relevant accounting practice (for example, we will see that an integrated system was developed very early on in the iron industry), but Table 2 provides a useful framework for analysing developments in the literature up to the middle of the twentieth century.

Table 2. Phases in the relationship between cost and financial accounts.

1	No cost accounts	The 'old accountancy'—characterised by company (financial) accounts but no cost accounts
2	Kept completely separate	The 'costing added' phase—company accounts and incomplete cost accounts
3	Kept separate but <i>capable</i> of being reconciled	'Reconciled cost accountancy'—characterised by 'hit and miss' reconciliations of company accounts and cost accounts
4	Kept separate but interlocked through the use of 'Control' accounts	'Interlocked cost accountancy'—company accounts and cost accounts framed using the same information
5	Part of single, integrated system	The 'new accountancy'—a single system of accounting, called industrial accounting, in which the discipline of debit and credit was applied to costing

Source: Brown (1949).

He considered that this could be achieved in small firms by having the commercial and cost accounts interwoven (phase 5) but, in a large enterprise, where he believed that the magnitude of the work involved in such integration would be large, Plumpton (1892b, p. 884) considered that the cost accounts should form a 'separate and distinct set of Double Entry Accounts' (phases 3 or 4). Plumpton therefore raised two fundamental issues: the use of double entry methods for keeping the cost accounts, and the efficacy of using fully integrated, or reconcilable, systems depending on the size of the business. Convergence of opinion amongst qualified accountants seems to have occurred much more quickly in relation to the first of these issues (e.g. Bird, 1921; Cathles, 1920, p. 255) than it did in regard to the second (cf. Bardsley, 1902; Cowan, 1901, pp. 115–148; Urie, 1902, p. 51). Irrespective of the method used, there was consensus that the content of the cost accounts should be consistent with the financial accounts (Hazell, 1921, p. 35). Cathles (1924, p. 79) went so far as to insist that

no Cost Accounts are worthy of the name which do not reconcile with the financial books of the business. (see also Bell, 1931, p. 153; Glover & Williams, 1934)

During the interwar period, the call for the cost and financial accounts to at least be interlocking (phase 4) became a chorus (Elbourne, 1919, p. 58; Lunt, 1922, pp. 3–4; Scott, 1939, p. 118; Strachan, 1936, p. 99; Wight, 1932, p. 83).

The 1930s also saw the case being made for a single, integrated system (phase 5), with Simpson (1932), for example, rejecting as wasteful the maintenance of separate cost and financial accounts. Simpson's conclusions were supported by Jack who, in the discussion following the presentation of Simpson's paper, further argued that accounting systems should be 'active

agents and not merely passive records' (Simpson, 1932, p. 191). Ewing argued that the recent past had seen a movement away from the pursuit of 'accurate' costs and, especially amongst members of the ICWA, a movement towards the development of a 'system of live [financial] records' (Ewing, 1932, p. 186) which would inform 'management of the essential facts necessary for effective control' (Ewing, 1932, p. 187).

After World War II, de Paula contributed to the view that reconciliation between the two types of accounting, in some way or the other (phases 3 and 4), 'fell short of what was ultimately desirable' (de Paula, 1950, p. 237; see also, Ede, 1949, p. 66; Evans-Hemming, 1952, p. 105). Brown noted that 'some businesses have already progressed considerably beyond this point' (phases 3 and 4) (Brown, 1949, p. 17), and agreed that phase 5 was the direction in which accounting would develop. In his view, the transition from phases 1 to 5 reflected a movement from static to dynamic accounting. For Brown, static accounting, i.e. the 'old accountancy'—comprising manufacturing accounts, a profit and loss account and a balance sheet—had for too long 'masqueraded as accountancy' (Brown, 1949, p. 13). In his view, accountancy should reflect the physical life of the business; something which was, and could be, done by cost accountancy focusing on 'movement' and 'conversion' transactions (Brown, 1949, p. 15).

The case for phase 5 accounting was well put by Sermon (1943, p. xii), who conceived it to be founded on three propositions

1. cost accounting is essential to help ascertain the result (profit or loss) of each trading transaction;
2. the profit or loss for a period is simply the sum of that for each trading transaction within the period; and

3. 'There is every logical reason for the union of Cost Accounting and Normal Accounting'. (Sermon, 1943, p. xii)

Sermon's conclusions were echoed in an ICAEW report entitled *Developments in Cost Accounting*:

the integration of cost and financial records is not merely advisable but is essential if the future development of cost accounting is to satisfy the needs of management. (ICAEW, 1947, p. 10)

So that their readers should be left in no doubt on the matter, it was later put thus:

We consider it fundamental that there should be complete integration between cost and financial records not only for the purpose of cost control but also for the purpose of cost ascertainment. (ICAEW, 1947, p. 16)

We might infer a possible move towards fulfilment of these aspirations, by the early 1960s, when Most commented as follows:

I hold that the subject of accounting is one and indivisible and that its object is measurement for management. ... Throughout this book the financial and cost accounts are conceived of as one set of accounts. (Most, 1961, pp. 10, 13)

### 3.6. Costing as an Aid to Management

The post-World War I literature focuses, increasingly, on the role of costing as an aid to management (Dunkerley, 1931, p. 343; Scott, 1939, p. vi; Walker, 1930, p. 151). Standard costing, budgetary control, uniform costing and marginal costing became the cost accounting literature's principal technical foci, with the relevant material now examined.

#### 3.6.1. Standard Costing

According to Solomons (1954, p. 41), a precursor of full standard costing surfaced in a paper on factory costs presented by H.S. Garry to the Society of Chemical Industry in 1902. Garry referred to the concept of a standard normal output against which to measure the quantity of production and quality of material. While suggesting that the best way to establish standards on a reliable 'basis' would be to use data from several businesses, Garry recognised that this might not be feasible, concluding that

for present purposes the experience of one business taken over a sufficiently long period will give enough data for a first attempt at a standard. (Garry, 1902, p. 1,441)

Garry was also aware of the fact that periodic revisions would need to be carried out if the standard was

to be an effective device for monitoring plant efficiency.

References to standards become common after World War I, and are mainly associated with the concern to control waste; an issue which had been a focus of attention since the beginning of the twentieth century (see, e.g. *Accountant*, 1917, p. 421; Hamilton, 1910, p. 202; Urie, 1902, pp. 50–51). Indeed, Boyd (1919, pp. 34–36) believed that the essence of scientific management was the elimination of waste through the setting of standards and the monitoring of performance against those standards. Other writers making references to standards in the early 1920s do not necessarily use the term standard costs, but they clearly have in mind financial yardsticks against which comparisons could be made. Newman refers to standard output and the need to establish a

standard oncost for a period sufficiently long to include the normal fluctuations of a manufacturing business. (Newman, 1921, pp. 55–56)

Newman uses the label 'normal costs' to describe financial measures from which the effect of fluctuations 'due to conditions beyond the control of the manufacturer are eliminated' (Newman, 1921, p. 57; see also Ainsworth, 1924). Cathles draws attention to the fact that it is 'not sufficient to know what an article does cost, it is necessary to know what it ought to cost' (Cathles, 1924, p. 3). Acknowledging behavioural considerations, Stelling (1924) stresses the need for standards to be constructed carefully and with the full agreement of all concerned. And cognizant of the scope standard costing provides for 'management by exception', Stelling explains that standard costing

discloses *tendencies* and thus enables policy to be determined rapidly, undesirable tendencies and their causes being subjected to examination in detail on the exception principle. (Stelling, 1924, p. 279—italics in original)

The move within the literature towards standards and, eventually, standard costing, is evident from an examination of early twentieth century books, especially those which appeared in several editions. Thus, although George Pepler Norton (1889) had dealt with the issue of comparing costs with the prices charged by outside specialists, i.e. the trade or 'country' prices, there was no discussion of 'full-blooded standard costs' until publication of the 1931 edition of his book (Solomons, 1952, p. 39). In another standard text of the period, Walter Strachan's *Cost Accounts*, a chapter on standard costs first appears in the fifth edition of 1928. Just 1 year earlier, the first British book devoted entirely to the subject of standard

costing—T. Downie Jr.'s, *The Mechanism of Standard (or Predetermined) Cost Accounting and Efficiency Records*—was published (Downie, 1927). Wight (1932, introduction) states that the determination of standard costs was an 'aspect of costing' which 'is being recognized as of considerable importance', while C.H. Durman (1934, p. 139) claimed the following seven advantages for a standard costing system:

1. Comparisons can be made between actual cost and a pre-determined standard.
2. As variations from standard are analysed in detail, the factors causing the variations are more readily ascertained, and, in the case of controllable factors, steps can be taken to remedy the inefficiency.
3. Factory efficiency is readily measured.
4. There is a reduction in the amount of clerical help required to operate the system.
5. Costs are more quickly obtained.
6. The effect upon costs of changes in labour rates or the cost of material is readily determined.
7. Tendencies are disclosed enabling business policy to be more rapidly determined.

A major issue with standards, of course, is how they should be established. Emsley believed that they could be based on experience, noting that, in situations of large batch production and mass production, the material and labour costs of standard products would become known with considerable exactitude, enabling the 'theoretical or **standard cost**, of material and labour' to 'be written down once for all' (Emsley, 1939, p. 164—emphasis in original). In contrast, Wight believed that:

It is not sufficient for the costs to be continuously compared with previous results, when it can readily be understood that past achievements may not represent a correct basis on which to pass judgement. (Wight, 1932, introduction)

Wight emphasised the need to construct a 'reliable standard' and, acknowledging the technique's behavioural implications, distinguished between an ideal standard and an attainable standard.

A standard cost, in the full acceptance of the term, would naturally represent the cost of producing an article under conditions of 100 per cent efficiency in every respect. In most businesses, however, this very desirable state of affairs will probably be impossible of achievement, unless in boom periods. For this reason the basis of output on which the standard cost is to be based should represent a reasonable standard of attainment which may possibly be only 75 per cent

of full capacity, or even less than this. (Wight, 1932, p. 93)

Some writers were willing to approve a variety of different approaches depending on the circumstances. For example, the first edition of Scott's (1939) book refers to the scientific estimation of standard costs, whereas a paragraph added to the second edition acknowledged the potential usefulness, in circumstances where planning was not fully developed, of deriving accurate standard costs from actual recorded costs (Scott, 1946, p. 63). Further comments on the subsequent development of standard costing during the period covered by this chapter are considered at the end of the next section dealing with what was increasingly regarded as its congenial twin, budgetary control.

### 3.6.2. Budgetary Control

The first known scheme proposing 'the incorporation of budgets into the cost records for the purpose of controlling expenditure' (Solomons, 1952, p. 47) is contained in *Reorganisation and Costings* (Preen, 1907) written by the chartered accountant Harvey Preen. A chapter entitled *The Budget System* (Preen, 1907, pp. 81–84) describes a hybrid monthly trading account containing both backward looking elements, e.g. purchases, sales, debtors and creditors for the month just completed, and forward looking elements, e.g. estimates of the following month's purchases and cash requirements. Little more appears to have been said on the matter till the early 1920s and, even then, comments were initially of a fairly cursory character. Thus, Hazell (1921, p. 53) merely refers to a 'Budget of the expenses', whereas Scott-Maxwell notes that, for 'indirect material',

the modern method is to budget for a fixed expenditure on experimental work and not to exceed it without further investigation'. (Scott-Maxwell, 1923, p. 91)

More detailed advocacy of the use of budgeting or budgetary control for management purposes emerges in a number of articles published in the mid-1920s, with the afternoon session of the ICWA's fourth National Costing Conference in 1925 devoted entirely to that topic. Papers were presented by F.T. Quennell, of Charles Roberts and Co. Ltd. and L. Perry-Keene, of Austin Motors Ltd. Quennell acknowledges the fact that, due to increased competition, it was not enough to ascertain costs in order to fix prices. Instead, a company needed to know its costs so as to be able to reduce them and to maintain margins where

prices were 'given'. Quennell emphasised the role that could be played by 'budgeting'.

Budgeting, in its complete form, embraces not merely a system of controlling costs, both of production and distribution, but seeks to formulate a co-ordinated policy for the whole ramification of the business to which it is applied. (Quennell, 1925, p. 406; see also Stelling, 1924, pp. 278–279)

Perry-Keene (1925, p. 403) agreed that budgetary control 'appeared to be a reasonable method of meeting' the requirements of those in charge of large undertakings concerned with efficiency in the light of increased competition. Moreover, he believed an early advantage of budgetary control to be the fact that

it enforces a very considerable and close study of the whole of the problems connected with the particular business that is under review before any useful scheme of control can be evolved. (Perry-Keene, 1925, p. 403)

Another enlightened British business manager of this generation, Charles Renold, managing director of Hans Renold Ltd., indicated that he expected the accounting department to be responsible for, among other things, the preparation of financial information for the guidance of management. In his view, the function of the cost accountant was to develop an information system in which

all results should show not only the *actual* position but the position in comparison with the programme or, in the case of costs, with the ideal or 'standard'. (Renold, 1927, p. 354—emphasis in original)<sup>18</sup>

A key feature of this information system was, in his view, the use of standard costs in conjunction with budgetary control.

Despite growing discussion of the topic, it was not until 1932 that we find the appearance of the first British text devoted to the topic: A.W. Willsmore's *Business Budgets and Budgetary Control*.<sup>19</sup> In the preface, Willsmore distinguishes between the need for

any businessperson to be forward looking and the nature of a formalised system of budgetary control:

The broad idea of budget control in so far as it affords an outlook into the future is not new. No business can be operated without some sort of estimation of the future, even though the forecast be nothing better than a few half-formed ideas at the back of the manager's mind. But budget control entails more than a mere forecast of the future. It involves a concerted plan of action based on a careful consideration of all relevant tendencies and factors, and it is, in itself, a complete system for controlling costs and preventing waste. (Preface to first edition, 1932, reproduced in Willsmore, 1949, p. viii)

The state of accounting practice and the way in which a properly operated system of budgetary control might improve matters are commented on by Scott in the preface to his 1939 text. Scott noted that the information supplied by the accounting system in many businesses was 'very meagre', comprising only how much it owes, how much it is due and what profit has been made (Scott, 1939, p. vi). By contrast, Scott considered that 'the primary function of accounting should be to assist the management in the efficient conduct of business' (Scott, 1939, p. v), something which the utilisation of budgetary control and standard costing could achieve with their emphasis on the principle of 'exceptions' and expressing all variations and all causes of profit and loss in financial terms (Scott, 1939, p. vi). He continued:

The term budgetary control is applied to the system of management control and accounting in which all operations are forecast and so far as possible planned ahead, and the actual results compared with the forecast and planned ones. (Scott, 1939, p. 10)

In 1955 de Paula demonstrated concern with the psychological impact of the imposition of budgets on those responsible for meeting its targets when arguing that it was better, in certain circumstances, to set a budget on the basis of current performance than to set a tight budget. His reasoning was that this was more likely to result in a black, rather than a red, variance and opened up the possibility of giving those responsible the chance 'to improve upon the position and feel some satisfaction in so doing' (*Cost Accountant*, 1955, p. 245). Management and employee response to the operation of a system of budgetary control (likewise standard costing) became an issue of increasing interest and concern to management theorists during the 1950s and 1960s following the publication of Argyris' (1952) seminal work.

It is after World War II that the literature increasingly sees standard costing and budgetary control

<sup>18</sup>Scott-Maxwell also refers to budgeting for 'development work' (1923, p. 106) and for 'yearly sales oncost' (1923, p. 149).

<sup>19</sup>A spate of further texts devoted to the issue of budgetary control coincided with the appearance, in the early post-World War II period, of the term 'management accounting' (e.g. Cave, 1955; Court, 1951; Evans-Hemming, 1952; Spinosa Cattela, 1948).

interlinked. According to the ICAEW report published shortly after World War II:

Budgeting and standard costing evolved independently but contemporaneously and, with the added refinement of flexible budgeting, are now coming to be welded together into the most effective instrument of cost control yet available to management. (ICAEW, 1947, p. 13)

For Scapens, the 1950s and 1960s saw the dawn of the era of ‘responsibility accounting’, with budgetary control and standard costing to the fore. F.T. Hunter, a consultant and partner in the firm of Robson, Morrow & Co., while insisting that there is, as yet, ‘no better means of control of any business than budgetary control and, where appropriate, standard costs’, drew attention to the fact that its effectiveness depended on how it was implemented and applied:

It has to rely on technical data from other people, and it is sometimes very difficult to check the adequacy of that information; it is no substitute for management, which must be carried out by people, and it will have its value considerably lessened or enhanced by bad or good interpretation of the results ... It does, however, if intelligently set up and operated, provide a means of finger-tip control of a business which will bring to light all the unusual and unsatisfactory events which require the attention of the management. Please note I said a ‘means of control’. It is not the control itself. (Hunter, 1954, pp. 413–414; see also *Cost Accountant*, 1956, p. 389)

### 3.6.3. Uniform Costing

A much-debated C/MA issue during the third and fourth decades of the twentieth century was uniform costing, a procedure that involves the establishment of rules for classification, calculation and presentation of costs in financial statements in order to improve their comparability. This accounting practice has numerous potential applications that include enabling company management to compare the results of different internal operations (e.g. a number of factories producing the same products); permitting managers of different companies to compare their results (e.g. to help identify areas where there is scope for an improvement in efficiency); providing companies in a particular industry with a mechanism for agreeing a common price structure and supplying central government with data that can be used to inform economic planning decisions (Edwards et al., 2003, p. 26).

In Blyth’s (1923, pp. 120–121) view, there were at least six contemporary benefits that would arise from the adoption of uniform costing: (1) an improvement in costing; (2) the stimulation of the use of costing in

management; (3) the elimination of uninformed price cutting; (4) where costs were circulated, a spirit of emulating the best; (5) greater consolidation and specialisation within sectors as a result of showing the inefficiency of all firms trying to produce the whole range of products and (6) aid mutual understanding of the economics of each industry. From a more technical point of view, Blyth (1923, p. 123) added that uniform costing would lead to the calculation of ‘complete’ costs which would be ‘capable of comparison to any degree of detail’. Uniform costing would also enable the distinguishing of ‘Terminable’ from ‘Non-Terminable’ costs and facilitate the ‘compilation of standard or normal costs’ (Blyth, 1923, p. 123). Curiously, Blyth fails to mention its role in price-fixing, an application considered important by many of its advocates (see, e.g. Walker & Mitchell, 1997, pp. xiii–xvi).

In the context of the interwar depression, debates over rationalisation of industry and the more widespread emergence of cartels, Dunkerley (1931, p. 344) considered that one of the main future tasks for cost accountants would be the evolution of uniform systems of costing for each industry. In his view, this would make possible ‘informed decisions as to efficient or non-efficient and economic and non-economic plants’, something which was not possible in the present state of affairs where the lack of comparable data meant that many decisions had to be made on ‘a basis of compromise’ (Dunkerley, 1931, p. 344). In this area, as in others, writers were aware of the need to take steps to ensure, if possible, acceptance of the system by the workforce. Blyth (1923, p. 284) pointed to the need for ‘educating those concerned so that a natural apathy to any attempt at interference with established [costing] practice may be overcome’. Lazarus similarly acknowledges potential hostility which might be

best overcome by securing the co-operation of the works’ accountants early in the development of the proposed standard cost system, so that they may feel they have contributed something to its formulation. (Lazarus, 1922, p. 277)

The interest in uniform costing continued during and beyond World War II, partly a consequence of the war itself, during which mechanisms for fixing prices through the monitoring of costs, as in World War I, were introduced for government contracts. The war also encouraged greater cooperation amongst businesspersons which facilitated discussion of uniform costing schemes, whereas the reports of various working parties established by the Board of Trade immediately after the war, together with those from

the teams established by the AACCP in the early 1950s, encouraged their adoption. Additional impetus in this direction was provided in the 1950s by the work of the Organisation for European Economic Co-operation and the British Institute of Management. Concerned as these two bodies were with the combined issues of productivity and inter-firm comparison, they repeatedly emphasised the necessity for uniform cost accounts (Most, 1961, p. 47). The growing interest in uniform costing was also reflected in a two-part survey article by Solomons (1950) and, a decade later, in the appearance of Most's (1961) book entitled *Uniform Cost Accounting*.

#### 3.6.4. Marginal Costing<sup>20</sup>

We have seen that, by the 1950s, commentators were by and large unanimous in their advocacy of standard costing and budgetary control. A cautionary note was sounded, however, by David Solomons in an article that originally appeared in *The Manager*. Solomons expressed the view that the

widespread adoption of standard costing in recent years has resulted, in an excessive emphasis on cost control and a relative neglect of the development of costing as an aid to management in choosing between alternative courses of action. (Solomons, 1954, p. 279—emphasis in original)

It has been suggested (Solomons, 1952, p. 37) that Garcke & Fells (1887) should be considered amongst the founders of the marginal cost school of thought when noting the futility of allocating fixed overheads. But it was not until the late-interwar period that marginal costing began to receive much attention in the accounting literature.<sup>21</sup> According to Dugdale & Jones (2003), a paper by Moran in 1935 was the first to clearly exhibit a 'marginal costing technique', referring to a scheme that distinguished between fixed and variable costs within the double entry framework.<sup>22</sup> Edwards, in a lecture presented in 1937, propounded the use of marginal costing (though not using that precise term) as the basis for decision

<sup>20</sup>In common with many other accounting practices, agreement on terms to be used to describe what we today understand as marginal costing has been slow to develop. Historically, also, the labels marginal costing and direct costing have often been used interchangeably.

<sup>21</sup>It was, however, discussed somewhat earlier by economists (Parker, 1969, pp. 16–19).

<sup>22</sup>Armstrong (1995) has claimed that the first published paper to use the phrase 'direct costing', in Britain, was that by Reece (1940).

making, while also criticising contemporary costing texts for their failure to use that approach:

Textbooks are prone to emphasise the fact that cost accounting analyses *past* costs not future estimates, but they often do not make clear the fact that this data is useful only in so far as it is a guide to future costs; it is future variable cost which is important. (Edwards, 1952, p. 94—emphasis in original)

Edwards argued

that cost accountants have spent too much effort in trying to arrive at total cost by building up complicated and delicate oncost structures which depend on arbitrary assumptions. (Edwards, 1952, p. 101)

However, he did recognise that in some industries

long period analysis can be helpful to the management and its estimating department. .... The cost department should say *definitely* at what figure a job is worth handling and *possibly* how much we ought to get if we are not to close down when our fixed equipment wears out. To do this overhead costs must be allocated over jobs in the least arbitrary manner possible. (Edwards, 1952, p. 101—emphasis in original)

Edwards' ideas were further elaborated, in 1938, by his colleague at the London School of Economics, R.H. Coase, providing the basis for what Dev (1980) has described as 'the L.S.E. Tradition'. It is not until after World War II, however, that we find the appearance of the first British text entitled *Marginal Costing*, written by the consultants Lawrence & Humphreys (1947). They rehearse the virtues of marginal costing with its emphasis on variable costs, and argue that the marginal profit and loss account has advantages over its absorption cost counterpart, not least because it made the accounts 'alive' (Lawrence & Humphreys, 1947, p. 49).

In the mid-1950s, C.D. Ellis (*Cost Accountant*, 1956, p. 411) suggested that marginal costing could be 'most useful' in avoiding many of the pitfalls to which accountants were prone and which could 'hinder rather than help the "down to earth practical outlook" of the production men'. These pitfalls included the

arbitrary apportionment of overhead expenses, the use of abstract ratios as indices of performance, unreal valuations of work in progress or finished stock, and a rigid division of expense between fixed and variable. (*Cost Accountant*, 1956, p. 411)

However, not all accountants were in favour of direct costing. During the quarter of a century following 1950, there was a lively, ongoing debate in the



accounting literature on the merits, and legality for tax purposes, of drawing up accounts using direct costing methods. For example, marginal costing was seen by some accountants as providing a threat to cherished ideas and traditions since, as pointed out in the report by the AACP's Management Accounting Team:

By limiting the inventory valuations to the direct expenses incurred in manufacture ... no portion of the overheads is carried forward in stock valuations. This in effect alters the basis of the measurement of profit month by month. (AACP, 1950, p. 43)

Reflecting a different kind of concern, in 1941 Amsdon argued that 'Direct costs foster the old gross profit idea so strongly adhered to by auditors' (quoted in Armstrong, 1995). He continued:

it has been the Cost Accountant's hard won privilege to be able to point out how much of this margin is required to be absorbed in order to show a net profit. If that privilege is to go we must all start from scratch. (quoted in Armstrong, 1995)

According to Dugdale & Jones (2003, p. 331), the debate between marginal and absorption costing was part of a

long-running war that began in the nineteenth century, continued throughout the twentieth century, and is still active in the twenty-first century.

Thus, even though the period 1950–1975 represented a 'particularly heated passage in the UK debates' (Dugdale & Jones, 2003, p. 331), it culminated in a victory for neither side. Indeed, it seems doubtful whether the issue is capable of resolution, given that the utility of the method depends on the business and industrial context within which the calculation is made.

### 3.6.5. Review

By the 1940s, the nature of the debate surrounding cost accounting had moved on somewhat compared with the decades spanning the end of the nineteenth century and the beginning of the twentieth century, when the focus had been on the ascertainment of 'true' costs. The spotlight in the literature had instead turned to the relationship between the cost and financial accounts and the *use* of cost information for management purposes (see Table 1). Subjects such as budgetary control, standard and uniform costing had begun to dominate the literature, with marginal costing also beginning to be debated.

Despite the growing focus on a new, unified accountancy by the early 1950s, the main concern of the

costing literature, much of it contributed by members of the ICWA, was with the need for financial accounting to change so that it could incorporate cost accounting. There is clear evidence of a 'turf war' being conducted between cost accountants on the one hand and financial, often chartered, accountants on the other. The publication of the ICAEW report on *Developments in Cost Accounting* (1947) can be interpreted as a recognition of the need, by chartered accountants, to pay attention to an area that had, until then, largely been ignored.

It was during the period following the end of World War II that use of the term management accounting began to come into vogue. A major influence on the appearance of the label, on this side of the Atlantic, was the pronouncements of the Management Accounting and other teams that visited the USA in 1950 as the result of arrangements made by the AACP. Such developments were part of a broader, US-driven economic and political agenda for a democratic/capitalist Western Europe as a counterpoint to the postwar growth of the Soviet bloc. Decentralised, competitive economic management, rather than state or other monopolistic practices were seen as playing a key role in this process. The AACP, established in Britain under the auspices of the Marshall Aid programme, hosted visits by American experts and arranged trips by British teams on 'productivity missions' to discover the 'secrets' of management across the Atlantic.

On their return, many of the teams reported that it was not so much the case that techniques employed in America were unknown in Britain, but that they were used in a different manner. Some reports even questioned the technical superiority of the Americans. Nevertheless, the general message conveyed by the reports was the more widespread acceptance and use, in American businesses, of forward-looking techniques such as standard costing and budgetary control, with some evidence also of the greater adoption of direct costing. As we have already noted, such techniques had been discussed in the British literature even before World War II, but the reports of the AACP teams undoubtedly gave a renewed vigour to a literature discussing these ideas and helping to disseminate them more widely.

## 4. C/MA Practice

In the absence of close regulation, and perhaps even accompanying it, there will exist at any time and in any sector a wide variety of business practices. Hence, we should not be surprised to find, when surveying the available evidence, whether contemporary comment or archival, that different companies used

different methods, of which some were more complex, detailed and 'advanced' than others. Further, as new techniques were developed and new conceptual ideas came to the fore, we should expect to discover some businesspersons rapidly embracing new ideas and practices, whereas others were more conservative in their approach. It also needs to be recognised that contemporary opinion about the state of costing, at any point in time, was often quite diverse.

#### 4.1. Structure of Accounting Information Systems

The accounting information prepared for management may be seen to arise from two principal sources—that is, from inside or outside a formal system of bookkeeping—and to take two principal forms—routine reports prepared periodically and *ad hoc* accounting calculations prepared for a specific purpose (Burley, 1958; McKendrick, 1970; Pollard, 1968, Chapter 6). Each form of financial statement can be derived from either of the two sources, though it is more typically the case that routine reports will be products of a formal system of bookkeeping, whereas *ad hoc* reports may have more diverse origins<sup>23</sup> and might literally be compiled on 'the back on an envelope'. In addition, we need to be aware of the fact that, at a time when the range of users, scale of business activity and complexity of financial arrangements were rather more limited than subsequently became the case, it was possible and probably a quite common practice to obtain the financial knowledge required for decision-making purposes from direct examination of the contents of the ledger.

The above schemata raise many questions, of which perhaps the most difficult is: What is a formal system of bookkeeping? Our answer is that any system maintained for the purpose of keeping a continuous record of rights and obligations fulfils the criteria. It would therefore include charge and discharge accounting, other systems of single entry bookkeeping (which might involve the use of memorandum books of entry and ledger accounts to record some of the entities transactions) and a fully fledged system of double entry bookkeeping. Or, as Miller & Napier (1993, p. 644) express it:

there are different modes of economic calculation deployed according to particular objectives or ideals. (Miller & Napier, 1993, p. 644)

Charge and discharge accounting was, of course, dominant in the middle ages and continued in

widespread use much later. During the transition to double entry bookkeeping,<sup>24</sup> which spanned several centuries, there can be found plentiful examples of hybrid schemes of bookkeeping. For example, the system employed on the Mackworth Estate (Neath), 1759–1760, which was designed to enable the preparation of traditional charge and discharge type statements of accountability, while also involving the maintenance of a ledger, kept on double entry principles, was organised in such a way as to help identify the income, costs and profits of separate operations (Jones, 1985, p. 56). A profit and loss account for the Gnoll property, for the year ending 13 December 1760 (Jones, 1985, p. 56), matches profits arising from a range of activities—including coal, wheat, barley and brickmaking—with overhead costs such as maintenance of the gardens, household expenses, servants' wages and general charges. This activity-based method of profit calculation persisted when companies moved over to a fully fledged system of double entry bookkeeping, such as that prepared for the Cyfarthfa Ironworks for 1814.<sup>25</sup>

The dynamic nature of the accounting process, sometimes the subject of continuous revision in order to enable the compilation of data for performance assessment and pricing decisions, 'in a competitive environment during a period of technological and organizational change' (McLean, 1995, p. 142), is well-demonstrated in McLean's study of the Sunderland traders, shipowners and shipbuilders, Laings, during the nineteenth century.

We have seen that the relationship between the cost and financial accounts received considerable attention from contemporary writers in the first half of the twentieth century. The extent to which integration of the cost and financial accounting functions occurred in earlier times was initially the subject of speculation on the part of accounting historians whose conclusions have been proved wrong as the result of subsequent research. Edwards (1937), Solomons (1952) and Garner (1955) believed cost and financial accounts to have been initially separate

<sup>24</sup>The first known use of double entry bookkeeping in Britain was by the London branch of an Italian firm of merchants—the Gallerani company of Siena—in 1305 (Nobes, 1994). This was probably exceptional, and the rate at which double entry procedures were diffused remains unknown, with some large companies continuing to use single entry bookkeeping into the late nineteenth or early twentieth century (Jones, 1981, p. 23).

<sup>25</sup>McLean (1995, p. 121) describes a comparable method of presentation in use at the shipbuilders Tanner and Beckwith, 1819–1821.

<sup>23</sup>For example, the 'rough' costing book used by Wedgwood in August 1772 and 'the routine jotting of 1781' (McKendrick, 1970, p. 57).

and to have come together in the late nineteenth century. Edwards (1937, pp. 389–390) and Johnson & Kaplan (1987) have further argued that the process of integration of cost and financial accounts has been detrimental because the dominant priorities of financial accounting result in cost accounts losing relevance for the purpose of decision making.

Archival-based research has shown that cost and financial accounting systems in British firms did not start out separate from one another, at least in certain industries. Indeed, for ironmakers, there is evidence of the integration of cost and financial accounting systems within a double entry framework as far back as 1690 (Edwards & Boyns, 1992). There is mounting evidence of the introduction of integrated systems by companies during the industrial revolution at, for example, the Cyfarthfa ironworks in South Wales by 1791 (Evans, 1990; Jones, 1985), with this arrangement becoming common practice among large iron, coal and steel companies during the nineteenth century (Boyns & Edwards, 1997b). Amongst textile companies, there is the known example of the Charlton Cotton Mills, Manchester, in 1810 (Stone, 1973); amongst mining companies, the Mona Mine Company, North Wales, by 1817 (Jones, 1985, p. 141) and for shipbuilders, at Laings, Sunderland, in 1819 (McLean, 1995).

We have suggested that the erroneous conclusion that integration dates from the late nineteenth century may be attributable to the fact that early commentators were writing at a time when few companies had been the subject of investigation. It might also be partly because companies could move in and out of integrated systems, or create the possible impression of non-integration by relegating the bulk of the costing data to subsidiary records (McLean, 1995). Of interest in this context are comments made by the chartered accountant Thomas Plumpton which appeared in *The Accountant* in the 1890s:

I had the advantage of a thorough training in a large engineering concern, manufacturing locomotive and marine engines, boilers, and every kind of machinery, where the Cost Accounts were so interwoven with the Commercial Accounts as to form an integral part of the whole on the system known as the Italian System, which until recent years was so universally adopted. (Plumpton, 1892a, p. 270)

Further:

It is upwards of thirty years ago since I received my first instruction in Cost Accounts from a professional accountant. The accounts were then kept on what had hitherto been known as the Italian system, embracing the Trading and Cost Accounts jointly ... But with the exodus of the Italian system, thought at

the time to be cumbersome for the payment of accounts, various dissections occurred, separating the Trading Accounts from the Cost Accounts, after which it has been a frequent matter of regret to manufacturers that the results of their costs do not reconcile with the Profit and Loss Accounts. (Plumpton, 1894, p. 990)

It is a theme of this paper that cost calculations have been used for centuries as the basis for planning, decision making and control. The cost accounting literature, however, which principally dates from Solomons' 'costing renaissance' (c. 1870), indicates a growing formalisation of the costing function over the next 100 years. We will see that this observation has some substance and, for this reason, the remainder of this section is divided into a consideration of events pre- and post-1870. The pre-1870 section examines the full range of cost accounting techniques as revealed by the archives and the literature. While these techniques continued in use after 1870, in our second sub-section we focus our attention (as in section 3.6) on the major new developments that occurred in relation to standard costing, budgetary control, uniform costing and marginal costing.

## 5. C/MA Practice to c.1870

### 5.1. *Cost and Profit Calculations*

The relevant costs to be included in a report designed to inform management decision making will naturally depend on the nature of the decision to be taken. For planning decisions, the key distinction will normally be between marginal and sunk costs, with the allocation of a particular cost to one or other of these categories depending upon whether it will be affected (marginal) or unaffected (sunk) by the decision reached. In general, most if not all costs will be unavoidable in the very short run and avoidable in the very long run. For the purpose of exerting control through performance assessment, businesspersons have normally considered total cost figures to be more relevant based on the conviction that, in the long term, these have to be covered if a firm is to survive and prosper.

It is generally agreed that all costs that can be traced to a particular unit or group of outputs—the direct or marginal costs—should be included; the controversy surrounds the treatment of indirect or overhead costs. Before examining the uses made of cost and profit calculations, we first consider the treatment of particularly contentious items affecting the identification of total cost—namely, depreciation and imputed interest—and whether and how identified overheads were allocated between different activities early on. We will also examine the valuation of goods transferred

between departments where the accounting system was adapted to track movements of goods within the firm.

### 5.1.1. Depreciation

One of the problems facing accounting historians is to judge the intended meaning of words, which may differ between individuals and groups at any point in time and may change over time.<sup>26</sup> A particular difficulty is encountered when attempting to judge whether the concept that we today call depreciation was being applied when preparing accounts in earlier times. A phrase used in the past that possibly implies the inclusion of a depreciation charge is 'wear and tear'. However, the term could alternatively signal merely an allowance for repairs (Jones, 1985; Pollard, 1968, p. 283), both depreciation and repairs (Bryer, 2005, p. 44) or possibly something else.

The 1612 account book kept by the 'Jacobean management accountant' Robert Loder (Freear, 1994, p. 473) refers to the 'worsening' of the horses, 'the wearing out of the sayd horse' and the charge for 'the wearing of him out some in the time I mow' (quoted in Bryer, 2000b, p. 372). The accounting treatment that Loder adopted, which in one instance resulted in the cost of a horse being written off over about 9 years on the straight-line basis, is described by Bryer as

depreciation expenses in the modern sense – the cost of the use-values consumed in the production of commodities. (Bryer, 2000b, p. 372)

Jones (1985, p. 100) has suggested that the late appearance of depreciation within business records is because the earlier organisation of business activity often rendered it possible to identify almost all expenditures directly with production. Properties were invariably leased, rather than owned, so that the rental charge could be included as a cost of production. While in the case of an ironmaker, for example, the furnace and utensils would have a long life, perhaps extending over the entire period of the lease, so it was usually considered sufficient to charge associated maintenance and repair to production. Indeed, the word depreciation is nowhere to be found in the extensive range of records that Jones surveyed. He finds various references to wear and tear, while the Morris manuscripts for 1727 contain a charge of 2s. 6d. debited to refining costs to reflect 'wear of furnace' (Jones, 1985, p. 158).

The first evidence we now have of what we would today describe as a depreciation charge being made in the case of an industrial enterprise concerns the construction of the Carburton Forge by the Derbyshire and Nottingham Company c.1700. The forge account for 1701 contains a figure for previously incurred capital expenditure of £250 described as: 'yett stands out the money laid out in building/£50 being thrown off in this account', so that the balance carried forward in 1702 was reduced to £200 (Edwards & Boyns, 1992, p. 163; see also pp. 163–164). Moving into the industrial revolution period, buildings were the subject of annual depreciation at the Carron Company ironworks in 1769 and also, together with steam engines, at Boulton & Watt's Soho Foundry in the 1790s (Pollard, 1968, p. 284).

After 1800, the use of depreciation in industrial accounting became more common (Fleischman & Parker, 1997), with the practice surfacing in the textile industry during the first half of the nineteenth century (Hudson, 1994, p. 445; Stone, 1973, p. 77). But it was within the highly capital-intensive railway sector, between 1830 and 1850, that accounting for capital assets first became a major issue. Initially, certain railway companies included depreciation in their accounts to cover the deterioration of rolling stock but, by the end of that period, some began to establish depreciation funds which, with compound interest, would accumulate 'the total amount required to restore the line to its original condition' (quoted in Edwards & Newell, 1991, pp. 52–53; see also Edwards, 1986, pp. 251–255).

### 5.1.2. Imputed Interest

The records kept by the Berkshire farmer Robert Loder for the period 1610–1620 have

been criticized as being mathematically inaccurate, arbitrary in content, and primitive in accounting form. (Freear, 1994, p. 478)

However, Freear proves that it is the substance of Loder's records—namely their decision usefulness—that is important. Of relevance here is the fact that Loder applied the concept of opportunity cost to decision making as early as the second decade of the seventeenth century (Freear, 1994, pp. 476–477). Pollard's broad-based study of developments during the Industrial Revolution (1760–1850) produced the conclusion that

[i]nterest was treated as a cost, universally in computing the advisability of planned ventures, but frequently also in accounts of the past. (Pollard, 1963, p. 80)

<sup>26</sup>The meaning of the various terms associated with the development of costing/cost accounting requires further investigation (see Parker & Boyns, 2004).

The term ‘universally’ is certainly too strong, but there are plentiful examples of financial calculations prepared to enable eighteenth-century managers to choose between alternatives that incorporated an allowance for interest, usually at 5% (Jones, 1985, pp. 168–171; Straker, 1931, p. 200).<sup>27</sup>

The inclusion of an interest charge in *post fact* accounts is rather less common, but could arise in calculations both within and outside the ledger. Calculations within the ledger were designed to reflect the sentiment expressed by the chief agent of Lord Uxbridge in 1788, namely that ‘every concern in the Trade ought to pay interest for the money employed in it’ (quoted in Jones, 1985, p. 168). Calculations of this type may be found in the profit and loss account of the British Linen Company for 1748 (Mephram, 1988a, p. 67), in the Crawshay ledger for 1791–1798 (Jones, 1985, p. 169) and in the Charlton (cotton) Mills books commencing 1810 (Stone, 1973, p. 77).

The use of imputed interest to enable an explicit assessment to be made of the profitability of specific business activities occurred at the Mona Mine Company where interest was charged at 10% on ‘average capital employed’ to finance its major asset over the 7 year period to 31 March 1800. The exercise revealed that the Mona Mine failed the test laid down by Hamilton and Lord Uxbridge’s agent; an operating profit of £11,990 was converted into a loss of £29,785 after taking account of interest on an ‘average capital employed’ of £59,680 (Jones, 1985, p. 177).<sup>28</sup>

### 5.1.3. Overhead Cost Apportionment

In addition to the problem of deciding which overhead costs to recognise, there is the question of how to apportion them between different activities once one moves below the level of the firm. The Duke of Norfolk’s Works provides an early example. When the firm paid a £460 premium on the lease of two forges and a furnace in 1727, the annual amortisation was apportioned between the company’s two forges on a 2:1 basis (Edwards & Boyns, 1992, p. 163). Fleischman & Parker (1991; see also Edwards & Baber, 1979; Fleischman & Parker, 1990; Rimmer, 1960) refer to four large industrial revolution firms, namely, the Carron and Dowlais iron companies and

the Marshall and Strutt textile enterprises that allocated overheads on the basis of pre-determined formulae. At Carron, for example, the General Court laid down, in 1763, the obligation to include overheads when computing cost of production, and further specified the proportion to be charged to each department (Fleischman & Parker, 1991, p. 215).

The evolution of the treatment of overhead costs at the iron and steelmakers located at Staveley, around a century later, is instructive, with what appear to be more sensitive apportionment procedures introduced as the level of overheads increased (Boyns & Edwards, 1997b, pp. 15–16). By 1870, for example, establishment charges were apportioned between the Staveley collieries, the North Staveley Colliery and the Castings department on the basis of throughput.<sup>29</sup> Where costing reports were prepared on a regular basis and management was keen that the information should be made available as promptly as possible, general expenses were sometimes recharged to departments on an estimated basis. At Dowlais, for example, management was supplied with cost sheets on a monthly basis, with the following apportionments of general expenses made for 1851: £50 to each of coal, blast engines and forge engines; £100 to the ironstone mines; £450 to the furnaces; £300 each to the puddling forges and rolling mills, and to the limestone pits or refineries. The stated aim in fixing the charges was to approximate actual overheads so as to keep under or over-recoveries to a minimum (Boyns & Edwards, 1997b, p. 16).

### 5.1.4. Transfer Pricing and Departmental Profits

When, during the seventeenth and eighteenth century, the processing of goods was typically organised through the domestic system, the calculation of profits from different activities could be based on values legitimated by external transactions. Once a company internalises a multiprocess activity, and perhaps mechanises it to achieve ‘flow production’ (Mephram, 1988a: 59), the preparation of departmental process accounts requires a decision to be made about how inter-departmental transfers are to be valued. The options are cost, market price or an accounting price produced as the result, perhaps, of negotiation between departmental managers. Different methods of transfer pricing naturally fulfil

<sup>27</sup>This was the rate fixed by statute in 1714 and was still in force when Gordon’s *The Universal Accountant* was published in 1763 (Mephram, 1988a, p. 64).

<sup>28</sup>See Edwards et al. (1995, p. 14) for details of a corresponding calculation made at the Staveley Works, Derbyshire, in 1847.

<sup>29</sup>Throughput was also the basis for allocating most, though not all, the overheads of the Wigan Coal & Iron Co. Ltd., with a standard charge for ‘Rent’, ‘Horses Work’, ‘Depreciation’, and ‘Salary’, multiplied by the ‘get’ to obtain the total cost for a particular item (Boyns & Edwards, 1997b, p. 15).

different purposes. The use of total cost figures enables cost-based measures of operating performance, relevant data for the identification of waste and the ability to assess the effect of technological or organisational innovations. Use of cost-based transfers also avoids the inclusion, in stock, of unrealised profits that might be seen to affect the comparability of costings over time, or to conflict with the application of the realisation concept for the purpose of external reporting. The use of market (or an accounting) price, on the other hand, enables identification of the relative profitability of different products and processes for performance measurement purposes (e.g. the achievements of departmental managers) or decision-making purposes (e.g. to decide which parts of a business to expand or contract). The business records examined reveal a variety of procedures employed.

According to Freear, the accounting practices of Robert Loder between 1610 and 1620 involved

charging inter-enterprise transfers at weighted average market price, which represents the cost of the opportunity forgone by retaining for internal use produce which would otherwise have been sold. (Freear, 1994, p. 477)

At the Derbyshire and Nottingham Company, transfers between the furnaces, forges and slitting mill, in 1750–1751, were made at transfer prices approximating market price, thus enabling departmental profits or losses to be calculated (Edwards & Boyns, 1992, p. 161).<sup>30</sup> More often, transfers were made at total cost. For example, the Dowlais Iron Company's cost sheets for the 5 weeks ending 29 May 1847 show transfers at actual or estimated average cost per ton (Boyns & Edwards, 1997a, pp. 32–34, 45–46).

The archives of the Consett Iron Company reveal that, in 1867, the company adopted accounting prices in place of historical cost for the purpose of measuring transfers of raw materials and intermediate goods. The purpose was to identify the relative profitability of the coal- and iron-making departments and to reach a key strategic decision, namely whether to cease iron manufacture (Boyns & Edwards, 1995).

## 5.2. Uses of Cost and Profit Calculations

When considering the uses made of cost and profit calculations, a relevant classification is between calculations made *ex ante* and *ex post*. Either class of

calculation may be generated routinely from an appropriately organised accounting system, or prepared as and when required for decision making based on information, as noted earlier, contained within or outside formal record keeping arrangements. The amount of evidence available concerning different types of costings and costing methods is mounting, and the material presented in the following section is confined to a few examples, under each heading, together with an indication of some of the sources that can be consulted for further clarification. For the purpose of presenting these data, we continue to apply the explanatory framework that treats C/MA as a mechanism for planning, decision making and control. The fact that costing calculations often fail to fall neatly into any of these three categories is acknowledged, as is the fact that the archives sometimes remain silent about the purpose of such calculations, which must therefore be inferred from the context within which they are made.

### 5.2.1. Planning

Early costing calculations typically took the form of an estimate or 'standard' made *ex ante* (a) for purposes of planning and co-ordinating future activity and (b) to serve as a benchmark against which actual performance could subsequently be compared. We concentrate principally upon the former here, and the latter in the sub-section headed 'Control'.

*5.2.1.1. Standards and Trials.* It is known that standard yields were developed for crops and livestock in the thirteenth century (Lamond, 1890, 71ff; Scorgie, 1997), with Macve (1986, p. 240; see also Noke, 1981) describing how these measures were exploited by the auditors of medieval estates:

The final audited account contained not merely receipts and payments that had occurred but those that the auditors considered should have occurred (e.g. by reference to the standard yields of land and livestock).

'Trial smeltings' of copper ore were undertaken at Keswick at the beginning of the seventeenth century to provide standards for smelting costs (Hammersley, 1988, pp. 122–124), while Fleischman & Parker (1991), in their study of accounting during the industrial revolution, found plentiful evidence of production and costing standards amongst the twenty companies surveyed. Their examination of the Philips archive, for example, revealed 'a detailed set of production standards for 1771 that shows monthly input quantities projected over a 20-month period to achieve a desired level of output' (Fleischman & Parker, 1991, p. 367).

<sup>30</sup>Edwards et al. (1995) trace the accounting practices of this company and its successors through to 1900, revealing the continuous use of a transfer pricing system modified to enable the profitability of intermediary departments, which interfaced to any extent with the market, to be measured.

Standards were also established for raw material waste and to provide a yardstick for assessing departmental results (Fleischman & Parker, 1991, pp. 363–364, 368).

Possibly the best-known early example of scientifically constructed labour and material standards in Britain comes from the Boulton & Watt archive. Labour standards, involving time studies and the creation of piece rates, were the output from ‘an incredible outburst of calculating activity in the 1800–1802 period’ (Fleischman et al., 1995, p. 167). Moving further into the nineteenth century, there is the exercise designed to ascertain the efficiency of coal consumption at Vivian & Sons’ Hafod works in 1848. Coal was the major variable cost element in the copper smelting industry, and Vivian arranged ‘trials’ designed to ascertain the quantity that should be used in each operation. The trials showed that 59,286 tons of coal were required, whereas 69,525 tons of coal had been used, indicating that fuel costs were 17% higher than might have been expected ‘owing to bad work’ (quoted in Edwards & Newell, 1991, p. 49).

*5.2.1.2. Budgeting.* Forward planning was, on occasions, designed to co-ordinate the activities of an entire enterprise in a manner akin to a twentieth-century system of budgetary control. A systematic and broadly based budgetary exercise, though not described as such, is contained in an unpublished treatise written in the 1760s by Thomas Lovatt, chief agent on the Chirk Castle estate. His study (reproduced in Jones, 1985, pp. 63–72) was designed to help decide whether it was worthwhile farming, in a particular manner, 400 acres of land. In Jones’ estimation, Lovatt’s statement interlinks

on a detailed budgetary basis, investment and return. He integrates into the one whole of an income statement, the cash flow results of making a decision to invest in and operate a 400 acre farm for a year. (Jones, 1985, p. 72)

As fulfilling a similar purpose, Spraakman & Wilkie (2000, pp. 67–69) describe the system of budgeting, based on ‘outfits and indents’, developed by the Hudson Bay Company over one and a half centuries following its formation in 1670.

To help plan future business activity effectively, an important issue was the determination of the price to charge customers. For example, Solomons (1952, p. 19) believed that ‘the difficulty of price fixing’ in the late-nineteenth century engineering industry was the most important reason for a growth of interest in costing around that time. Certainly, there exists archival evidence testifying to the need for accurate

costs for price-fixing purposes and, where the market determined prices, to enable management to decide whether to supply goods at those figures. But such uses of costing data occurred much earlier than Solomons imagined.

The availability of ‘intricate cost data for determining pricing policy’ was a key output from Josiah Wedgwood’s famous cost-finding exercise of 1772 (Fleischman & Tyson, 1993, p. 509; see also Fleischman & Parker, 1991, p. 365). In addition, by the end of the eighteenth century at Boulton & Watt, ‘engine books’ were used to record costs in careful detail as the basis for fixing prices as well as for assessing profitability (Fleischman & Parker, 1991, p. 365; Williams, 1999, p. 85). In the nineteenth century, on the basis of his reading of the Dowlais Iron Company Letter books 1784–1852, Jones reached the conclusion that in fixing prices ‘management looked backwards at calculated book costs and forward to gauging what the traffic will bear’ (Jones, 1985, p. 110).

*5.2.1.3. Summary.* We can therefore see that, from very early times, some managers recognised the need to plan future activities and, sometimes, even to co-ordinate the operation of different segments of the entity being managed.

### *5.2.2. Decision Making*

Researchers have also found that the archives abound with examples of accounting used for management decision making purposes (Edwards, 1989, pp. 310–311; Fleischman & Parker, 1991, pp. 366–367; Parker, 1980, pp. 262–263). We consider below some of the ways in which costs and revenues were assembled to inform both short- and long-term decision making.

*5.2.2.1. Fixed and Variable Costs.* Early recognition of the differential behaviour of costs in response to changes in output is provided by Josiah Wedgwood, proprietor of the Burslem pottery works, when observing (in 1772) that some expenses ‘move like clockwork & are much the same whether the quantity of goods [produced] be large or small’ (McKendrick, 1970, p. 55). A clear recognition of the impact of changing levels of output on selling price and profit is contained in a calculation made by John Vivian, deputy governor of the Cornish Metal Company (1785). This shows that the sale of three quarters of available copper capacity enabled a higher price to be charged and a higher profit to be achieved than by

selling the entire output. Vivian further observed:

it will be in [the mine owner's] interest to keep the overplus in Reserve, in hope of an increased demand for a decreased produce. (quoted Jones, 1985, p. 190)

Further calculations made by John Vivian, for the Mona Mine Company in 1811 (Jones, 1985, p. 204) and 1813 (Jones, 1985, p. 191), clearly recognise the impact of different qualities of copper ore on yields and production costs. Moving further into the nineteenth century, Richard Cort, accountant, states in a letter to John Taylor (11 May 1824) that

the increased scale of smelting, lessens also the [im-  
pact of] fixed expenses which...are as much on 1000  
as on 6000 tons.

Such costs are also contrasted with 'all other items which move more or less in proportion to the quantity of ores smelted' (Jones, 1985, p. 105).

Routine decisions, such as those associated with the above-mentioned calculations, are concerned with issues like how much to produce; who should run the department; what price to be charged; which material to use; from whom raw material inputs should be acquired. In the next sub-section, we consider the use of accounting to help reach the strategic decisions that managers are sometimes required to address.

*5.2.2.2. Strategic Decision Making*<sup>31</sup>. Freear (1994) reveals that, even within a relatively stable agricultural society, accounting was employed to inform strategic decision making. Amongst the issues addressed by Robert Loder during the second decade of the seventeenth century, the allocation of acreage between the production of wheat and barley was of fundamental importance to the success of his enterprise. A study of Loder's farm accounts led Freear (1994, p. 488) to celebrate him as 'a "pioneer practitioner" in management accounting' on the grounds that he was a profit maximiser who applied the concepts of opportunity cost and avoidable costs for the purpose of decision making and control. Overall, Freear judges Loder to be

not merely ahead of his time, but [that he] used techniques superior to those which were advocated and used at least three centuries later. (Freear, 1994, p. 488)

Moving a century forward in time, Jones (1985) provides a number of examples of accounting

exercises undertaken on the Mackworth Estate to answer the question 'What if we did this rather than that?' (Jones, 1985, p. 22). For instance, calculations were made by the accountant at the Melincryddan works, in the 1740s, which distinguished between fixed and variable costs to help assess whether it would be more profitable to locate production at Neath or at Redbrook (Jones, 1985, pp. 25–32). Estimates were made of the relative cost of producing and selling five, six, seven and eight tons of copper per week at each of the two locations. The total costings were then compared with estimated sales revenue to show an advantage for Neath at each planned level of production. The financial analysis is accompanied by a splendid discussion which starts by outlining the various economic conditions that must be favourable to justify siting the works at a particular location. The Tredegar manuscripts around the same time (1746) reveal the application of marginal and opportunity costing techniques to help decide whether the landowner should renew a lease or instead take it over and himself operate the iron works located on his land (Jones, 1985, pp. 187–189).

Fleischman and his collaborators (Fleischman & Parker, 1991, 1992; Fleischman & Tyson, 1993; Fleischman et al., 1991) have found that, during the early decades of the industrial revolution, 'entrepreneurs employed cost analyses to support vertical integration and product line decisions' (Fleischman & Parker, 1991, p. 366). Further:

Capital equipment purchases, mineral field leases, and major technology decisions (e.g., the introduction of the power loom) were all undertaken after a careful costing of alternatives. Subcontracting and transport options were likewise evaluated.

The use of accounting information to inform strategic decision making probably gained further momentum after the industrial revolution, with the increasingly heavy investments associated with technological advances further emphasising the need for managers to be fully informed of the possible financial consequences of alternative courses of action. In their study of the Dowlais Iron Company, Boyns & Edwards (1997a) found accounting information playing a full part in decisions made in the late-1850s and 1860s to switch from iron to steel manufacture and to purchase the unprofitable Penydarren iron works in order to gain access to its valuable coal reserves. According to Chandler (1962), structure follows strategy, but this hypothesis receives no support from Boyns and Edwards' analysis of events at Dowlais during the 1850s. They conclude that the link is more complex, possibly reflecting, as Alford (1976, p. 59)

<sup>31</sup>We are concerned here with the collection of accounting information for the purpose of reaching decisions that might have a significant impact on the organisation, nature or location of a firm's activities and how those activities are undertaken.



has suggested, a symbiotic rather than causal relationship.<sup>32</sup>

*5.2.2.3. Discounted Cash Flow.* A strategic decision will often involve the commitment of a large sum of money and have financial consequences that extend far into the future. It is today considered appropriate that an evaluation of a particular course of action, sometimes involving a choice between alternatives, should take account of the time value of money. The application of discounted cash flow (DCF) techniques for the purpose of business decision making dates from at least the eighteenth century, a time when Tyneside viewers acted as valuers ‘whenever an owner or part-owner wished to sell, or more commonly when an owner died and the value of his holding had to be estimated for his executors’ (Flinn, 1984, p. 60). Brackenborough et al. (2001, p. 140) discover the initial appearance of DCF in colliery viewers’ books in 1772, with its more regular use dating from 1801. They see its adoption as

a specific wealth-maximization response to the economic conditions of the day ... a clear case of accounting and engineering technologies combining to facilitate the exploitation of deep coal reserves, where accounting acted as a determinant of industrial expansion. (Brackenborough et al., 2001, p. 137)

Their study also revealed one example of DCF used to compare alternative investments. The exercise performed by John Watson, Jr. in 1813 discounted the projected annual revenues at the rate of 10% plus an ‘addition of interest for the risk of the colliery not being let at the time specified’ (Brackenborough et al., 2001, p. 141).

In the third quarter of the nineteenth century, the ‘accountant, economist and engineer’ (Pitts, 2001, p. 33) William Armstrong was regularly consulted by major coal, iron and steel companies in the North of England. His reports contain heavy use of the DCF technique for the purpose of valuing mines and other income-producing assets, and application of the annuity method to decide the amount to be set aside for the depreciation and replacement of fixed assets (Pitts, 2001; see also Edwards & Warman, 1981).

*5.2.2.4. Summary.* This sub-section has revealed that, from early times, management understood the complexities of decision making, recognised the need for relevant information, took steps to ensure its

availability and applied careful thought and common sense in interpreting its significance. In short, accounting innovations were the product of perceptive businesspersons struggling with real problems.

### *5.2.3. Control*

The use of costing data for management control purposes has a number of different dimensions. The focus may be on costs, revenues or profits and, in each case, either individually or in total. Then, the unit which is the subject of assessment may be the goods or services the organisation supplies, its workforce, the organisation itself or some subset thereof. In all cases, the concern is to assess performance and, if appropriate, to take action. The *ex post* calculations made will be based on actual costs or, particularly in earlier times, estimates of actual costs incurred, either because the accounting records are insufficiently reliable or comprehensive to allow actual costs to be ascertained, or because the time and cost involved is considered unjustified in terms of the expected benefit to be derived from a more precise calculation.

*5.2.3.1. Estimates of Actual Costs and Profits.* Edwards et al. (1990) reproduce a series of calculations taken from the business notebook of Daniel Hechstetter, the German manager of the Keswick copper works from 1597 to 1633. These include estimates of actual costs incurred in extracting minerals and manufacturing copper, perhaps made in the hope of reassuring the owners that it was worthwhile continuing activities in which a substantial investment had been sunk. Edwards et al.’s (1990, p. 77) conclusion that the ‘calculations are rudimentary and, possibly hopelessly inaccurate’ is consistent with Pollard’s conviction that early costing developments, even during the industrial revolution, were embryonic and hesitant (Pollard, 1968, pp. 271, 285). It is certainly the case that Hechstetter’s accounting did not guarantee prosperity or even survival; the company always struggled and survived only 7 years beyond Hechstetter’s retirement, closing in 1640. But Edwards et al. (1990, p. 77) strike a more optimistic note when they observe that ‘trading conditions were not favourable’ and that

the determined efforts made by Hechstetter to subject business events to financial analysis, nearly four hundred years ago, paid dividends in the sense that the company did a little better and survived a little longer than would otherwise have been the case. (Edwards et al., 1990, p. 77)

The archives that formed the basis for Jones’ (1985) extensive study display a keen interest in cost

<sup>32</sup>For further evidence of the relationship between accounting data and strategic decision making, see Boyns and Edwards (1995) and Edwards et al. (1995, pp. 26–30).

estimates rather than in actual cost calculations for the purpose of performance assessment. For example, a theoretical estimate of the total cost of making 300 tons of bar iron at the Pontypool Forges over a 12-month period, prepared by Hanbury in 1704, is divided by 300 to give a cost per ton of £13.2s.0d (Jones, 1985, p. 13). This figure is then compared, favourably, with the estimated selling price of £15. Particularly notable, with this and other exercises described by Jones, is the careful thought devoted to the construction of the estimates. Hanbury recognises that some of the costs might appear to be a little low, but he takes the view that this is compensated because estimates of some other costs are probably too generous (Jones, 1985, p. 14).

The records of the Landore works, for the 1730s, contain a sophisticated assessment of 'The Charge of Making a Ton of Copper when the Ores produce one in ten', i.e. ten tons of copper ore yields one ton of refined copper. The calculation (Jones, 1985, p. 23) sets out the various direct costs—materials, labour and expense—for each of the following stages of production: smelting, melting, roasting and refining. Carriage inwards is included as also are allowances for candles, smithwork and repairs to furnaces at each stage of production. Added to the total direct costs are certain indirect costs such as salary of agent, rent of workhouses and selling (commission) and distribution (freight from Neath to London) costs.

*5.2.3.2. Calculation of Actual Costs and Profits.* The first known example of a profit calculation is provided by the monks of Canterbury cathedral priory who 'were calculating the *profectus* [profit] of some of their manors in 1224–1225, the date of the earliest of their extant "assisæ scaccarii"' (Stone, 1962, p. 27). Indeed, amongst the *assisæ scaccarii* can be found 'a comprehensive schedule of manorial profits for the year 1258–1259 that declares the items of which the *profectus* of each manor is made up' (Stone, 1962, p. 27). Within an industrial context, Burley's (1958) investigation of the accounting records of the Essex textile manufacturer Thomas Griggs for the period 1742–1760 is an early known example of interest being shown in the identification of actual costs incurred. There were five main processes: wool sorting, cleaning, combing, spinning and weaving. The first three stages which appear to have involved relatively little in the way of labour and capital requirements were performed on the premises. The remaining work was undertaken by approximately five hundred outworkers, and the surviving records focus on activities undertaken by these individuals, perhaps because

records were not required to provide information about transactions under the owner's direct supervision. Also of interest are the forty or so *ad hoc* direct costing calculations made for various fabrics at a time (1749–1759) when demand was low and direct costs were high. As in the case of Josiah Wedgwood's pottery business in 1772 (McKendrick, 1970, p. 49), poor results seem to have stimulated cost consciousness.

The fuel used to run iron-making furnaces, prior to coal, was charcoal, and it is therefore perhaps unsurprising to find that eighteenth-century managers of charcoal iron-making enterprises employed accounting calculations to help ensure the least-cost supply of that source of energy. The eighteenth-century records of the Derbyshire and Nottingham Company and the Duke of Norfolk's Works reveal that charcoal was obtained in batches of varying size from a wide range of geographical locations—some far distant—with detailed calculations made, both inside and outside the double entry bookkeeping system, of their cost. The total batch costs were then expressed as an average per dozen, providing a common unit for comparative purposes and a financial basis for future purchasing decisions (Edwards & Boyns, 1992, pp. 163–167).

For plentiful evidence of 'purposeful cost management' during the industrial revolution see, for example, Fleischman & Parker (1990, pp. 211, 216–218; 1991, 1997). The use of cost comparisons as a basis for exerting cost control is summarised by these writers as follows:

Mills, departments, blast furnaces, steam engines, other machines, and workers were rated against one another in terms of costs and profitability. Large firms engaged in macro-level cost comparisons, either at the function room or plant level. Quarterly cost comparisons were used to evaluate the cost control of respective managers in the four carding and four spinning rooms of Strutt's mill at Milford. Boulton & Watt compiled weekly expense reports comparing their multiple lathing and drilling rooms. In the 1790s, the blast furnace supervisor at Carron was transmitting monthly reports of costs per ton for good iron for each blast furnace, with notes explaining why production might be down either generally or at a particular furnace. (Fleischman & Parker, 1991, p. 365)

We have seen that double entry bookkeeping systems were sometimes adapted to reveal profits or losses arising from different activities. There is also plentiful evidence of looseleaf profit statements prepared for ease of reference and, probably, to enable a more informed assessment of a firm's operations to be made (Oldroyd, 1999, pp. 189–190; Spraakman & Wilkie,

2000, pp. 72–75). In addition, the data made available to management for the purpose of performance assessment were increasingly tabulated on cost sheets. Those for the getting of coal at four pits belonging to the Staveley Works in 1856, for example, contain a wealth of data that could be exploited for comparative purposes (Boyns & Edwards, 1997b, p. 29). For the purpose of performance assessment, it is possible to add value to the reported numbers by expressing revenues, costs and profits on a per unit basis, and this was clearly done (Boyns & Edwards, 1997a, pp. 45–46; 1997b, p. 29).

*5.2.3.3. Return on Investment.* A key measure of performance used today relates profit to capital invested, and Johnson (1984, p. 13) associates its use with the twentieth-century development of vertically integrated and multidivisional organisations on the grounds that it provided a more effective means of allocating resources than the capital market. However, the calculation of ROI did not await the emergence of the modern business enterprise. The relationship between profit and capital investment was made by Hamilton as early as 1777, and Mephram may well be right to claim that ‘Hamilton was the only eighteenth-century writer of an English-language accounting text to discuss the topic’ (Mephram, 1988a, p. 63). An early application of such notions which may well have not been widely practised occurred when Robert Morris estimated that

Profit from May 1727 when Partnership [Lockwood, Morris & Co., copper makers] was formed to Michaelmas 1728 was about £2,900, which upon a capital of £10,000 was 23% per annum granting the time to be one year and a quarter. (Jones, 1985, p. 20)

One hundred years later we find Richard Cort commenting that for 1826 the British Iron Company’s reported profit of £11,000 was ‘about 4% on £267,616 total amount of real capital employed’ (Jones, 1985, p. 186), and this outcome is contrasted unfavourably with the company’s prospectus which forecasts a return of 20% (Jones, 1985, p. 216). In the coal industry, an 1843 report on the Ashington Coal Company demonstrated that a ‘bottom line profit of £2,302’ represented a  $17\frac{1}{4}\%$  return on capital (Fleischman & Parker, 1997, p. 139).

*5.2.3.4. Summary.* According to the modern management control theorists Emmanuel & Otley:

A vital part of the control process, and one with which accounting is particularly concerned, is the measurement of actual performance so that it may be

compared with what is desired, expected or hoped for. (Emmanuel & Otley, 1985, p. 25)

The evidence presented in this sub-section has demonstrated the timelessness of this assertion.

## 6. C/MA Practice c.1870–c.1970

In this section we survey, in three stages, developments in C/MA practices in Britain during the one hundred years or so following the onset of Solomons’ so-called ‘costing renaissance’. First, we examine pre-World War I developments, followed by an assessment of the impact of World War I on costing practice. Finally, we examine developments in C/MA practice from the 1920s through to c.1970, focusing on the same key areas as in the literature section of this chapter.

### 6.1. Pre-World War I Developments

#### 6.1.1. Assessments from the Literature

In the previous sub-section, we saw that cost and profit calculations made for the purposes of planning, decision making and control were already being widely used in certain companies long before 1870. Nevertheless, writers in the early decades of the twentieth century were either entirely unaware of pre-1870 costing developments or, with a little (but not much) more justification, believed that the development of costing *systems* was a relatively modern phenomenon. Thistlethwaite (1928, p. 149) suggested that cost accountancy was no more than 30 to 40 years old, whereas J.M. Fells noted that ‘The need for costing has always been recognised, and there have been many systems practised’ (Fells, 1919a, p. 550; see also Annan, 1930, p. 183). Significantly, Fells acknowledged the fact that the ‘costing function’ had ‘preceded the structure of any cost accountancy systems’ (Fells, 1919a, p. 548). Massey was of the view that, within the last generation, costing

has developed more on the lines of an exact science, certain broad principles having come to be recognised as standard and which form a basis on which to build up the individual system. (Massey, 1919, p. 12; see also, *Accountant* September 1910, p. 395)

Contemporary writers of the late nineteenth and early twentieth centuries, however, noted developments in certain key industries of the first (1760–1850) and second (1871–1914) industrial revolutions, such as coal mining, iron and steel manufacture, chemicals and engineering. Plumpton (1892a, p. 268) commented that ‘no firm of engineers would seek to carry on their business without some description of costs, for it is the backbone of their business’. Speaking in Manchester, Plumpton, having noted that he had

recently helped to install a ‘thorough system of departmental costs in a large steel works not many miles from here’, went on to add that collieries ‘keep elaborate Cost Accounts of their workings’ (both quotes Plumpton, 1892a, pp. 268), and that costs were also kept by builders and in many manufacturing trades. F.G. Burton, ASAA, believed that it was

in the more complex trades, such as large chemical manufactories and mechanical or civil engineering works, that we shall find the greatest use for Cost Accounts, and seek for guidance in constructing them. (Burton, 1901, p. 115; see also *Incorporated Accountants’ Journal* December 1901, p. 54; 1910, p. 395)

Other commentators, however, were less convinced of progress in manufacturing; the leader writers of the *Incorporated Accountants’ Journal* suggesting that

The keeping of proper cost accounts ... is generally looked upon by the manufacturer himself more as a luxury than a necessity, and only in a very few industries has it come to be a recognised element in the counting-house system. (*Incorporated Accountants’ Journal*, March 1901, p. 101)

W. Strachan, FSAA, was similarly downbeat:

[Manufacturers] usually have their own methods of costing - mental or otherwise - which are very imperfect; in fact, I should think that in the majority of cases where rough and ready calculations are applied, establishment expenses are left out of account altogether, and as these are often heavy, the results arrived at must necessarily be very inaccurate and misleading. (Showell, 1901, p. 64; see also Hamilton, 1910, p. 202)

Other writers focused on the failure of the small manufacturer to operate an ‘efficient costing system’:

Ask the *small* manufacturer why he does not keep proper Cost Accounts, and he will generally tell you that profits are so small that he cannot afford the expense. (Jenkinson, 1907, p. 316; see also Britten, 1912, p. 449)

Consistent with this, Jenkinson tells us that the cost accounts of smaller colliery companies could be highly variable in their quality:

in some cases the Cost Sheets are badly designed, and the results obtained unreliable [but] ... in large collieries there are exceedingly good costing systems in operation, and a valuable fund of statistical information is collected and used by the management for control purposes. (Jenkinson, 1919, p. 81)

The above range of views creates an image consistent with the notion that costing had long been carried out

in Britain, but that costing *systems* were a relatively recent phenomena. Furthermore, there is a strong suggestion that, before World War I, use of costing systems was limited to certain major sectors of the economy, e.g. coal, iron and steel, chemicals and engineering, where large- and medium-sized firms were more likely to have adopted cost calculation practices than small firms; views which are largely, but not entirely, supported by archival research.

### 6.1.2. Findings from Archival Research

In many firms, systems which had been introduced before 1870 continued to be used, albeit with changes made in an evolutionary fashion. Amongst integrated iron, steel and coal companies, Boyns & Edwards (1997b) have shown the continuing existence over long time periods up to 1900 of costing systems which were fully integrated with the financial accounting systems; the cost accounts usually being drawn up half-yearly, though some firms prepared cost sheets more regularly (e.g. monthly). Boyns (1993) further reveals that, amongst South Wales collieries for which evidence has survived prior to 1914, the central feature of their costing systems, namely the cost sheet or cost book, largely reflected the content of the contemporary cost accounting literature. Costs (including overheads) were reported monthly or fortnightly for each colliery using a large number of detailed cost categories, both for underground and above ground costs. The lack of surviving financial accounts makes it difficult to determine whether unified financial/costing systems were in operation, though there is evidence that this was the case for the Nostell Colliery (West Yorkshire Archive Service, Leeds, NC). Boyns (1993) and Boyns & Wale (1996) have argued that such cost sheets were originally used in the coal industry for purposes of cost finding and the control of waste and inefficiency, but from the 1880s onwards they increasingly came to be used as a key element in management decision making.

Turning to the engineering sector, Fleming et al.’s (2000) study of shipbuilding, engineering and metals firms, operating in the west of Scotland between 1900 and 1960, has revealed that estimates were at the heart of the cost calculation practices employed. These provided the basis for pricing individualised work and, in the larger works (though not the smaller ones where firms made do with ‘an annual profit and loss account and detailed knowledge of each job’), comparisons were made between actual costs and estimates (Fleming et al., 2000, p. 205). Ongoing research (Boyns, 2005c) focusing on the nature of cost calculation/estimation procedures utilised by a

number of engineering firms engaged in contract work, in parts of Britain not covered by Fleming et al. (2000), reveals a similar result, with firms around the time of World War I using 'full' cost for the purposes of estimating future cost and recording actual cost.<sup>33</sup> For most companies, there is also evidence of comparisons being made between actual and estimated costs, and the former also with the selling price to give an indication of profit or loss for each job.

Table 3 reveals that a wide range of firms in the engineering and chemical industries were carrying out regular cost calculations from an early stage; indeed, several as far back as the middle of the nineteenth century. Picking out one company for further comment: the Old Castle Iron & Tinplate Co. Ltd. was drawing up regular cost statements or analyses from at least the early 1870s. By the 1880s, and through to 1928, the company produced half-yearly statements of manufacturing costs for each product. And although the relevant cost sheets do not survive, the directors meeting minute books suggest that monthly costs were being kept by 1870 (Swansea Archives, Old Castle B16, board minute for 5 February 1870; see also C17 and C38–C41).

The evidence presented in Table 3 also indicates that overheads were often included in cost summaries, especially where these summaries were for the company as a whole: Old Castle, Nalder & Nalder, Horseley Bridge, F.H. Lloyd, Hingleys, Birmingham Small Arms (BSA), Hans Renold, British Xylonite, Winfields and Baird's. Where only works cost figures have survived, it seems clear that these may have included some but not all overhead costs. For example, at United Alkali, general charges and a share of district office expenses were included for each works, but not a share of head office expenses. Due to the varied use of terminology, it is often difficult to be categorical about whether computed costs represented full costs; some companies used the same phrase, though possibly in different ways, whereas others adopted firm-specific terminology. Thus, it is not always clear what is meant by terms such as 'general charges' and 'outside charges' used at Winfields.

The archives clearly reveal that cost information was being widely used for price estimation purposes at engineering companies, and that the basis for such exercises was similar, namely the inclusion of a percentage addition to labour costs, or occasionally to labour and material combined, to cover overheads.

There is also evidence to show that these percentage additions were monitored, especially at some of the agricultural engineering companies examined, with revisions made following the discovery of under- or over-recovery. Such monitoring became more intense in the years leading up to World War I.

Other evidence of continuous, evolutionary change in cost calculation practices is provided by minutes of board meetings and various memoranda contained in the archives. Thus, the records of Hans Renold reveal that c.1901 the company brought in A.H. Church to install a new cost system, a fundamental feature of which was the introduction of Church's method of overhead allocation based on scientific machine rates (Boyns, 2003). The new system underwent a number of modifications even before the outbreak of World War I. At F.H. Lloyd's in 1904, the managing director John Hemming reported that there was a need for 'more accurate costs' in the foundry. Keenly aware of the costs and benefits of innovation, he expressed the hope that the relatively modest changes being implemented would not increase staffing requirements; more detailed costings, he declared, would require

immense labour, involving considerable expense, and might even then be no more accurate than the system we have adopted. (Sandwell Community History and Archive Service, 8807/6, fos. 327–328)

Given that cost calculation practices usually involved some element of estimation, reconciliation with the financial accounts was naturally an issue, as at, for example, Hans Renold, where the company's 'expense rates' (their term for Church's scientific machine rates) increasingly tended to throw up costs which did not correspond to actual expenses (Boyns, 2003).

### 6.1.3. Summary

Loft (1995, p. 118) has claimed that, in the early twentieth century, 'the combination of traditional family firms and strong unions [in the UK] did little to encourage interest in cost accounting systems in practice'. Further, that, as a result of the influence of the Ministry of Munitions during World War I, 'cost accounting was brought to the attention of manufacturers, and many either installed a system or improved their existing one' (Loft, 1995, p. 125). In contrast, the contemporary literature and the practices revealed by more recent research provide clear evidence of a positive, ongoing development of costing prior to World War I, especially amongst British firms engaged in key sectors such as iron and steel, coal, engineering and chemicals. Although cost calculation practices varied between firms, even within

<sup>33</sup>While Thomas Hudson & Co. Ltd. included overheads as a percentage on labour costs, other firms applied figures, the basis for which is unclear.

Table 3. Cost summaries/statements/sheets.

Company name	Sector	Year(s)	Comments	Archival reference
<i>Engineering companies</i>				
Horseley Bridge Engineering Co. Ltd.	Bridge maker and engineering company	1908–1919	Reconciliation of prime cost accounts and profit & loss account.	Staffordshire Record Office, 1288/B/3/6 Staffordshire Record Office, 1288/B/3/12
F.H. Lloyd & Co. Ltd.	Iron and steel castings	1896–1904	Annual comparison of costs includes overheads	Sandwell Community History and Archive Service, 8707/6
Andrew Barclay Sons & Co. Ltd	Locomotive manufacturers	1905 1902–1908	New system of costs introduced Annual comparison of 'total costs per ton of iron castings' – labour and materials only	Glasgow Archives and Business Records Centre, GD329/4/1/9
N. Hingley & Sons Ltd.	Anchor & chain manufacturer	1911	Discussion with auditors re allocation of head office and general charges between works	Dudley Public Libraries, 8264 Pt. 1/2
		1913–1918	Four-weekly cost sheets and six monthly cost summaries of works cost and total cost (= works cost + general charges + depreciation; last two estimated in 1913, actual figures from second half of 1915)	Dudley Public Libraries, 8264 Pt. 1/6
Nalder & Nalder Ltd.	Agriculture machinery manufacturer	1870	From 1870, monthly costs for works as a whole are determined	Rural History Centre, TR NAL 334
		1900	Costs of each foundry 'cast' (labour + materials + % on labour for 'unclassified')	Rural History Centre, TR NAL 382
		1907–1913	By 1913, monitoring 'unclassified expenses' as % of productive labour to set percentage for future periods	Rural History Centre, TR NAL 360
		1911–1952	Analysis book contains breakdown of weekly cost for company into 'productive', 'non-productive', 'plant & patterns' and 'unclassified'	Rural History Centre, TR NAL 360
R. Hunt & Co.	Agriculture machinery manufacturer	1900–1908	Foundry casting book includes average cost per ton on a quarterly basis	Rural History Centre, TR HUNT 305
Wantage Engineering Ltd.	Agriculture and mining machinery manufacturer	1900–1901	Departmental cost summaries include charge for interest on 'land and buildings value' and depreciation	Rural History Centre, TR WAN AC5/1

Table 3. (Continued)

Company name	Sector	Year(s)	Comments	Archival reference
Ransomes & Sims (Ransomes, Sims & Jefferies Ltd. from 1884)	Agriculture machinery manufacturer	1856	System of integrated cost and financial accounts implemented; still being used in early 1920s	Rural History Centre, TR RAN AC5/6 & AD3/11
Beyer, Peacock & Co. Ltd.	Locomotive manufacturer	1881–1990	Annual costs per ton of forge work, iron castings and brass castings; figures include ‘general expenses’	Manchester Museum of Science and Industry, M0001/628
BSA Ltd.	Cycle department	1908–1909	Monthly and annual cost sheets include overheads	Modern Records Centre, MSS19A/2/40/2
Hans Renold Ltd.	Chain manufacturer	c. 1901	A.H. Church installs a cost system based on his method of allocating overheads by means of scientific machine rates	Manchester Central Library M501 657.471 HR913/9
<i>Chemical companies</i>				
British Xylonite Co. Ltd.	Celluloid/plastics	1882	‘Standard cost price’ used from c. 1882. Actual cost data collected monthly, figures include overheads, and kept in same manner from 1888 to 1932	Suffolk Record Office, HC410/D1/2
Albright & Wilson Ltd.	Phosphorous manufacturer	1898–1921	Annual product costs including fixed costs (depreciation included by 1921)	Birmingham Central Library, A&W Box 51
		1903	Quarterly costs = works costs + fixed costs + depreciation	Birmingham Central Library, A&W Box 7
Chance & Hunt Ltd.	Alkali manufacturer	1917	Full costing (including depreciation) of each process on a weekly basis has been in use ‘for years’	Chester Record Office, DIC BM 20/179
Brunner Mond & Co. Ltd.	Alkali manufacturer	1893	Monthly cost sheet for alkali includes overheads	Chester Record Office, DIC BM 4623/14
		1902	Monthly cost sheets for each product include ‘Salaries’ and ‘General charges’	Chester Record Office, DIC BM 4/2
United Alkali Co. Ltd.	Alkali manufacturer	1891	Monthly works cost accounts for each product at each works include share of general charges and district office expenses, but not head office expenses	Chester Record Office, DIC UA 6/6/1
Castner-Kellner Alkali Co.	Alkali manufacturer	1902	Total cost = works cost + head office charges + debenture interest (4-weekly figures)	Chester Record Office, DIC BM 20/52/1
<i>Other companies</i>				
Winfields Rolling Mills	Wire and tube manufacturer	1899–1914	Annual cost analysis for each department	Birmingham Central Library, MS332/45B

Old Castle Iron & Tinsplate Co. Ltd.	Tinsplate manufacturer	1867	Annual, half-yearly and quarterly statements of manufacturing costs (including overheads) for company as a whole	Swansea Archives, Old Castle C38, C39
		1883–1928	Half-yearly statement of manufacturing costs for each product (includes ‘trade expenses’)	Swansea Archives, Old Castle C38, C40, C41
		1907	Fortnightly cost figures for company (includes ‘office and trade expenses’)	Swansea Archives, Old Castle C17
Yorkshire Imperial Metal	Zinc and spelter manufacturer	1878	Monthly and quarterly cost figures for different products (includes ‘outside charges’)	Swansea Archives, YIM H13
Wm. Baird & Sons Ltd.	Gartsherrie Iron Works	1891–1914	Monthly and half-yearly ‘general abstracts’ showing costs including overheads	Glasgow Archives and Business Records Centre, UGD164/1/2/1-14



the same sector, it is perhaps worth noting that the firms listed in Table 3 varied right across the size spectrum. Costing developments were certainly not confined to large businesses.

## 6.2. World War I and its Consequences

### 6.2.1. Conflicting Assessments from the Literature

Sir John Mann informed the Committee on Public Accounts (1917) that the records of many manufacturers were in a deplorable state. Those of many large firms, he considered, 'were absolutely antiquated' and there were no standardised procedures for bookkeeping, for financial accounting, or for production methods (quoted in Marriner, 1980, p. 136). If this was so, it is easy to understand why some contemporaries, as reported by Loft (1990, pp. 15–16), might claim that the intervention of individuals trained in up-to-date cost calculation practices, under the auspices of the Ministry of Munitions, had an important impact. Indeed, officials claimed that, as a result of the Ministry's intervention,

large areas of British industry were introduced to best-practice cost accounting formerly restricted to small numbers of firms. (Marriner, 1980, p. 137)

This view was also expressed shortly after the war by the leader writers of the *Incorporated Accountants' Journal*:

The recourse to cost investigations by Government departments and the results which have followed have been nothing less than a revelation to traders and manufacturers, many of whom have hitherto regarded cost accounts as an expensive luxury. When they were told that a costing system would show them where economies could be effected they were somewhat incredulous, but when professional accountants were deputed by the Government departments to investigate their accounts, and as a consequence the cost prices put forward by them were shown to be inaccurate, they began to realise that costing was more valuable than they had imagined – so much so that many of the investigating accountants employed by the Government have since found remunerative employment with the very firms whose accounts they examined. (*Incorporated Accountants' Journal*, 1919, p. 104)

Elliot (1921, p. 467) see also Pulford, 1927, pp. 403–404) commented that, as a result of the wartime cost investigations conducted by the Ministry of Munitions, 'Costing, although just as important before the war as during it and after it, has come into its own'. A specific instance of a raising of standards was provided by Sir Lynden Macassey who had originally worked in a marine engineering shop and, having revisited it recently, could not fail but to note

how the work [in that shop] was re-organised after the adoption of a system of cost accounting by the Government ... [and] All kinds of improved methods and revised organisations had naturally followed. (Fells, 1922, p. 124)

Although Moran (1936, p. 305) agrees that the war had given many businesspersons the first glimpse of costing as a means of controlling production, by no means everyone shared this view. *The Accountant* (July 1919), for example, contained the following observation:

In retrospect, after the war it was felt that costing investigations were not so effective as they could have been, one of the problems being the lack of training of those carrying them out. (quoted in Loft, 1986, p. 147)

Corresponding comments abound in the first edition of the *Cost Accountant* (1921). Reporting on a meeting of the Central Committee under the Profiteering Acts, it noted that

the results of the various late government 'Costings Departments' have not been anything like a brilliant success and have undoubtedly been the cause of creating an unfavourable impression with most manufacturers as to the real necessity of an efficient costing system. (*Cost Accountant*, 1921, p. 2)

The industrialist Sir Herbert Austin remarked that everybody had complained about it: 'the cost keeping of the Government, particularly during the War, was very very bad' (*Cost Accountant*, 1921, p. 22). Edward Brown, FCIS recounted

some rather amusing experiences during the War with Government inspectors who came to the Midlands to 'spread the light' as they put it, and bewailed the backward condition of the art of costing [in the heavy iron and steel trades]; but it was interesting to find that when it came to 'brass tacks' none of them were able to offer any practical alternative to existing methods, while some of them knew so little of the practical working of the industry as to give up any attempt to make a real check of the figures submitted. (Brown, 1921–1922, p. 250)

### 6.2.2. Findings from Archival Research

A contemporary article published in the *Journal of the Society of Chemical Industry* (Curtis, 1921, p. 175r) makes much play of advances in costing brought about during World War I at the National Chemical Factories, especially in the development of process costing and the provision of comparative data. The available archival evidence is inconsistent with these claims, however, revealing that such practices previously existed in a number of chemical firms,

including Brunner, Mond & Co. Ltd., United Alkali Co. Ltd., Albright & Wilson Ltd. and British Xylonite Co. Ltd. (Boyns et al., 2004). Indeed, within some quarters of the chemical industry there was dissatisfaction with the impact of government intervention. C.F. Chance, in a series of lectures to the staff of Chance & Hunt and those at HM Factory, Oldbury, in 1917 (Chester Record Office, DIC BM 20/179, Lecture 3, fos. 2–3), expressed strong criticism of the costing methods used by the Ministry of Munitions in relation to the National Chemical Factories. He was particularly concerned that they ignored depreciation; a practice which had been employed in his firm and several other chemical companies for some time (Boyns et al., 2004).

Broader-based archival research is consistent with the idea that the war may have had little impact on companies that had costing systems in place before 1914. Table 3 provides little support for the view that World War I had much effect on, for example, either the cost estimating procedures used or the nature of cost statements produced. Indeed, in many cases, the nature of the estimating procedures, as well as the format of the cost statements, appears to be identical over long runs of years spanning either side of the war.

This is not to suggest that the war had anything other than a profound effect on the development of the cost accounting profession, as revealed by Loft (1986, 1991), or that no changes in costing systems occurred at any of the companies examined. One of the most notable set of developments, although possibly atypical, occurred at Hans Renold Ltd. where the company began to experiment with the use of budgets to operate its expense rate system c.1914–1915, developed the use of standard costing in the company's shell department in 1918 and gradually evolved a fully fledged system of standard costing and budgetary control between c.1918 and the mid-1920s (Boyns, 2003; Boyns et al., 2000). However, there is no evidence to suggest that war-time controls led *directly* to any of these changes, though the needs of war provided the opportunity to experiment with new ideas of cost calculation in one small part of the business, the shell department. Indeed, the origins of these changes can be traced back to a desire to overcome problems recognised before the outbreak of hostilities (Boyns, 2003). After the war, Hans Renold Ltd. also 'injected accounting numbers and principles into the heart of its industrial relations programme' (Bougen, 1989, p. 61), using them to underpin management's attempt to operate, unsuccessfully as it turned out, a profit-sharing scheme between 1921 and 1930.

At other companies like British Xylonite and Ransomes, postwar comments by individuals intimately connected with the cost calculation processes stress the continuity of costing systems, stretching way back into the nineteenth century, rather than any discontinuities created by the war. Thus, in 1936, following the recent introduction of a 'modern cost accounting system', together with his co-author, British Xylonite's cost accountant J.B. Rule could write (1936):

It is pleasing to reflect that our present cost-accounting system, with all its analytical and calculating machinery, is the spiritual child of that system started by the late Mr L.P. Merriam in 1879. (Rule & Bennett, 1936, p. 6)

Similarly, at Ransomes, J.B. Reeve considered it 'an interesting fact that the [double entry] methods designed [by R.C. Ransome] nearly seventy years ago are practically those which are in use to-day' (Reading Rural History Centre, TR RAN AD 3/11, fos. 102–103). Reeve reveals that such continuity did not rule out change:

Naturally, as the years brought new developments in the business, it became necessary to make adaptations. A very complete method of arriving at expenditure of plant and fixtures has grown up, for instance, as also new methods for fixing percentages of this expenditure on wages for use in drawing up costs. Also a more elaborate system of detailing trade expenses or indoor expenditure has been derived, so that a more accurate percentage on wages can be arrived at for use in making costs. (Reading Rural History Centre, TR RAN AD 3/11, fos. 102–103)

In other key sectors of the economy, such as coal and iron and steel, there is also little evidence of major discontinuities occurring in cost calculation practice. Boyns & Wale (1996) have shown that, as firms in the coal industry became larger and their organisational structures more complex, their management information systems, based around cost information, likewise became more detailed. Nevertheless, the basic structure of the cost calculation practices remained largely the same, as it did in many iron and steel companies (Edwards et al., 2002).

Where changes were imposed by wartime legislation, they were not necessarily seen to be improvements. At the integrated coal, iron and steel manufacturer, Bolckow, Vaughan & Co. Ltd., the chairman Sir J.E. Johnson-Ferguson informed the 1916 AGM that he was unhappy with the changes forced on the company as a result of war control. In particular, he complained of the 'arbitrary line' that had been drawn through the middle of the company's accounts as a result of the iron and steel part of the company's business being

controlled (Report of the Proceedings of the Ordinary General Meeting, 1916, p. 9). In 1917, he noted further disruption resulting from changes to the rules wrought by the Finance Act, 1917, which came into effect on 1 January 1917, and the taking under government control of the company's collieries (Report of the Proceedings of the Ordinary General Meeting, 1917, pp. 18–19). The most significant problems seem to have been faced by integrated concerns, i.e. those whose collieries were run mainly, if not entirely, for the purpose of supplying their iron and steel furnaces with fuel. These companies were required to make transfers of coal to their iron works at market (or controlled) prices rather than, as had been the practice before the war, at cost. Thus at the Consett Iron Co. Ltd., a 1916 board minute informs us that 'for submission to the Munitions Department, the Accounts of the Iron & Steel departments should be made up for the Standard period and afterwards on a Market price of Materials basis, and not as now on a Prime Cost basis' (Consett Iron Co. Ltd., Board minute book, vol. 16, min. 60). Surviving departmental profit and loss accounts are drawn up for the year ending 30 June 1917 on two different bases, one using market prices and the other using costs (Consett Iron Co. Ltd., D/Co 90). Parallel changes were made throughout the company's costing records at this time, suggesting that, while conforming to government accounting requirements, cost-based transfers were preferred for internal management purposes.<sup>34</sup>

Archival studies to date have focused their attention on companies which already had costing systems in place by 1914, and it remains to be shown whether the Ministry of Munitions had any lasting impact on costing in those companies which did not have systems in place at that date. Some commentators, both contemporary and more recent, have thrown doubt on the longevity of any wartime impact. Fells, for example, commenting on the view that the costing methods imposed during the war were less than ideal, further complained that they were 'rather based more on estimates than actual facts' (Elliot, 1921, p. 470). For Gill, the problem was that the cost systems had been imposed on certain industries from 'outside', and hence were 'not altogether a natural and, therefore, a sound growth' (Gill, 1923, p. 331).

Where improvements were thought to have occurred, some attributed it to the disturbed environment created

by the war rather than the activities of the Ministry of Munitions:

The rise and fall of prices and of outputs, the changing methods of production, and the alterations in the character of the goods produced, all prove that some system [of costing] is needed which will enable a manufacturer to obtain a knowledge of his costs daily, quickly, and accurately. (Hazell, 1921, p. 21; see also Lord Leverhulme, p. 5)

The precise extent to which costing systems, of whatever nature, had been introduced by the 1920s is far from clear. A 'Comment' in the *Cost Accountant*, in the early 1920s, claimed that most large companies had costing systems, though there was a lot of ground still to be made up by medium-sized firms (*Cost Accountant*, 1921–1922, p. 177; see also Burton, 1922, p. 265). The relatively small number of large firms in Britain, however, may explain Cathles' (1920, p. 256) conviction that possibly less than 5% of manufacturers had installed proper costing systems, whereas Boyd (1919, p. 40) considered 'efficient' costing systems to be 'very, very rare'. Commenting specifically on costing in small businesses in the metal industries, Blyth (1923, p. 121) notes that

The majority of works had in operation some form of costing, but with few exceptions costing had not been developed beyond the stage of arriving at some approximation to cost and would be concerned with the average cost of the unit of output of a variety of product - differing either in type or in size of the same type. (Blyth, 1923, p. 121)

As late as 1927, Sampson considered that cost systems in many firms were still crude (Sampson, 1927, p. 964), whereas the (Balfour) Committee on Industry and Trade (1929, p. 225) noted the 'lack of consistent and scientific practice amongst many firms in respect of costing accounts'.

Interviews conducted by Loft (1990) with several of the early members of the ICWA lend support to the conclusions of the Balfour Committee. Samuel Seymour reported that textile costing was often primitive and that there was little progress until after World War II (Loft, 1990, p. 140). 'Primitive' was also the term used by John Molyneux to describe the system employed at the Longford Wire Company in Warrington which he joined in 1931 (Loft, 1990, p. 138). At other firms, however, things were a little more advanced. Thus at Harland & Wolff's offices in North Woolwich, London, Frank Atkinson, who had worked there as a clerk in the 1920s, observed that they added overheads as a fixed percentage, but 'Nobody knew whether it was right or wrong' and, moreover, 'nobody appeared to be interested' (both

<sup>34</sup>Dissatisfaction with the effect on costing practices of interventions by the Ministry of Munitions also surfaces in the internal records of Hans Renold Ltd. (Manchester Central Library, M501 650.0522 HR910/7, Head Office Meeting, 28 March 1916).

quotes in Loft, 1990, p. 120). Similar critical assessments of overhead recovery methods were provided by accountants working at the Richmond Gas Stove & Meter Company (1918) and the Vulcan Motor & Engineering Co. Ltd. in the 1920s (Loft, 1990, pp. 136, 143).

Later observers, including de Paula (1948, p. 141) and Stacey (1954, pp. 123–124), have also queried whether there was any real progress during the 1920s, whereas Solomons (1952, p. 36) suggested that any development in costing in Britain during the first half of the twentieth century was slow and patchy.

### 6.2.3. Summary

In 1922, H.G. Jenkins, finance director of Hans Renold Ltd. and council member of the ICWA, utilised the phrase ‘coming into the light’ to highlight developments in the growth of the cost accountancy profession which had supposedly come about as a result of World War I. This phrase, immortalised by Loft (1990) in the title of her book on the early history of the ICWA, can be seen as part of the rhetoric/discourse used by members of the executive committee of that organisation surrounding the attempt to establish cost accountancy as a professional activity (Parker & Boyns, 2004). Although Loft (1986, 1990, 1995) has suggested, and others have often reiterated (see, e.g. Dugdale & Jones, 2003, p. 309; Fleischman, 1996, p. 132), that cost calculation practices also changed markedly during World War I, the overwhelming evidence from major sectors of British industry, such as coal, iron, steel, engineering and chemicals, is that little change in cost calculation practices occurred between the pre- and post-war eras. The archival evidence, therefore, supports the assessment made by the business historian Sheila Marriner (1980) that the war and the Ministry of Munitions had no major or widespread influence on costing systems in the private sector.

### 6.3. Costing Developments 1920s–c.1970

The period between the 1920s and c.1970 saw a number of significant C/MA developments, many of which were linked to the concept of scientific management and the associated attempt to develop a scientific approach to costing and management control. In this section, we will, in turn, focus (as within section 3.6) on four areas: uniform costing systems, budgeting, standard costing and marginal costing. In surveying the developments post-1920, we will also point to evidence, where it exists, of the use of such techniques prior to 1920. It should also be noted that, during the 1920s in particular, there was a lack of clarity in costing terminology, with many references

to standard or standardised costing actually meaning uniform costing.

#### 6.3.1. Uniform Costing Systems

Amongst large individual businesses operating more than one plant, there is evidence of a growing concern with the standardisation of costing systems from the 1890s. An early example occurred at the United Alkali Co. Ltd., formed from a merger between 40 companies in late 1890 (Kudo, 1980, p. 80). From the outset, the company attempted to impose a standardised system of cost accounts on its numerous works. Eight years later, the South Durham Steel and Iron Co. Ltd. engaged the accountants W.B. Peat & Co. to advise on a scheme of uniform cost accounts to be applied to each of its works (Matthews et al., 1998, p. 115). It was also in the 1890s that a scheme encompassing a number of different companies in the same trade was ‘first tried out’ in Britain. Solomons (1952, p. 18, 51) refers to the activities of the Birmingham iron bedstead trade in the 1890s under the tutelage of E.J. Smith, ‘a pioneer of uniform costing in Great Britain’. Writing at the time Smith was plying his trade, W.A. Addinsell, in an address to the Birmingham Chartered Accountant Students’ Society, regaled his audience with tales of Smith’s exploits. Described as ‘the inventor of the plan’, Smith is credited with having proved able ‘to persuade manufacturers of all sorts and sizes to sit together at one table and confide their dearly loved secrets to each other’ (Addinsell, 1899, pp. 577–578).

The British Federation of Master Printers, formed 1901, is renowned for initiatives in this area, culminating in the publication of the 1913 costing manual entitled *The Printers’ Cost Finding System*. In the absence of a formal cartel, Mitchell and Walker have shown that uniform cost accounting was advocated by the larger printing firms in order to increase an awareness of total costs of production, particularly by the many small workshops, and thereby better inform price setting and drive out ‘intense’ and ‘cut-throat competition’ (Mitchell & Walker, 1997, pp. 76, 97–98). Such problems were rife in many sectors of industry during the interwar depression, but the spread of uniform costing in Britain was never as widespread as in the US (Chatfield, 1977; Lazarus, 1922; Solomons, 1952). It is not totally clear how many British trade associations adopted uniform costing schemes but, during World War II, Robson (1943, p. 8) suggested that at least 18 had introduced schemes, whereas a year later Dunkerley (1944, p. 54) suggested that around 20 had ‘established or taken steps to establish, uniform systems of cost accounting’. Solomons (1950) estimated that, following the

British Federation of Master Printers' lead, some 26 further schemes had been introduced by the time of writing. Evidence from other sources suggests that Solomons' figure is too low. A more recent estimate which combines the evidence of contemporary sources with that of Solomons' suggests that at least 39 schemes were established between 1913 and 1950 (Boyns, 1998b).

Archival research has drawn attention to the complex issues that promoters of such schemes strove to overcome. On the basis of their detailed study of the British Federation of Master Printers' initiative, Walker & Mitchell (1996) conclude that only limited success was achieved due to the persistence of traditional attitudes amongst printers, the effects of World War I and adverse macro-economic conditions during the interwar period. The difficulty of establishing a uniform costing scheme in the iron and steel industry has been examined by Edwards et al. (2003). Problems stemmed, firstly, from the technical frailty of what was being attempted and the unwillingness of companies to abandon long-established accounting procedures and, secondly, from the reluctance of companies to supply neutral accounting numbers to help government reach decisions (especially in relation to pricing and import tariffs) that could affect their economic value.

Within the iron and steel industry, the introduction of a system of uniform costing was first given consideration immediately following formation of the National Federation of Iron and Steel Manufacturers in 1918, but it was not until 1935 that, what was now called the British Iron and Steel Federation, published a scheme entitled *The Iron and Steel Industry: Uniform Cost System*. The system was based on total or absorption costs; an approach which had a history of use within the iron and steel industry going back at least two centuries. Updated versions were published in 1958 and 1967 and, despite their limitations,

appear to have gone some way towards improving uniformity in accounting practice between steel companies, but it was a very gradual process which ... had by no means reached fruition even by the date of renationalization in 1967. (Edwards et al., 2003, p. 44)

Perhaps the widespread nature of the difficulties to be overcome, coupled with the individualistic approach of British managers, helps to explain why there is no evidence of any significant attempt to introduce a uniform costing system across the British coal industry prior to nationalisation, despite the recommendations of Jenkinson (1919), Bryce (1923) and Phillips (1928). Certain coal companies like the

Powell Duffryn Steam Coal Co. Ltd. standardised the cost sheets of the collieries of companies it acquired during the early decades of the twentieth century, imposing the format that it had developed for its own pits over the previous 50 years (Boyns, 1993). However, it was only under the auspices of the National Coal Board (NCB) that wider attention was given to the adoption of uniform costing across the industry; significant progress being made immediately following nationalisation on 1 January 1947. From the outset, the NCB began to provide detailed monthly profit and loss accounts and weekly wage costs for every colliery. However, the claim that, by the end of 1947, 'uniformity of wages and stores systems had been obtained in Many Areas' (NCB Annual Report 1947, p. 98) was judged by the Fleck Committee (NCB, ACR 1955) to exaggerate the progress actually made.

Some companies in other industrial sectors adopted uniform costing systems, despite the apparent absence of any interest from their trade association. Thus, when the Dunlop Rubber Company acquired the Mackintosh group of companies in 1926, all the costing and accounting systems were converted to conform to the 'Dunlop method' (interview with Thomas Badgery, Loft, 1990, p. 124). Likewise, when the Richmond Gas Stove & Meter Company merged with four other companies in the early 1920s, standardisation took place (interview with John Molyneux, Loft, 1990, p. 137).

Uniform accounts can, of course, be used for the purpose of state planning purposes, as occurred extensively in Germany in the late 1930s. Although at a more modest level, a significant upturn in peacetime state intervention occurred in Britain in the 1920s (Tolliday, 1987, pp. 285–293; Wilson, 1995, p. 168). Although sectors such as coal, shipbuilding, agriculture, railways, electricity and fishing were subjected to some system of national, if not government, control (Morris 1935, pp. 40–41), the only sector in which costing was directly affected by state planning appears to have been the electricity supply industry. Under the Second Schedule of the Electricity (Supply) Act 1926, rules were enumerated for determining cost of production. According to a number of observers, undertakings running the generating stations that were selected to feed the planned national electricity grid had remodelled their accounts to facilitate the preparation of the monthly cost statement in the required form by the early 1930s (Wheldon, 1952, Chapter XXIII; interview with Nicholas Bolan, Loft, 1990, p. 127).

The possibility of the government also *influencing* the adoption of uniform costing procedures was not

confined to the iron and steel industry noted above. The successful application of uniform costing at the Royal Ordnance factories between the wars may have been partly due to their close connection with government. There, a key role was played by Reginald Townsend, a chartered accountant who, by 1923, had become 'Advisor on Costs to the Director-General of Factories' at the War Office Royal Ordnance Factories and, by 1930, Director of Ordnance Factories at the War Office (Loft, 1990, p. 82). Even where there was government involvement, however, the advantages claimed for uniform costing schemes did not necessarily materialise. An example concerns the establishment of the Shadow Factory Accountancy Committee in 1936, whose purpose was to introduce uniform accounting into the shadow aircraft factories then being built, including those of the Standard Motor Co. Ltd. and Rover Co. Ltd. According to H.H. Norcross, 'it was found to be extremely difficult to know whether one was comparing like with like when their accounts were examined' (Most, 1961, p. 38).

The precise impact of World War II on the adoption of uniform costing schemes is unclear but, by encouraging greater cooperation amongst businesspersons, and through the utilisation of cost-plus pricing for government contracts, it may have provided an impetus in this direction. As already noted, the nationalisation of several industrial sectors immediately after World War II clearly had a positive impact on some, but not all, of them. Another factor affecting the adoption of uniform costing schemes came from the passing of the Industrial Organisation and Development Act (1947). This provided for the establishment of Development Councils for particular industries, but only where the relevant trade association agreed, and the relevant government minister was convinced, that such an arrangement was favoured by the majority of its constituent companies. The main idea behind the Development Councils was to implement the recommendations of postwar working parties appointed by the Board of Trade and, to this end:

Among the functions which may be assigned to development councils are 'promoting the improvement of accounting and costing practice and uniformity therein, including in particular the formulation of standard costing'. (Stacey, 1954, pp. 203–204, quoting the Industrial Organisation and Development Act, 1st Schedule, point 17)

In the 1950s, an additional source of impetus towards the adoption of uniform costing methods was provided by the work of both the Organisation for European Economic Co-operation and the British Institute of Management. Addressing the combined

issues of productivity and inter-firm comparison, they repeatedly emphasised the necessity for uniform cost accounts (Most, 1961, p. 47).

### 6.3.2. Budgeting<sup>35</sup>

We have already seen that fairly sophisticated budgetary exercises were undertaken at Chirk Castle and the Hudson's Bay company as early as the eighteenth century, but we might imagine that these were not typical arrangements even amongst large organisations of that period. A key pre-condition for the operation of a system of budgeting, of course, is the forecasting of customer demand and there is plentiful evidence of this being done by companies early on.

Unsurprisingly, therefore, evidence of forecasting is manifest from an examination of the archival material for businesses in the years leading up to World War I, though it is often unclear whether such activity was connected with a formal system of budgeting. In the chemical industry, for example, United Alkali was making regular profit forecasts by 1903; it had been joined in this practice before World War I by Brunner, Mond and Co. Ltd. and the Electric Reduction Company, the Canadian subsidiary of Albright & Wilson Ltd. But there is no evidence of systems of budgeting *per se* in operation at any of these companies before 1914 (Boyns et al., 2004, pp. 18–19). Quail (1996, pp. 128–129) claims that the only known modern use of budgets in business in Britain before World War I was by W.H. Lever (later Lord Leverhulme), who utilised a form of trading budget at the Wigan branch of his father's business in the 1880s. However, Solomons (1954, p. 278) suggests that 'Dunlops have been using budgets for about fifty years'.

Focusing on the post-World War I period, Scott-Maxwell (1923, p. 91) notes that, in reference to 'indirect material',

the modern method is to budget for a fixed expenditure on experimental work and not to exceed it without further investigation. (Scott-Maxwell, 1923, p. 91)

Scott-Maxwell also refers to companies budgeting for 'development work' (Scott-Maxwell, 1923, p. 106) and for 'yearly sales oncost' (Scott-Maxwell, 1923, p. 149), whereas Hazell (1921, p. 53) refers to a 'Budget of the expenses'. As noted earlier, however, it was not until 1932 that the first British book on budgetary control was published. Willsmore's book was based

<sup>35</sup>See Miller & O'Leary (1987) for an examination, from a Foucauldian standpoint, of the emergence of budgeting and standard costing in their modern form during the first three decades of the twentieth century.

on his experiences in the application and administration of budgetary control in manufacturing industry,<sup>36</sup> further demonstrating the fact that the literature was lagging behind the practice of pioneering firms like Hans Renold Ltd. and Austin Motors. Having experimented with budgets before World War I, as a means for setting limits for certain types of expenditure, by 1915 Hans Renold Ltd. was using budgeted expenses in place of actual expenses in the endeavour to improve the effectiveness of the 'expense rate' costing system installed by Church at the beginning of the twentieth century. By 1920 Church's system had been superseded by a full-scale system of budgetary control, evolving into a flexible budgetary system by the late 1920s (Boyns et al., 2000). The Austin Motor Company also began to use budgets for planning and control purposes in the early 1920s; an initiative that was widely publicised at the time. The combined system of standard costing and budgetary control was the brainchild of Sir Herbert Austin working in collaboration with the company's cost accountant, later comptroller, L. Perry-Keene (see the series of articles in the *Cost Accountant* in 1922–1923; also Quail, 1996).

Although these comprehensive systems were probably exceptional, not only by British but also by American standards, secondary and archival evidence (see Table 4) suggests that, by the mid-1930s, many British firms had begun to undertake budgetary exercises, albeit sometimes on a piecemeal and experimental basis (Boyns, 1998a); a finding which is consistent with that of Theiss (1937) in the American context. In the introduction to his 1932 book, Willmore commented that:

It is gradually being appreciated that the very existence of any individual concern may well depend as much on the efficiency of its forecasting system as upon the efficiency of its production methods; and, as a result, many companies have turned to the application of budgetary-control principles as a means of planning their operations with an eye to the future. (reproduced in Willmore, 1949, p. viii)

Evidence from a budgetary control survey carried out by Roland Dunkerley on behalf of the Management Research Groups in the mid-1930s provides further details as to practice in particular companies (British

Library of Political & Economic Science, Harry Ward papers—findings incorporated in Table 4). His survey results formed the basis of a paper presented to the 6th International Congress for Scientific Management and covered firms operating in

such diverse industries as confectionery, hosiery, motor vehicle (both heavy and light), boot and shoe, musical instruments, patent medicines, heavy steel, glass, light engineering, and rubber, and cover a range from relatively small firms to large combines. (Dunkerley, 1935, p. 68)

Amongst the findings reported by Dunkerley were that

all [the firms] are extracting considerable benefits from the use of budgetary control. Some, like the light motor-car and confectionery industries, are going a long way towards full exploitation of the underlying theories; others, in the basic industries, are finding budgetary control of value, even in their limited sphere ...

It [budgetary control] has been applied with sound business commonsense and adapted to the needs of large firms and small; to the direct distributor, as well as to the basic supplier, who is several stages away from the consumer; to the varying stages of sales, purchasing, and manufacture as well as to the financial side; and through all it has demonstrated itself as a valuable aid to scientific management. (Dunkerley, 1935, pp. 72–73)

But the utilisation of budgets for control purposes, once introduced, did not automatically become a standard feature of the management information system. Hans Renold Ltd. continued to use budgetary control through to the end of the study period, and Dunlop (Hannah, 1983) and Unilever (Quail, 1996) subsequently built upon their interwar experiments and developed full systems of budgetary control after World War II. However, the experiments with budgeting at the London, Midland and Scottish Railway Company in the early 1930s just 'faded away' (Quail, 1996, p. 170), while even the well-established Austin system was abandoned in 1941, following the death of the company's founder and the retirement of Perry-Keene.<sup>37</sup>

The post-World War II period undoubtedly saw an increased interest in the application of budgetary control, as exemplified by comments from Willmore in the introductions to the third and fourth editions of his text. In the third edition, Willmore claimed that, in part due to wartime controls, 'budgetary control is now

<sup>36</sup>The book was developed out of a series of articles written for *The Times Trade and Engineering Supplement* between December 1931 and February 1932. Willmore also utilised material culled from other articles on management topics, including production control and market research, published in the *Electrical Review* and the *Manchester Guardian Commercial*.

<sup>37</sup>Thus, in the 1960s, the British Motor Corporation, formed as a result of a merger of Austin and Morris Motors in 1952, had 'no sensible way of pricing its cars, because it did not know precisely what they cost to make' (Turner, 1971, p. 114).

Table 4. *Known cases of the use of budgets and budgetary control in British businesses to c.1942/1943.*

Firm	Industry	Year	Source(s)
Royal Ordnance Factories	Ordnance	c.1895	Perry-Keene (1925), Quennell (1925)
Hans Renold	Chain making	1915 c.1920–1925	Manchester Central Library (M501) & Renold (1927)
Austin Motor Co.	Motor cars	c.1921	Perry-Keene (1922–1923)
BSA	Engineering	1921 c.1930	Coventry Record Office (PA594) Nelson (1930)
Charles Roberts & Co. <sup>a</sup>	Railway rolling stock manufacturer.	c.1924/1925	Quennell (1925)
Lawson, Paragon Supply Co. <sup>a</sup>	Paper	1927/1928	Winder (1927)
<sup>a</sup> United Steel Companies	Engineering Iron and steel	1927/1928 c.1928 1933	Lightbody (1927) Boswell (1983) and other secondary sources British Library of Political and Economic Science, Harry Ward papers, Dunkerley report, 1933–1934
Steel, Peach & Tozer. (part of United Steel Companies)	Iron and Steel	1929	Simpson (1929)
English Electric Co.	Electrical goods	1929	British Library of Political and Economic Science, Harry Ward papers, Minutes of MRG No. 1
Gramophone Co.	Record manufacturer	1929	British Library of Political and Economic Science, Harry Ward papers, Minutes of MRG No. 1
Crabtree & Co	Electrical	1930	Dent (1930) <sup>b</sup>
Cadburys	Chocolate	1930	Dent (1930) <sup>b</sup>
Anglo-Persian Oil Co.	Oil	1930	Dent (1930) <sup>b</sup>
Western Electric Co.	Electrical	1930	Dent (1930) <sup>b</sup>
Rowntree & Co.	Chocolate	1930	Dent (1930) <sup>b</sup>
ICI	Chemicals	1930	Dent (1930) <sup>b</sup>
Beyer, Peacock & Co.	Railway locomotive maker	c.1928	Manchester Museum of Science & Industry (M0001), Company Newsletter
Associated Equipment Co.	Coaches/buses	1929	Modern Records Centre, MSS 226
British Thomson-Houston	Electrical	Early 1930s	Modern Records Centre, MSS 242
W. & T. Avery	Weighing machines	1930	Sellars (1930)
J. Lyons & Co.	Food makers & retailers	c.1932	Modern Records Centre, MSS 363
Dunlop Rubber Co.	Rubber goods/tyres	1933	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
Pilkington Bros.	Glass	1933	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
Standard Telephone & Cables	Telephones/cables	1933	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
Wolsey	Wool textiles	1933	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934



Table 4. (Continued)

Firm	Industry	Year	Source(s)
Baker Perkins	Machinery makers	1934	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
British Xylonite Co.	Celluloid manufacturer	1934	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
Full-Fashioned Hosiery Co.	Hosiery/knitwear	1934	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
Lotus	Shoe makers	1934	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
Josiah Parkes & Sons	Builders' hardware	1934	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
Wiggins, Teape & Co.	Paper manufacturers	1934	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
General Post Office	Postal services	1934	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
London, Midland & Scottish	Railway	1934	British Library of Political and Economic Science, Harry Ward Papers: Draft report of the Budgetary Control Committee of the Management Research Group No. 1, conducted by Roland Dunkerley in 1933/1934
Spillers	Milling	1930s	Hannah (1983)
Turner & Newell	Asbestos	1930s	Hannah (1983)
F.H. Lloyd	Engineering	mid-1930s	Sandwell Community History & Archive Service, 8707
Rolls-Royce	Motor cars	1938	Lloyd (1978)
Albright & Wilson	Chemicals	1938	Birmingham Central Library—A&W records
Electro-Hydraulics	Aeroplane hydraulics	1942/1943	Modern Records Centre, MSS 338

<sup>a</sup>This indicates that the name is either not known or is uncertain (in the latter case a possible name is suggested).

<sup>b</sup>Of the British firms identified, only Crabtree and Hans Renold are specifically mentioned as using budgetary control. All of the companies listed, however, are stated as planning their activities on a scientific basis, and are mentioned alongside the following US companies: Edison Industries, Eastman Kodak Co., Dennison Manufacturing Co., American Telephone & Telegraph, General Motors and the Walworth Manufacturing Co.

fully established in this country as an aid to management planning and control' (Willsmore, 1949, p. vii). In the fourth edition, he wrote: 'Budget techniques are now so firmly established that they are virtually standard practice for all large and medium-sized concerns' (Willsmore, 1960, p. vii; see also Wheldon, 1952, p. 7).

The consultant Evans-Hemming (1952, p. v), a fellow of both the ICWA and the Royal Economic Society,<sup>38</sup> indicated that he had helped to introduce flexible budgetary control and standard costs into firms operating in a range of industries. Furthermore, such techniques had also been introduced at

very many firms, ranging from small workshops and garages to factories of a combine employing many thousands of workers. (Evans-Hemming, 1952, p. v)

In the early 1950s, members of the various AACCP teams which reported on accounting issues in specific industries found very little that was new to them and were often critical of the assumed technical superiority of the Americans. However, there was widespread agreement that there was a much more open view in America towards costs and budgets and their use for managerial purposes. In the view of a member of the management accounting team, John Craig, the major difference between American and British industry was in the 'attitude of mind towards budgeting', noting that

The American was prepared to 'have a crack' at budgeting, even though there was a great deal of detailed work involved and he might not get the right answer. He was not afraid to look ahead and plan. (*Cost Accountant*, 1953, pp. 241–242)

Summarising, Craig suggested that

a synthesis of the American conception of budgeting and the British attitude of 'let's get by' ... could give something of value to the western world. (*Cost Accountant*, 1953, p. 242)

Applications of budgetary control in the 1950s were not confined to the private sector. Following nationalisation, budgets and forecasts were introduced for control purposes within the NCB from the top down, beginning with divisions, then areas and, eventually, individual collieries (Boyns, 1997). By 1948, budgetary control of overheads had been introduced almost throughout the coal industry. By 1954, the Board was requiring operational forecasts from divisions and areas for the following year for 'manpower, output, productivity, financial results and capital investment (planning and expenditure)' (NCB Annual Report, 1954, p. 23).

<sup>38</sup>The role of economics in the development of management accounting techniques is an area in desperate need of study.

In the iron and steel industry, which found itself something of a political football in the 1950s and 1960s, first being nationalised in 1951 and then rapidly, though partly, de-nationalised in 1953, only to be nationalised again in 1967, the adoption of budgetary control tended to lag behind that in other sectors (Edwards et al., 2002). Managers of steel companies turned increasingly to the technique, usually in association with standard costing, around 1960, as part of a desperate search for 'a magic accounting solution to deep-seated structural and operational problems' (Edwards et al., 2002, p. 37). These problems came to a head at a time when industry increasingly looked to accountants, as the 'priesthood' of industry (Matthews et al., 1998), for managerial as well as financial expertise, reflecting a growing conviction that the accountants' calculative techniques would help counter the iron and steel industry's serious operating and financial problems.

Despite such developments, progress towards the adoption of budgetary control remained patchy, even at the end of the 1950s. A study conducted of 47 firms operating in six industries (wool textiles, machine tools, shipbuilding, electronics, domestic appliances and earthmoving equipment), most of which employed less than 5,000 workers, revealed that only 20 had operated a budgetary control system for more than 5 years, whereas 10 had introduced it within the last 5 years, and 17 used budgetary control not at all (PEP, 1966).

Overall, while the 1950s and 1960s may have seen an upsurge in the utilisation of budgetary control, the process was neither complete by the mid-1960s, nor had it started only in 1950 as some have suggested or implied. Archival research now indicates a more substantial development of the use of budgetary control within British firms during the interwar years; a development which provided a springboard for post-World War II developments.

### 6.3.3. *Standard Costing*<sup>39</sup>

There is a widely held view that the adoption of a standard costing system, in its modern sense, occurred in Britain only in the 1950s and 1960s, alongside budgetary control, as part of the rise of responsibility accounting (Scapens, 1991). Recent archival research,

<sup>39</sup>Standard costing was defined in 1937 (ICWA, 1937, p. 325) as: 'The determination of costs of standard products, produced in standard quantities under standard conditions which may be normal or otherwise.' A more recent definition of standard costs is that they are 'scientifically pre-determined costs, calculated with the aid of some method such as time and motion studies' (Epstein & Epstein, 1974, p. 166).

however, has shown that examples of the use of standard costs in ways that approximated modern standard costing date back to the late 1870s and early 1880s, when Louis Parsons Merriam developed the concept of the 'standard cost price' to help monitor efficiency at British Xylonite. Indeed, in the 1890s, the technique was used by his son to call to account the manager of the company's production unit, now located some sixty miles from the company's headquarters, when monthly production costs exceeded the standard cost price (Boyns et al., 2004, pp. 17–18). British Xylonite finally adopted a full-blown modern standard costing system in the 1930s, following engagement of the British Bedaux consultancy.

As with budgetary control, there is evidence that standard costing practice was ahead of the related literature. Commenting on Moran's (1933) paper, Miller provides an example of the use of standards early in the twentieth century. He cites a factory in the Glasgow district employing 14,000 workers (possibly Singer), at which, before World War I,

there was conceived the idea of fixing a standard for all manufacturing labour operations; and the departmental efficiency was solely concerned with the handling of their labour which was checked with the adopted standard labour costs. (Moran, 1933, p. 165)

Hans Renold Ltd. and Austin Motors were early pioneers of standard costing, the former adopting it within their shell factory in 1918 and the latter in the early 1920s. As Table 5 shows, however, it was not until the late 1920s and early 1930s that more widespread developments occurred in the use of standard costs. This finding is consistent with the evidence from the contemporary literature.

Moran (1933, p. 155), chief accountant and cost manager of the biscuit manufacturer, Peek Frean & Co. Ltd.,<sup>40</sup> noted the rapid development of standard costs 'in recent years', to become a distinct branch of costing in its own right. Wight (1937, p. 364) considered standard costing to be the most recent and important advance in costing practice. Wight concluded that the experimental stage of the use of standard costing was coming to a close, and that 'a much wider' application of standard costing in industry is to be expected 'in the near future' (Wight, 1937, p. 365), whereas Leadbetter (1937, p. 169), the accountant of Morton, Sundour Fabrics Ltd., of Carlisle, suggested that

The trend towards Standard Costs must have permeated very thoroughly into British industry by now and the procedure of fixing Standards is fairly general. (Leadbetter, 1937, p. 169)

Monkhouse, an employee of the United Steel Companies Ltd., notes that for some years they have used standards at the company's works and collieries in Workington (Moran, 1933, p. 166). In the chemical trades, L. Staniforth, cost accountant of Messrs. Brotherton & Co. Ltd. of Leeds, noted that the application of standards is 'an essential part of each element of production' (Staniforth, 1933, p. 184). A few years later, Wight could comment that:

During the past few years standard costs have been successfully introduced in many of our basic industries, viz. Iron and Steel, Motor Car Manufacture, Textiles, Wireless and Radio, Electrical Specialities, Chemical Manufacture, Food Products, etc. (Wight, 1937, pp. 364–365)

He went on to note that

many firms in this country, including a number of important organisations in Glasgow and the West of Scotland, have recently introduced standard costs with beneficial results. (Wight, 1937, p. 365)

Morris (1935, p. 42) specifically referred to a system in place at a tyre factory at Inchinnan (presumably Dunlop) which involved both budgetary control and the use of standards. Leadbetter (1937, p. 168) outlined a system of standard costing and budgetary control which he claimed was 'meeting with some success in many industries' including three widely differing ones, namely 'Rubber and Cotton Footwear, Plastics and Textiles'. More specifically, Leadbetter informs us that

In the Rubber Footwear industry Standard Costs are fixed for childrens', maids', ladies', and mens' shoes in each Product line. (Leadbetter, 1937, p. 169)

Standard costing, together with budgetary control, was introduced at Daimler Co. Ltd.'s New Radford factory in 1936, following the appointment of F.W. Ayers as managing director, and with the help of an American, J.J. Lestro (Boyns et al., 2000).

Compared with budgetary control, however, the overall impression gained from an examination of the available evidence is that the adoption of standard costing was perhaps somewhat slower up to World War II. Things then seem to have picked up. In the newly nationalised coal industry, for example, standard costing began to be developed in the early- to mid-1950s (Boyns, 1997), though lagging that of budgetary control not least because the individual circumstances

<sup>40</sup>According to Loft (1990, p. 81), Moran had been chief cost accountant at Peek Frean in 1923, and became chief accountant and cost manager in 1930.

Table 5. Known cases of standard costing in British industry to c. 1942/1943.

Company	Standard costing	Source(s)
British Xylonite Co. Ltd.	Standard (total) costs 1882 Standards for labour (Bedaux) 1930	Suffolk Record Office, HC410
Albright and Wilson Ltd.	For total cost c.1890s For labour 1924	Birmingham Central Library, A&W
Hans Renold Ltd.	First use of standard costs 1918	Manchester Central Library, M501
British Dyestuffs Ltd. (ICI from 1926)	Standard (total) costs from 1922	ICI Internal Booklet Budgetary Control in the Dyestuffs Division' - in authors' possession
Austin Motor Co. Ltd.	1922/1923	Perry-Keene (1922–1923)
?(Coronium Metal Co. Ltd.)	c.1924/1925	Kearsey (1924–1925)
Skefco Ball Bearing Co. Ltd.	1927	<i>Cost Accountant</i> (1928, pp. 371–372)
Linotype & Machinery Ltd.	c.1928	Staniforth (1933)
United Steel Companies Ltd	c.1928–1930	Edwards et al. (2002, 2003)
J. Lyons & Co. Ltd.	Introduced 1932	Modern Records Centre, MSS 363
Dunlop Rubber Co. Ltd.	c.1935	Morris (1935)
Audley Engineering Co. Ltd.	1935/1936	Coventry Record Office, PA594
Daimler Co. Ltd.	Introduced at Radford factory 1936	Coventry Record Office, PA594
Workwear Ltd.	By 1937	British Library of Political & Economic Science, Harry Ward papers
ICI Ltd.	Alkali and Dyestuffs groups have Standard (total) costs by 1938	Quail (1996)
F.H. Lloyd & Co. Ltd.	Introduced c.1940	Sandwell Community History & Archive Service, 8707
Llanelli Associated Tin Plate Co. Ltd.	Standard costs c.1941	Swansea Archives, LATP
Electro-Hydraulics Ltd (Rubery Owen)	Introduced in 1942/1943	Modern Records Centre, MSS 338
Other Possibilities:		
?(Singer)	Early 1900s	Moran (1933)
John Knight Ltd.	c.1921	Garnham (Perry-Keene, 1925)
Rolls Royce Ltd.	Early 1920s	Solomons (1994)
Beyer, Peacock & Co. Ltd.	c.1928	Manchester Museum of Science & Industry, M0001
Warne, Wright & Rowlands Ltd.	1933/1934	Coventry Record Office, PA594

? indicates that the name given is not known for certain

of each pit required the establishment of specially tailored standards. Experimentation with standards and the use of work (method) study/operations research commenced at the beginning of the 1950s. By 1954, full or partial applications of budgetary control of operational expenditure through standard costs had been introduced at 60 collieries and some coke ovens (NCB Annual Report, 1954, p. 23). By the end of 1956, standard costing had been introduced for manpower, wages and output at most coke ovens and at 753 collieries; the only collieries not covered being some very small ones and those with a short remaining life (NCB Annual Report, 1956, vol. 1, p. 59). That all was not well is perhaps implied by the fact that the NCB continued work designed to

see whether any modifications might serve to furnish management with yet more prompt and accurate

means for the day-to-day control of colliery operations. (NCB Annual Report, 1958, para. 81)

According to Capps et al. (1989, p. 223), this attempt to introduce standard costing in the coal industry proved a 'massive failure' due to the negative influence of mining engineers and the dominance of an engineering culture in the industry.

In the steel industry, some companies adopted standard costing between 1957 and the late 1960s (Edwards et al., 2002). Standard costing was implemented by local government authorities to measure activities such as the school meals service, and a good deal of attention was also given to the possibility of using it more extensively in hospital costing (Solomons, 1954, p. 277). Solomons (1954) also notes that British Overseas Airways Corporation (BOAC) was using standard costs to control their airline results,

whereas British Insulated Callender's Cables (BICC) began to use them in the early 1950s (Boyns, 2005a). Most, writing in the early 1960s, refers to a system of

actual times and standard times as developed by Joseph Lucas Ltd. in this country and a number of organizations abroad. (Most, 1961, p. 79)<sup>41</sup>

Summarising the position as they saw it in 1960, Owler and Brown stated:

In the principal factories in Britain producing on a large scale, as, for example, in the textile industry, electrical and other engineering, biscuit-making, and chemical industries, Standard Costs are in use, and there is every indication that Standard Costing will be used to a very large extent in future. (Owler & Brown, 1960, p. 325)

That standard costing had become increasingly common in Britain from the early stirrings in the late nineteenth and early twentieth century is evident from Table 5 with some of the companies known to be, or said to have been, using the technique prior to 1945. Although Britain, in terms of the *number* of companies which had adopted standard costing, is likely to have lagged behind America, this fact should not automatically be taken to imply any less willingness on the part of British firms to adopt the technique. Indeed, given the far greater number of large companies in America, one might expect a much smaller number of British firms to have taken up the technique (Berland et al., 2002), finding that it was less appropriate to their needs or remained unjustified on a cost-benefit basis.

#### 6.3.4. Marginal Costing

Dugdale & Jones (2003) use the term 'costing war' to describe a debate which raged, during the third quarter of the twentieth century, between the advocates of full or absorption costing on the one hand and those favouring marginal or direct costing on the other. Although evidence of the extent to which marginal costing was used in British firms remains fairly limited, business archives are increasingly revealing an awareness of the relevance of marginal costs to decision making that goes back well before the development of a theoretical literature on the subject in the 1920s and 1930s.

<sup>41</sup>In the early 1930s, Lucas undertook an internal review of their system of costing and works procedures and then brought in the Bedaux Consultancy. In 1934 the company introduced the 'Lucas Point Plan System' (Nockolds, 1976, p. 288).

We have seen that marginal and opportunity costing techniques were applied, for decision-making purposes, as early as the mid-eighteenth century (e.g. in the Tredegar manuscripts of 1746, see Jones, 1985, pp. 187–189). Moving forward to the time period (post-1870) covered in this section of the chapter, we find the chemists Albright & Wilson when deciding which type of steam generating plant to introduce for their electricity-generating station in the early 1890s, making calculations which reveal an understanding of which costs were common to all plans and which were specific to particular schemes. Thirty years later, when considering whether or not to close a production plant, Albright & Wilson's management reveal further understanding of the need to focus on variable costs and to ignore fixed, or sunk, costs (Mathew, et al., 2003).

In the 1930s, Frederick Spink, the finance director of the chocolate manufacturer, Rowntree & Company,

introduced the concept of marginal costs and profits, as a means of demonstrating how each additional business or product might assist overheads or the rate of return. (Fitzgerald, 1995, p. 462)

That marginal costing was still in use in the 1950s is confirmed by R.E. Watson, Rowntree's costing manager:

Maximum benefit was obtained from these methods in a concern which was operating a marginal costing system as it was then possible to set a target of gross margin contribution from each salesman, by products and serving as yardsticks against which subsequent performance of actual sales and earnings were measured. (*Cost Accountant*, 1952, p. 406)

By the late 1950s, however, it had become clear that marginal costing, taken in isolation, failed to provide the complete solution to Rowntree's management accounting needs. Implying recognition of the idea that different costs are required for different purposes (Clark, 1923), Fitzgerald concludes that

Rowntree's historical emphasis on marginal costs and profits had led it to pay inadequate attention to fixed costs and the 'bottom line', and the company began to look at gross as well as marginal costs, and, in the use of resources, at gross margins per ton or output per man-hour or per unit of sugar. (Fitzgerald, 1995, p. 462)

F.L. Impey, the managing director of Morland & Impey, producers of looseleaf volumes (e.g. *Kalamazoo*), noted in 1936 that experience

has proved the value of separating all 'constant expenses' (i.e. those expenses which remain practically

unaltered whether the output be 5 per cent. or 100 per cent. of capacity) from those expenses which vary with volume of production, and that this holds good not only for manufacturing departments, but also for all other functions. The remaining costs are 'marginal costs'. (MRG, 1937, p. 25)

Another company where experimentation with the use of marginal costs appears to have taken place before World War II is the electrical manufacturers, Ferranti Ltd. (Brown, 1951, p. 205). Brown notes that he was introduced to the break-even chart c.1931 and marginal costing c.1935–1936, and goes on to state that 'we used (experimentally, of course) both marginal costing and break-even charts'. However, it appears that these techniques again failed to provide answers to the questions posed by management.

Although additional examples to those already mentioned could be given, as with the application of other techniques already examined, the extent of the diffusion of marginal costing in Britain after World War II remains unclear. According to J.P. Wilson, in the early 1950s 'marginal costing was being used, but very often not recognised as such' (*Cost Accountant*, 1953, p. 397). Similarly, in a report on marginal costing prepared for the ICWA and published in October 1961, the association's president F.M.W. Hird noted that:

There has been very considerable interest in the technique of marginal costing and it can certainly be said that numerous undertakings have benefited from its judicious application in relation to the most advantageous action which can be taken to achieve maximum profit. Despite its controversial nature, however, the increasing use now being made of the technique, whether restricted to solving specific problems or comprehensively used in association with limiting factors, has come about because of the better understanding by both accountants and management of what it is intended to achieve. (ICWA, 1961, foreword)

### 6.3.5. Summary

Contemporary opinions as to the extent of development of C/MA practices rarely depict a single view, and the evidence reviewed in this section is no exception. No definitive data exists as to the extent of the use of specific techniques at different points in time, but archival research to date (like some of the contemporary literature) suggests that there was an early development of the use of these techniques, and that the extent of their usage by 1939 was wider than conventionally acknowledged. Furthermore, their early use between the wars was not confined to Chandlerian big business, and was not held back by

the smaller number of large companies in Britain compared to America. Indeed, the archival evidence suggests that, in Britain, it was amongst the proprietorially controlled, medium-sized firms derided by Chandler that there was likely to be the most rapid adoption and greater willingness to adopt new C/MA techniques between the two world wars (Boyns et al., 2000; Quail, 1996). However, the growth of the use of standard costing and budgetary control in the 1950s and 1960s can, to some extent, be tied to the growth in company size. Channon's examination of the internal characteristics of 25 of the 100 largest companies in Britain, for example, reveals that the key features of their control systems comprised the use of annual budgets, central cash accounting and long-term (mainly financial) plans (Channon, 1973, pp. 196–217).

Scapens is probably correct when arguing that during the 1950s and 1960s responsibility accounting became widespread throughout British firms; as we have seen, however this development did not occur from a zero base. Indeed, the rapid spread of responsibility accounting in the 1950s suggests that there was already a widespread knowledge of such ideas within British management circles, partly based on experience of prior practical application. Some firms employed outside assistance, especially management consultants, to help them implement standard costing and budgetary control (e.g. Daimler), but others seem to have been able to do so largely by employing resources from within their own organisation (e.g. BICC). As individuals became more skilled in such techniques, their movement between firms clearly facilitated the more rapid dissemination of ideas and their diffusion into practice, just as had been the case in earlier times.

## 7. Relationship between Theory and Practice

In this section, we briefly examine the relationship between theory and practice. Reflecting the approach adopted previously in this chapter, we divide our consideration into two temporal phases in order to accommodate an assessment of the significance of the sharp upsurge in the costing literature post-1870. We also draw attention to the fact that, following Scapens (1991, Chapter 1), we equate theory with the available relevant contemporary literature.

### 7.1. Pre-'Costing Renaissance' Period

We saw earlier that the numerous textbooks on double entry bookkeeping published in Britain up to the end of the industrial revolution, and indeed up to the 1870s, revealed little evidence of a concern with cost accounting. It is for this reason that Garcke & Fells's

(1887) *Factory Accounts. Their Principles and Practice* is seen to be of seminal importance in extending the ambit of the technical accounting literature. A work, in Garner's estimation,

probably having more to do with the advancement of cost accounting practices than any single book ever published. (Garner, 1954)

This is not to suggest that earlier writers were uninterested in providing information that could be used to help assess performance, with some authors (e.g. Gordon, 1770) explaining how the accounts could be designed in order to reveal profits arising from the different product lines traded in by merchants (see Dean et al., 2005). But their focus remained, in the main, firmly on recording and reporting external transactions so as to produce measures of relevance to traders rather than manufacturers.

It was quite common for calculative techniques of use to management to be created *outside* the system of double entry bookkeeping. For almost all business organisations in Britain in the thirteenth century, and for many of them through to the eighteenth and even nineteenth century (Yamey, 1981, p. 130), this was bound to be the case with double entry not yet in place. However, while this chapter has not focused overmuch on whether relevant calculations were made inside or outside the ledger, partly because it is sometimes difficult to tell and partly because it often does not matter, evidence has been cited which indicates that, for a range of companies before and during the nineteenth century, costing *was* conducted within the double entry bookkeeping system. Of more fundamental interest to us, however, is whether costing calculations were made and, if so, what purpose they served. Provided we are willing to look beyond that concerned with double entry bookkeeping, a much wider relevant literature is revealed. This chapter has shown that advice for management about how to do its job appeared in published and unpublished form from about the thirteenth century onwards. Much of the material appearing early on focused on physical rather than financial measures, but there is no reason to believe that this rendered the calculations any less useful for managerial purposes.

So was theory ahead of practice? Focusing specifically on what he labels the 'theory/practice schism' during the British industrial revolution (BIR), Fleischman's conclusion is clearcut:

the proposition can now be suggested with some confidence and supported with evidence, that the entrepreneurs of the BIR deployed in practical application a cost accounting methodology of some

sophistication despite the absence of a literature. (Fleischman, 2003, p. 76)

Our answer to the same question, for a much longer period ending just after the British industrial revolution, is a rather more tentative 'Probably not', though it partly depends on how you look at it. For example, it is undoubtedly the case that few companies operated an integrated system of double entry approaching the sophistication described by Hamilton (1777–1779) until much later, or generated the costing information that the operation of Hamilton's system might be expected to reveal. But we know that one company did it as early as 1690 (Edwards & Boyns, 1992), and others might have emulated or pre-dated such actions. In the broader literature, Babbage (1832, p. 174) revealed an understanding of the impact of production on unit costs, but clear knowledge of the differential significance for decision making of fixed and variable costs had already been given practical application in the Mackworth Estate papers c.1740 (Jones, 1985, pp. 25–32), by the potter Josiah Wedgwood in 1772 (McKendrick, 1970, p. 55) and by the accountant Richard Cort in 1824 (Jones, 1985, p. 105).

But where supposedly best practice was not adopted—and it must be accepted that many and perhaps most managers were unlikely to have been aware of the relevant literature—the question that remains is whether it mattered. Here, we should heed the advice of Sybil Jack:

the best accounts in any given situation are those which provide sufficient information for the most rational decisions to be reached at the cheapest possible cost. (Jack, 1966, p. 139)

Not only is the lack of costing calculations not a crime, it might well be the rational economic arrangement found by applying (probably intuitively) a cost/benefit analysis. Nevertheless, based on this review, we judge the accounting calculations made to serve managerial purposes, in terms of range of issues addressed and the complexity of the measures adopted by at least some businesses, in general, to be ahead of the contemporary literature up to the late nineteenth century.

## 7.2. *Post-'Costing Renaissance' Period*

In the late twentieth century, advances in C/MA theory tend to lead practice and, in some respects, may be seen by businesspersons as being theoretical and irrelevant to their needs. This is in contrast to the evidence for the pre-'costing renaissance' period, and it raises the question as to when the 'switch over' occurred.

In the chemical industry, detailed research into cost calculation practices has shown that, from the middle of the nineteenth century, a number of chemical firms actively developed their costing methods, despite the relative lack of any significant literature related to the topic of costing in the chemical industry (Boyns et al., 2004; Matthews et al., 2003). Indeed, during the second half of the nineteenth century and even the early decades of the twentieth century, Boyns et al. (2004) have shown that, in some respects, cost calculation practice remained ahead of the techniques espoused in the literature, whereas in other respects it kept pace with it.

Although studies of the precise link between theory and practice are still in their infancy, the evidence for the chemical industry is consistent with the view that the 'switch over' may have occurred after World War II. Scapens (1995) has suggested that this was the period of the growing academisation of C/MA research, and the consequent rapid development of the C/MA literature. However, the increasingly academic nature of the literature meant that it arguably lost its relevance for businesspersons. British businesspersons either continued to practice C/MA according to tried and tested procedures, or developed their systems in the time-honoured fashion, by adjusting them in an evolutionary manner, as befitted the changing needs, real or perceived, of their business.<sup>42</sup>

## 8. Concluding Comments

Today's reviewers of the development of C/MA in Britain are much better served than were the likes of Edwards (1937), Urwick & Brech (1948–1949), Solomons (1952), Yamey (1962), Pollard (1968) and Chandler (1977) when they made their assessments of the history of C/MA in Britain and its possible contribution to business development. In this respect, we are fortunate that the study of the history of C/MA in Britain has attracted the attention of overseas academics as well as indigenous researchers. Nevertheless, the archival material so far examined represents only a tiny fraction of that which was initially produced, and a small fraction of what has survived. It also suffers from all the usual drawbacks concerning its representativeness, including the likely bias in favour of successful, bigger businesses. This clearly makes generalisations difficult, but the evidence presented in this chapter, while supporting some long and widely held conventional wisdoms regarding the development of C/MA in Britain, has clearly

indicated that others are no longer tenable and need to be replaced with ones based more firmly on the archival evidence now available.

It is clear that C/MA literature was slow to develop in Britain, compared with say France (Boyns et al., 1997, Chapter 3) for reasons which remain unexplained. The idea that British businesspersons wished to keep confidential techniques that might give them a competitive advantage is plausible, but inconsistent with knowledge of a willingness to exchange technical expertise. Neither would it explain the failure of authors of accounting treatises who were not businesspersons—many were teachers and accountants—to take advantage of what appears to have been a money-making opportunity. Some authors did of course write about the accounting problems facing manufacturers, and also described analytical procedures that could be applied to a factory setting, but these expositions account for only a small fraction of the space occupied by routine descriptions of double entry bookkeeping within the retail and merchanting sectors of the economy.

The oft-quoted signal that the accounting literature was beginning to embrace cost accounting issues in the late nineteenth century—Garcke & Fells's (1887) *Factory Accounts*—is entirely justified, and just 2 years later it was augmented by George Pepler Norton's equally important *Textile Manufacturers' Book-keeping*. Concurrently with the growth of scientific management around the turn of the nineteenth century, and the application of science to accounting, a significant literature begins to emerge both within accounting journals and outside (e.g. trade journals in engineering and chemicals). Published papers reveal a growing focus on concepts, principles and theory to supplement the often-turgid descriptions of accounting systems considered appropriate for this and that type of business.

Textbooks appearing in multiple editions during the middle decades of the twentieth century, such as Bigg (1963), Wheldon and Willsmore, began to focus on the operation of complete management accounting systems that were probably only operational in a small minority of businesses, though the number probably grew continuously as the accounting function became increasingly professionalised. As we have seen, the formation of the ICWA (in 1919), which provided a platform to help industry-trained accountants compete with chartered accountants transferring their allegiance to commerce and industry for remunerative employment, was the foundation event leading to an ongoing process whereby the cost or works accountant became eventually re-branded as the management accountant. We have seen that

<sup>42</sup>This view is consistent with that of Bromwich & Bhimani (1989), who entitled their study of contemporary techniques, *Evolution not Revolution*.



professionalisation of the C/MA craft influenced the direction and content of the relevant literature, and it might also have had great significance (yet unexplored) for the development of practice, but it remains our thesis that many of the fundamental features of today's practices are deeply rooted in the past.

Although the accounting practices of earlier times, such as those of Loder (1610–1620), have been dismissed by some as rudimentary, they have achieved much more favourable comment in Freear's (1994) study of their decision-useful rather than aesthetic qualities. Consistent with Jack (1966), the essential question is whether the information generated is suitable for its intended purpose and, when designing the accounting dataset, it is neither necessary nor economically rational to invest more than is required to achieve the perceived objective. Despite this likely limitation on innovative endeavour, businesspersons devoted time to the design of procedures to account for contentious items such as depreciation, imputed interest, overhead apportionment and valuation of internal transfers of goods (and some people were also writing about them) as early as the seventeenth and eighteenth centuries. During the pre-industrial revolution period, we find ample evidence of the application of the opportunity cost concept, a distinction being made between marginal/sunk costs and fixed/variable costs, and even account taken of the time value of money for the purposes of routine and strategic decision making. A significant focus on the use of physical and financial 'standards' or 'trials' for the purposes of deciding what to do and monitoring subsequent performance is also uncovered in early times. And, although probably exceptional, integrated systems for planning, coordinating and controlling organisational activity—on the Chirk Castle estate, at the Hudson Bay Company and at the Derbyshire and Nottingham Company—were capable of being developed during the eighteenth century where the complexity of business operations appeared to require their application.

The industrial revolution period saw the widespread adoption of unified financial and cost accounting systems by companies within certain industries (e.g. the integrated iron producers also engaged in the extraction of mineral resources), and whether and how such integration could be achieved elsewhere became a major issue in the literature at the start of the twentieth century. Thus, in contrast with the view of earlier historians and, indeed, some of the contemporary literature, costing did not always languish in the dark corners of factories where engineers or cost clerks collected fragmentary financial data for

pricing new work and monitoring its profitability. Although this may have been a quite common arrangement in the engineering industry that flourished in the decades leading up to World War I, the advocates of reconcilable, interlocking and integrated systems in the early twentieth century were by no means singing from a completely new hymn sheet. The dissemination of inclusive accounting systems was, in one sense, a process of fundamental importance in the history of C/MA since information for performance assessment and control purposes was made more readily available on a routine basis.

Routine cost ascertainment had, of course, been a practical concern from earliest times, but a significant feature of the history of the C/MA literature in Britain during the first half of the twentieth century was the diminishing emphasis on the identification of 'true costs' and a growing attention devoted to the role of costing as an aid to management; what Horngren has described as the move from a search for 'absolute truth' to 'conditional truth' (quoted in Scapens, 1991, p. 8). It is far from clear how closely this shift within the literature was mirroring developments in C/MA practice, but it is possible that the emphasis on total costs may have received reinforcement from the development of accounting systems designed to enable routine, activity-based profit calculations to be made. It is certainly the case that we find examples of fixed cost allocations being made very early on within the double entry-based ledgers, and a concern to ensure that such costs should be apportioned to departments and products does seem to have been a priority amongst bookkeepers and accountants in the nineteenth century, though we find virtually no evidence to suggest that this was motivated by financial reporting considerations à la Johnson & Kaplan (1987).<sup>43</sup>

But just as cost ascertainment has been a pervasive issue through time, so too has been the collection of costs, whether historical or forward looking, for management purposes. The growing emphasis of the literature on accounting as an aid to management during the second quarter of the twentieth century, therefore, was nothing new, though it may have been reasserting an orientation that had lost direction, in terms of practical application, as the accounting

<sup>43</sup>A lone example is revealed in the archives of the Shelton Iron, Steel & Coal Co. which switched from market price to cost for the purpose of valuing internal transfers of goods, in 1891, following advice from its joint-auditors (Deloitte, Dever, Griffiths & Co. and John Adamson and Co.). Two years later the company reverted to the use of market prices (Boyns et al., 1999, p. 103).

process became increasingly routinised during the half century following Solomons' 'costing renaissance'. Nevertheless, such routinisation provided a framework within which the management accounting function could be more formally developed through the incorporation of techniques of uniform costing, standard costing and budgetary control, which were receiving growing emphasis and were now situated within a more formal accounting framework.

In interpreting such past developments in C/MA in Britain, a whole host of claims have been made concerning those events which are seen to be crucial. For example, Garner (1954, p. 3) has argued that the initial impetus for the development of cost accounting was provided by the replacement of the domestic system by capitalist processes of production; Johnson (1984) sees its origins within the 'single activity organisation' that flourished between 1780 and 1900; Solomons (1952) and Pollard (1968) believe that it occurred post-1875; Loft (1986, 1990) argues that World War I brought the practice and profession of cost accountancy 'into the light'; whereas authors of the AACCP reports in the aftermath of World War II insisted that the adoption of the forward-looking American approach to C/MA was required in order to better inform British managers. It is our contention that none of these events were of crucial importance for the development of C/MA in Britain, not least because, as revealed by recent archival research, many of them have little basis in fact. This chapter has instead shown that cost accounting has developed from the middle ages onwards to serve management in an increasingly complex and constantly changing social and economic environment. It is true that the major historical discontinuities referred to by previous commentators have increased the need for C/MA in the case of at least some contemporary enterprises, but it is difficult to see them as being of fundamental importance in changing the direction of the accounting craft.

Much more important in our view have been the kinds of factors that have accounting implications which continuously affect organisational entities, namely changes in size and organisational structure, technological advances and competition. None of these influences are new, though their impact may have become more widespread over the years. However, the accounting implications of size and organisational complexity, for example, had to be faced on manorial estates of the fourteenth century, by international trading companies of the seventeenth century and by the integrated iron manufacturers of the industrial revolution in much the same way that it has had to be confronted by the M-form global

corporations of the more recent past. But who were the agents of change that enabled accounting to become what it was not? We can probably agree with Baxter (1981) that much change was of a minor character and resulted from the work of 'countless' individuals, many of whom were working within the firm. But external agents of change were also active through time, and transferring their knowledge in similar ways. Clerks and bookkeepers changed jobs in the distant past in the same way as qualified and unqualified accountants do today, and they took their accounting expertise with them. Management consultancy firms have been an increasingly prominent feature of the business landscape during the last three-quarters of a century, but they also have their earlier counterparts in the form of mining engineers and colliery viewers. And the objectives of all these business advisers were exactly the same—to disseminate (hopefully) best practice and to make money.

The variety of the costing procedures employed up to the date of the 'costing renaissance', their often *ad hoc* nature and the widely differing circumstances in which innovations occurred demonstrate the contingent nature of the accounting framework. In these conditions the manager first decided what needed to be done—make plans, reach decisions or exert control—and then structured the information accordingly. As the problem changed so did the information required and generated. What was needed depended on contemporary circumstances, and there is no good reason to suppose that the failure to adopt practices that comprise today's management accounting toolkit is either indicative of backwardness or an inability to construct accounting data relevant to the issue under consideration. The C/MA accounting environment has of course changed dramatically since 1870—in particular, the leading companies have become much larger and increasingly operate at the global level, while the accounting function has become the domain of the professionally qualified expert. Post-1870 has seen the creation and installation of accounting systems incorporating a wide range of practices considered necessary to tackle the problem of managing effectively the modern business enterprise. But, we submit, the basic purpose of the C/MA function remains unchanged—namely, to inform the inter-related processes of planning, decision making and control—as do the fundamental features of the tools of the accountant's trade.

In concluding, it should be noted that this chapter did not set out specifically to compare Britain's C/MA history with that of any other country; an endeavour which would have anyway proved highly problematic given the lack of international comparative study of

accounting's past as well as its present. The chapter has nevertheless thrown some light on the relationship between developments in Britain compared to those in the US. Although often based on flimsy evidence, there is a widely held view that C/MA developed more quickly and was more widespread in the US than in the Britain between 1850 and 1950. This assessment might be partly attributable to the findings from the pioneering investigations by H. Thomas Johnson (1972, 1975, 1978) into the C/MA practices employed at Lyman Mills, du Pont de Nemours and General Motors, and to the arguments by Alfred Chandler (1962, 1977, 1990). It is also likely to have been influenced by contemporary comment, e.g. from the authors of the AACP reports in the 1950s. But the fact that people who studied highly successful US companies should have found in place leading-edge C/MA practices is not entirely surprising. Moreover, this chapter has shown that certain British companies were in the forefront of developing C/MA systems at the same time as their American counterparts. And although the adoption of systems of budgetary control and standard costing was initially often less than complete even among leading British companies, the same was the case with American companies (Theiss, 1937). The idea that American businesses may not have been massively ahead of their British counterparts, in these respects, receives support from Fleischman's (2000) conclusion that US companies operating scientific management techniques were very much in the minority before World War II. Hence, on the question of whether or not British C/MA practices lagged behind those of the US, the 'jury is still out'.<sup>44</sup>

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# Management Accounting Theory and Practice in German-Speaking Countries

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**Abstract:** This chapter provides insights into the state of management accounting theory and practice in German-speaking countries. We begin with a brief history of German management accounting and its relationship with financial accounting. We review cost theories, German cost accounting systems, and various uses of management accounting information in organizations and present their theoretical foundations and their diffusion into practice. Our selection is guided by what we consider innovations that are specifically “German” and are not widely recognized outside the German-speaking countries. We put these developments in perspective with international developments and discuss their potential contribution to theory and practice.

## 1. Introduction

Management accounting in German-speaking countries has developed from a common and long-standing history. German-speaking countries comprise Austria, Germany, and (part of) Switzerland, and we refer to management accounting in these countries as German management accounting for short. Indeed, German cost accounting systems have been among the most elaborate ones worldwide, and there have been many conceptualizations of management accounting. In this chapter, we review major developments.

The focus of this chapter is twofold: first, we aim at providing a better understanding of the evolution of major German cost and management accounting thought, which can look back to a long and highly developed tradition. Indeed, to date there has been little English language literature on German management accounting. Examples in international journals are mainly descriptions of German cost accounting systems, e.g., by Riebel (1994), Schildbach (1997), Kloock & Schiller (1997), and Weber & Weißenberger (1997).<sup>1</sup> We provide more material to

fill this gap by briefly surveying cost theories and cost accounting systems in the next two sections.

Second, we focus on what we believe are features and innovations that are specifically “German” and are not widely recognized outside the German-speaking countries. Examples are costs based on discounted cash flows, the effects of uncertainty, performance measures, budgeting, transfer pricing, and variance analyses. We not only survey literature on management accounting themes that has been published in the German-language literature and is not accessible to the international readership but also include international articles by German authors. We put the results of this literature in perspective with international developments and discuss the potential contribution to theory and practice. We do not cover in our survey in equal depth the international literature that relates to issues studied by German researchers, but provide references only to the international literature that we consider influential for the developments in the German literature. Indeed, as we show below, many innovations in German management accounting theory and practice were led by developments in the United States.<sup>2</sup> While

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<sup>1</sup>The latter three references are included in a special section on German cost accounting traditions in *Management Accounting Research*. Küpper & Mattessich (2005) provide a broad survey of financial and management accounting developments in the German-language area.

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<sup>2</sup>These developments are consistent with Shields' (1998) observation of the global convergence of management accounting practices across nations, most of which are based on US developments.

this influence is not restricted to current innovations, it has certainly increased in the last two or so decades.

We should note at the outset that this chapter is far from being a comprehensive survey of all developments in German management accounting. Our selection is guided by what we consider mainstream research and practice in German management accounting, which has a strong quantitative focus and is based mainly on production and economic theories. We select issues that spawned broad interest in the research community or in practice, basing the selection on the appearance of articles in major academic journals and in major textbooks, but we also acknowledge that this selection is to some extent subjective and may be a result of our own research preferences. In any case, we strive to highlight major developments in mainstream German management accounting research that we believe have had an impact on theory and/or practice and that are likely to be of interest to an international readership.

The chapter proceeds as follows: the next section provides a background of the developments of cost and management accounting and discusses the specifically German *Controlling*. Section 3 discusses the accounting environment, including the distinction between management and financial accounting that has been at the heart of German management accounting for a long time. In Section 4, we discuss cost theories and concepts that we believe are not common in the international literature. Section 5 explains and puts into perspective two German cost accounting systems, the *Grenzplankostenrechnung* (GPK) as an advanced system used in practice, and the *Einzelkosten- und Deckungsbeitragsrechnung*, that is interesting for its pure and consistent conceptual approach. In Section 6, we discuss the use of management accounting information for decision-facilitating and stewardship demands and review current German-language research literature in performance measurement, budgeting, transfer pricing, and variance analysis. The last section concludes. In all sections, we provide surveys of German practice to highlight the diffusion of management accounting theories and techniques into practice.

## 2. Scope of Management Accounting

In German-speaking countries, management accounting themes appear under labels, “*Kostenrechnung*” (cost accounting) or “*Interne Unternehmensrechnung*” (literally internal accounting) and “*Controlling*,” a

term borrowed from the English language.<sup>3</sup> Cost accounting looks back to a 100-year-old tradition whereas *Controlling* became popular in practice only in the 1970s. The main reason was the increasing reception of the developments in the United States, both in the practice-oriented literature and in large firms whose subsidiaries in German-speaking countries had established controllers.<sup>4</sup> Initially, *Controlling* was nothing more than a trendier name for management accounting departments, and the academic literature hesitated to jump on it as it was unclear what was new given the fact that *Kostenrechnung* or *Interne Unternehmensrechnung* extended their boundaries well beyond traditional cost accounting themes and included the usage of costs for management purposes, that is, planning and budgeting, management control, and decentralization issues.

When the demand from practice for controllers grew due to the growth and the internationalization of firms, universities reacted by establishing professorships in *Controlling* and research began studying themes that were considered to be part of *Controlling*. Indeed, there has been a significant increase in the number of publications both in research-oriented and practice-oriented journals, mainly in the late 1980s.<sup>5</sup>

German research has a long history in discussing definitions of research objects of the disciplines, and this is what happened with *Controlling*, too. Not surprisingly, there is an enduring and controversial literature that discusses the scope and boundaries of *Controlling*, its scientific program or framework and, more recently, its most promising methodologies.<sup>6</sup> The most commonly held view is that the research object of *Controlling* is coordination in firms. Coordination includes, in particular, planning and control, information, delegation, performance measures, and incentives. Most definitions rely on systems theory as the basis for deducing the content of *Controlling*.

<sup>3</sup>The distinction is evident from the titles of standard textbooks: the first two labels appear in Coenenberg (2003), Schweitzer & Küpper (2003), and Ewert & Wagenhofer (2005), the label “*Controlling*” in Horváth (2006), Küpper (2005), and Weber (2004). The leading encyclopedia (Küpper & Wagenhofer, 2002) uses both labels.

<sup>4</sup>Horváth (2002) provides an insightful overview of the historical development.

<sup>5</sup>See Binder & Schäffer (2005).

<sup>6</sup>The articles in Scherm & Pietsch (2004) are a recent example for the diversity of views of *Controlling*. Schäffer et al. (2006) provide a co-citation analysis of articles over the periods 1970–1989 and 1990–2003 and find clusters with *Controlling* concepts; a major place for such discussions are textbooks.

There is some controversy as to the boundaries of coordination. The narrower view is that *Controlling* focuses on planning, control, and information production with a clear earnings-oriented objective and, thus, it has a management support function. The broader view is that *Controlling* coordinates the management system of the firm, including planning, control, information, human resources, and organizational functions with a view to support all of the firms' objectives whatever they may be.<sup>7</sup> The issue then is how *Controlling* distinguishes itself from other disciplines such as organizational behavior and strategic management. To increase confusion of definitions, theorists discussed the difference between *Controlling* in a functional perspective and what controllers do (or should do) from an institutional perspective. The argument is that *Controlling* is, at least partially, a task of general management—the term “*Self-Controlling*” is indicative—and controllers would support these functions but not engage in the original tasks, such as, budgeting.

Hirsch (2003) asked professors of *Controlling* at universities in German-speaking countries in a questionnaire what definition of *Controlling* they would use in their teaching. Twenty-one percent responded with management support function, 18% said coordination, 16% management control, and 13% ensuring management rationality. A survey among business administration professors by Ahn (1999) finds that 42% favor the narrow coordination aspect while 12% support the coordination of the management system. The International Group of Controlling (IGC), which is German-based, formulated a mission statement for Controllers that includes the provision of information (or in a newer term: transparency), coordination, planning, and setting targets.<sup>8</sup> The analysis of job advertisements in a major German newspaper over more than 40 years shows a similar distribution: budgeting, control, and reporting are the most often mentioned tasks for controllers.<sup>9</sup> Hoffjan & Wömpener (2006) compare leading German *Controlling* textbooks with US and UK management accounting textbooks and find differences in the contents mainly that German textbooks

Table 1. Functions of controllers in German and US firms (Stoffel, 1995, p. 159).

Function	Percent German (%)	US firms (%)
Budgeting	97	89
Operative planning	80	34
Strategic planning	36	23
Management reporting	90	86
Capital budgeting	70	34
Cost accounting	65	91
Financial accounting	21	97
Financial planning	25	57
Financial reporting	30	63
Tax planning	12	57

emphasize management tasks more and cost accounting less than US and UK textbooks.<sup>10</sup> Hoffjan (2003) analyzes the image of controllers as evidenced in German magazine advertisements and finds that the cost-cutting image dominates (49%) with information provider (20%) and watchdog (19%) as the next most frequently used stereotypes.

The themes covered in *Controlling* and in management accounting overlap to a great extent. *Controlling* tends to extend somewhat more into strategic management accounting and into special applications in firms' functions (e.g., R&D, logistics, marketing, human resources) and in different industries (e.g., manufacturing, services, non-profit). An interesting aspect of the boundaries, however, is the difference between the typical tasks of controllers in German and US firms. A survey study by Stoffel (1995) shows that the main difference is the extent to which controllers cover financial accounting functions (see Table 1).<sup>11</sup> Financial and management accounting have been strictly separated in German-speaking countries; therefore, controllers have not been actively involved in financial accounting, reporting, and tax planning tasks, which contrasts the functions in US firms. We discuss this separation below in more detail and indicate that there is a tendency to converge financial and management accounting in German-speaking countries.

Generally, practice has been pretty unimpressed by the semantic discussion in academia that focuses on the definition of *Controlling* rather than on instruments that can be used to improve performance.

<sup>7</sup>One controversial definition is that *Controlling* guarantees the rationality of management (Weber & Schäffer, 1999). They have in mind that controllers should scrutinize management decisions (i.e., counter-act bounded rationality of managers), provide relevant information, control the effects of decisions and coordinate decisions.

<sup>8</sup>See [http://www.igc-controlling.org/engl/index\\_engl.html](http://www.igc-controlling.org/engl/index_engl.html) (August 2006).

<sup>9</sup>See Weber & Schäffer (1998, p. 229).

<sup>10</sup>A reason for this result may be that Hoffjan & Wömpener (2006) do not include German cost accounting textbooks in their study.

<sup>11</sup>Ahrens (1999) compares German with British controllers.

Table 2. Theories and research methods of 221 management accounting research articles in the leading German journals in 1997–2004 (Wagenhofer, 2006).

	Analytic (%)	Empirical (%)	Normative, conceptual (%)	Total (%)
Economics	27	1	3	31
Finance, capital markets	4	3	9	15
Production, operations management	14	6	15	34
Organizational behavior	–	–	–	0
Sociology	–	–	1	1
Psychology	–	–	1	1
Strategic management	–	4	12	16
Other	–	0	1	2
Total	44	14	42	100

Figures rounded.

From a research perspective, we believe a clear definition of the research object of *Controlling* is a moot question because changing environments, markets, and organizations require a flexible approach to analyze emerging issues rather than always questioning whether an issue is in the domain of *Controlling* or not. A potential benefit of a discussion of what *Controlling* is (or should be) lies in contributing to a better understanding of coordination problems and possible solutions in firms, including their change over time and how these are embedded in the organization.<sup>12</sup> Coordination of individual actions to advance a common objective is necessary due to interdependencies and decentralized decision-making. Management accounting research can study the design and use of information systems for decision-making and for coordination within the firm, including the costs and benefits of coordination instruments. We discuss some of the literature in a later section.

In the scientific community of German-speaking countries, there has recently been a debate about the strategies for internationalization of *Controlling* research.<sup>13</sup> Much of the research is normative or conceptual.<sup>14</sup> Even in the leading German academic journals over 40% of the management accounting articles fall in this genre. There are differing views of what constitute promising research strategies. Information economics and, in particular, agency theory count for a large part of recent research (see Table 2),

whereas some call for more behavioral or empirical research arguing that agency theory relies on too stringent assumptions and ignores actual decision-makers' behavior.<sup>15</sup> However, as yet, there have been few distinctive contributions using these methods.

### 3. Relationship between Financial and Management Accounting

A characteristic feature of German management accounting is the divorce of cost accounting from financial accounting. Almost every introductory cost accounting textbook starts with a careful distinction of costs, expenses, expenditures, and cash outlays and practice follows that distinction. A similar distinction has been put forth for revenues, but it is less pronounced in practice. The common definition of cost is the monetary value of goods and services used for a particular purpose in an accounting period (the term "particular purpose" is usually directed to the basic business of the firm, e.g., producing machines in case of a mechanical engineering firm, etc.). Expenses as recorded in the financial accounting system differ from costs in that the latter exclude "neutral" expenses, include other imputed costs, and may differ in measurement. "Neutral" expenses are those incurred for purposes other than those for which the calculation is made,<sup>16</sup> expenses that relate to other periods, and extraordinary expenses. Conversely, costs include additional items that are not expenses, such as the imputed cost of invested equity capital and costs for owner-managers' salaries and leases paid to owner-managers (as they are part of the owner's profit in the financial accounts of certain legal forms). Finally, items

<sup>12</sup>See for such an approach Homburg (2001).

<sup>13</sup>See, e.g., the collection of papers in Weber & Meyer (2005) presented at a conference with this topic in autumn 2004.

<sup>14</sup>There has not been much change over the last 30 yr or so, although in the last 10 yr the normative or conceptual approach declined in the number of articles in the German research journals. See Binder & Schäffer (2005).

<sup>15</sup>See, e.g., Bramsemann et al. (2004).

<sup>16</sup>Recurring to the example of the mechanical engineering firm, the expenses of, say, investment property that is unrelated to its basic business would be classified as neutral.

that are included in costs and in expenses may differ in their measurement. The most significant items are depreciation, material used for production, and warranties.

The reasons for differences between costs and expenses draw from various sources. The exclusion of other period and extraordinary expenses is due to the desire to shield the determination of costs from events that, as per definition, are not related to the production process in the period. For example, expenses for warranties are commonly based on average rather than actual claims in the period and, thus, are smoothed over periods. The inclusion of additional costs results from opportunity cost thinking: if the resources were provided by a party other than the owner, they would incur expenses and costs. Thus, including such items as costs takes into account the alternative use of the owner's resources and provides a threshold for the economic profit of the firm. Some of the differences in the amounts of certain items result from physical capital maintenance if, for example, the depreciation base is revalued to replacement cost and the cost of material used to current cost at the date of usage or even at the expected date of repurchase. Another difference aims at correcting the effects of financial and tax accounting rules that require an accounting treatment that may differ from a neutral treatment. A particularly important example is again depreciation: Financial accounting regulation limits the useful life of many fixed assets that is used for depreciation purposes, which may not conform to the economic useful life. The strong link between financial and tax accounting induces firms to select the shortest useful life tax laws accept in order to increase their expenses and, thus, reduce the present value of their income tax burden.

The typical design of German cost accounting systems follows this distinction and includes as a first step in cost accounting the “*Betriebsüberleitungsbogen*” that reconciles expenses from the financial accounting system and costs. In Germany, the typical chart of accounts even includes groups of accounts for “neutral” expenses and for additional costs.<sup>17</sup> Not every firm, however, makes all the distinctions suggested in theory. Table 3 provides insights into the potential occurrence of these differences and the variety of procedures of medium-sized and large German industrial firms in 1997.<sup>18</sup>

Table 3. Differences between costs and expenses in German industrial firms (Währisch, 2000, pp. 681–685).

Cost category	Percent of firms (%)
<b>Depreciation cost</b>	
<i>Depreciation base</i>	
No difference	54.4
Difference from expenses:	
Replacement cost	40.9
Inclusion of intangible setup costs	2.0
Inclusion of technological progress	10.1
<i>Depreciation method</i>	
No difference	38.9
Difference from expenses:	
Straight-line	65.1
Accelerated	8.7
Decelerated	0.7
Unit-of-production	10.7
<b>Interest cost</b>	
<i>Capital base</i>	
Not included in cost	12.4
Contract-related	2.7
Debt capital (no difference from expenses)	14.9
Equity capital	6.1
Invested capital	25.0
Total capital	38.9
<i>Interest rate</i>	
Long-term riskless interest rate	26.6
Weighted average cost of capital	24.4
Average cost of debt capital	21.5
Other	27.5

The diversity of underlying reasons for the distinction between costs and expenses is the result of a long history of conceptual thinking about costs. In the early days, accounting developed from the desire of firms to keep track of the production of products and the transactions with other parties and to periodically determine the profit from their activities. There was no difference between financial and management accounting. In the late nineteenth century, the German states introduced laws that made financial accounts the basis for taxation. This tax conformity rule, also known as the authoritativeness principle (“*Maßgeblichkeitsprinzip*”), has since been a key characteristic of German financial statements. The idea was to avoid that firms had to prepare a second set of accounts for tax purposes but instead could use their financial statements for that purpose.

<sup>17</sup>This chart of accounts is due to Schmalenbach (1927).

<sup>18</sup>Wolfsgruber (2005, pp. 215–218) reports similar observations for large Austrian companies.



The drawback, of course, was that the financial statements became instrumental in the firms' tax management, and firms had an incentive to understate accounting income to reduce current income tax payments. At the same time, financial accounting regulation increased sharply due to various scandals. To protect creditors, the regulation prescribed strongly conservative accounting to limit the distribution of dividends. Both these developments decreased the usefulness of accounting numbers for management purposes, and firms began to develop their own management accounting systems that differed from financial accounting.

Accounting and business research guided the development of deviations from financial accounting. One argument draws from capital maintenance concepts. The financial accounting regulation has ignored the maintenance of physical capital, although there were many theoretical developments in that direction in the 1930s.<sup>19</sup> The usage of replacement cost and current cost follows from this type of reasoning. In some cases, capital maintenance did more than it was designed for: several authors and industry recommendations favored depreciation based on replacement value *and* calculating interest cost using a nominal interest rate, thus, in effect double-counting for inflation. Another argument focuses on optimal decision-making based on cost information: costs should include all the effects of a decision, that is, direct costs and (if not all possible actions are considered) opportunity costs. Costs defined as such imply the separability of the decision problems and can be used for decentralized decision-making.<sup>20</sup> One difficulty with this approach is that opportunity cost can be measured only by solving the decision problem in the first place. Then, of course, there is no use of knowing the opportunity cost; it could only be used as an approximation for similar problems. Another difficulty is that different decision problems imply different opportunity costs, thus, making cost a highly situation-specific concept. The major usage of costs at that time was for pricing decisions.<sup>21</sup> In the 1930s, the German government regulated cost accounting to control firms' profits. Nowadays, a regulation includes a scheme for the determination of unit cost for use in public

contracts<sup>22</sup> and for regulated firms, such as the power grid divisions of electrical utilities. Of course, firms have incentives to pad costs in such situations and are happy to argue for costs that are greater than expenses.

Although there was some controversial discussion in the research literature, it did not have much effect on this separation of cost and financial accounting. A major change occurred in 1993 when a large firm, Siemens, eliminated most of the differences and used earnings in the income statement for management accounting purposes. Ziegler (1994) explained this change with the increasing globalization of the Siemens group, the experience that non-German employees had difficulty to understand and accept the German management accounting system, and the potential confusion that may be caused by different earnings in the financial and managerial accounting systems. In addition, the traditional use of cost accounting for pricing decisions had lost importance due to changes in global markets, while management control issues had gained significance in the decentralized organization. As a consequence, Siemens defined operating profit based on the income statement before expenses that resulted from conservative accounting (lower-of-cost-or-market for inventory and receivables and the recognition of certain provisions) and before associates' profits and losses and interest expenses. The only additional cost was interest cost on invested capital measured at market interest rates.

This widely recognized move spawned a new discussion of the definition of costs, their relation to financial accounting expenses, and the purposes of management accounting in general.<sup>23</sup> The major arguments for harmonization, or even integration, of management and financial accounting brought forth are the consistency of these two systems for reporting purposes, the lower cost of maintaining two accounting systems, the reliability of financial accounting numbers, and, perhaps most importantly, the lack of understanding of the traditional German cost

<sup>19</sup>Mattessich & Küpper (2003) provide a survey of this literature.

<sup>20</sup>This discussion goes back to Schmalenbach (1930). See Hax (2001) for a discussion.

<sup>21</sup>See Pfaff & Weber (1998, p. 153) for a discussion of this point.

<sup>22</sup>This regulation consists of several statements called principles for the price determination on the basis of cost (*Leitsätze für die Preisermittlung aufgrund von Selbstkosten*, LSP). See, e.g., Coenberg & Schoenfeld (1990). Up to 1989, it included depreciation based on replacement value and interest cost calculated with a fixed nominal interest rate.

<sup>23</sup>Several prominent accounting researchers such as, e.g., Coenberg (1995), Küpper (1995), Küting & Lorson (1999), Männel (1999), Pfaff (1994b), and Schweitzer & Ziolkowski (1999) contributed to the discussion.

Table 4. Costs and benefits of an integrated accounting system in the view of large German firms (Horváth & Arnaout, 1997, pp. 262–263).

Costs and benefits of an integration of management and financial accounting	Percent of firms (%)
<i>Benefits</i>	
Uniform performance measures in the group	82
Simplified management accounting	67
Clearness (international understandability)	61
Cost savings	59
Improvement of international management	45
<i>Costs</i>	
Lower achievements of management accounting objectives	45
Short-termism	29
Loss of information content of performance measures	26
No costs	29
<i>Importance of a distinction between costs and expenses</i>	
Very important	8
Important	27
Neutral	37
Less important	22
Unimportant	6

accounting outside German-speaking countries.<sup>24</sup> The major arguments against harmonization are that financial accounting serves a different purpose than management accounting and, consequently, costs should be different from expenses (“different costs for different purposes”), the effect of possible earnings management incentives on cost, and the dependence on financial accounting standards and, particularly, their frequent revisions that hamper consistency over time. The costs and benefits of harmonization or integration are still controversially debated. Table 4 lists costs and benefits mentioned by the largest German firms in 1997 in a survey by Horváth & Arnaout (1997). Generally, it shows a propensity for an integrated accounting system, but it also reveals some variation.

<sup>24</sup>(Then) Daimler-Benz coined the new controller “*Bil-trol-ler*,” a combination of “*Bilanzierer*” (financial accountant) and controller.

The most important change in the accounting environment occurred from 1994 onward, when several large and globally acting firms in German-speaking countries voluntarily adopted international accounting standards (International Financial Reporting Standards—IFRS—or US GAAP) in their group accounts.<sup>25</sup> This move required the implementation of a second financial accounting system in addition to that based on local GAAP. Even when laws in Germany and Austria allowed these firms to replace their local GAAP group accounts and European Union regulation now requires IFRS group financial statements for listed firms, they had to maintain local GAAP individual accounts and tax accounts.

The management accounting literature took up the issue and began studying the usefulness of international accounting standards for management accounting purposes.<sup>26</sup> International accounting standards are much more oriented towards providing decision-relevant information for investors than GAAP in German-speaking countries. They include less conservative accounting rules and revenue recognition and measurement rules that are more in line with management accounting purposes. Moreover, they require detailed segment reporting and risk reporting. Many firms concluded that they could well use the financial accounting information based on international accounting standards for management accounting purposes. The benefit is better communication of results to division managers who observe the segment reports and are confused by differences between the information in the segment and the management reports. An additional benefit is the aligned timing of information for management and for investors; both groups want interim and timely information; on the other hand, individual statements and tax assessment are required only annually and often with a long time lag. The adoption of international accounting standards may even improve management accounting systems if they require data that were not available before or procedures that were too complex or costly to implement or maintain for management accounting purposes alone.<sup>27</sup> However, the

<sup>25</sup>Interestingly, Siemens, who started the discussion, was a late adopter. It began preparing group statements according to US GAAP only in 2000.

<sup>26</sup>See, e.g., Küting & Lorson (1999), Weißenberger (2003), and the articles in Wagenhofer (2006).

<sup>27</sup>Of course, this improvement needs not be efficient from an individual cost-benefit perspective—otherwise the firm should have adopted it even without the appeal to international accounting standards.

availability of more information can also have detrimental effects because managers can use that information for their own purposes, which need not coincide with the owners' objectives.<sup>28</sup>

We note the interdependency between cost accounting systems and the financial accounting regime. A change in the financial accounting regime has a consequential effect on the costs and benefits of maintaining separate cost accounting systems and, indeed, led many firms to adapt their financial (international accounting standards) and cost accounting systems to the changing regulatory environment.

The development in the United States has been in the opposite direction. While financial and cost accounting systems have been closely aligned (as can be judged by a look into common introductory management accounting textbooks), there is a tendency to introduce adjustments to financial earnings numbers for management accounting purposes. For example, proponents of value-based management measures such as the Economic Value Added suggest a large number of (potential) adjustments. Typical examples are research and development expenses, provisions, lower-of-cost-or-market effects, and gains from disposal of assets, many of which are reminiscent of what the German cost versus expense debate is about. Another example is the tendency to disclose pro forma earnings numbers to investors. Firms usually claim that they better portray the actual situation than GAAP earnings—and some of the empirical literature supports this claim—and/or are used for management accounting purposes. Major adjustments are non-recurring items, such as restructuring expenses and gains from the disposal of assets. We take up this theme in a subsequent section.

#### 4. Cost Theories and Concepts

Management accounting in German-speaking countries has always shown great interest in theoretical foundations of costs and their use in solving various decision problems. In this chapter we focus on three cost concepts that illustrate the sophisticated level of cost theory in Germany.

##### 4.1. Production-Based Costs

Costs essentially consist of two components, price and quantity, which are determined by numerous factors that can at least be partly controlled by management. Thus, it seems appealing to have a model

that is conceptually capable of integrating all these factors into a unifying approach. In principle, such a model has to specify and explain the relationships for quantities as well as for prices. The approach of production-based costs focuses mainly on the detailed explanation of the quantities but leaves open the factors affecting the price component of costs. The reason for this procedure stems from the popularity of production theory in the post-war literature on business administration in German-speaking countries.<sup>29</sup> In this era, the economy was mainly manufacturing-driven, the firm was viewed as a “production function” and researchers strived to develop those functions in a very general form.<sup>30</sup> There are a large number of production-based approaches that can be used as a foundation for capturing the quantity component of costs. With respect to valuation, the prices of inputs were either taken as given or there were calls for further market-based research on these issues.

In its most general form, the production-based approach is essentially a variant of an input–output analysis.<sup>31</sup> To illustrate, assume the firm's activities take place in  $j = 1, \dots, J$  production departments, each of which produces exactly one product. Each product may be used as a final output (if sold to the firm's customers) or as an intermediate product (if it is further processed in the production chain). Let  $q_j$  denote the total output of production department  $j$ ,  $q_{jh}$  the quantity of this output that department  $j$  delivers to department  $h$  ( $h = 1, \dots, J$ ), and  $x_j$  the quantity sold as a final product to the market. Then the physical flows of goods between the firm's production departments can be written as a system of  $J$  equations:<sup>32</sup>

$$\begin{aligned} q_1 &= q_{11} + q_{12} + \dots + q_{1J} + x_1 \\ q_2 &= q_{21} + q_{22} + \dots + q_{2J} + x_2 \\ &\vdots \\ q_J &= q_{J1} + q_{J2} + \dots + q_{JJ} + x_J \end{aligned}$$

In general, the quantities  $q_{jh}$  depend on several factors, e.g., the total output of department  $h$ , the intensity of the production process in department  $h$  (i.e., the number of units produced per hour), the

<sup>29</sup>Gutenberg (1951) is a major source for this approach.

<sup>30</sup>See for an overview of several “types” of production functions Kloock (1998, p. 313).

<sup>31</sup>See Kloock (1969) and Schweitzer & Küpper (1974) for a comprehensive analysis of these issues.

<sup>32</sup>The system can be extended to include changes in the stock of each product.

<sup>28</sup>For example, Kunz & Pfeiffer (2001) show that more information that results from financial accounting requirements may induce coordination problems such as a hold-up problem among divisions.

number of setups, specific parameters determining the resource usage of a production process (e.g., pressure, temperature, weights), and so on. These aspects are formally captured by writing  $q_{jh}$  as

$$q_{jh} \equiv \text{dc}_{jh}(y_h) \cdot q_h$$

where  $\text{dc}_{jh}$  is a function describing the *direct* consumption of product  $j$  per unit of product  $h$  and  $y_h$  represents all factors in department  $h$  that may affect any of these relationships (i.e.,  $y_h$  includes the “decision variables” with respect to the production process in department  $h$ ).

With this definition the above system of equations becomes

$$\begin{array}{rccccccc} q_1 & = & \text{dc}_{11}(y_1) \cdot q_1 & + & \text{dc}_{12}(y_2) \cdot q_2 & + & \cdots & + & \text{dc}_{1J}(y_J) \cdot q_J & + & x_1 \\ q_2 & = & \text{dc}_{21}(y_1) \cdot q_1 & + & \text{dc}_{22}(y_2) \cdot q_2 & + & \cdots & + & \text{dc}_{2J}(y_J) \cdot q_J & + & x_2 \\ \vdots & & \vdots & & \vdots & & \vdots & & \vdots & & \vdots \\ q_J & = & \text{dc}_{J1}(y_1) \cdot q_1 & + & \text{dc}_{J2}(y_2) \cdot q_2 & + & \cdots & + & \text{dc}_{JJ}(y_J) \cdot q_J & + & x_J \end{array}$$

or

$$\mathbf{q} = \mathbf{DC} \cdot \mathbf{q} + \mathbf{x}$$

where  $\mathbf{q}$  is the  $(J \times 1)$ -column vector of  $q_j$ ,  $\mathbf{x}$  is the  $(J \times 1)$ -column vector of  $x_j$ , and  $\mathbf{DC}$  denotes the  $(J \times J)$ -matrix of  $\text{dc}_{jh}$ . If  $\mathbf{DC}$  is regular, the system can be solved for  $\mathbf{q}$  and provides

$$\mathbf{q} = (\mathbf{E} - \mathbf{DC})^{-1} \cdot \mathbf{x}$$

This representation expresses the total output of each production department as a function of the final output that the firm wants to sell and several intervening variables that are contained in the elements  $\text{tc}_{jh}(\mathbf{y})$  of the inverse  $(\mathbf{E} - \mathbf{DC})^{-1}$ . The factors  $\text{tc}_{jh}(\mathbf{y})$  can be interpreted as the *total* consumption of product  $j$ , which is required per unit of product  $h$ . The difference between direct and total consumption coefficients results from multi-stage production processes, and these relationships may be further complicated due to possible production cycles in which one department delivers goods to another department and vice versa. All these aspects are eventually contained in  $\text{tc}_{jh}(\mathbf{y})$  and this implies that, in general, the total consumption coefficients not only depend on the factors  $y_h$  of a single production department but on the factors of all departments (which are represented by  $\mathbf{y}$ ).

To derive expressions for production-based costs, the links between the final outputs  $x_j$  and the firm's market inputs have to be added. Assume that for each input  $i = 1, \dots, I$ , there exists one “virtual” procurement department whose total output is  $m_i$  (i.e.,  $m_i$  is the quantity of input  $i$  that has to be

procured on the market in order to fulfill the production needs for the planned program of final outputs). Let  $\text{fm}_{ij}(y_j)$  denote the *direct* resource usage of input  $i$  per unit of product  $j$ ; these coefficients may also depend on the factors  $y_j$ . Then, for each input  $i$  the following equation holds:<sup>33</sup>

$$m_i = \sum_{j=1}^J \text{fm}_{ij}(y_j) \cdot q_j$$

Inserting the solution for  $q_j$  yields

$$\mathbf{m} = \mathbf{FM} \cdot (\mathbf{E} - \mathbf{DC})^{-1} \cdot \mathbf{x}$$

where  $\mathbf{m}$  is the  $(I \times 1)$ -column vector of  $m_i$  and  $\mathbf{FM}$  is the  $(I \times J)$ -matrix of  $\text{fm}_{ij}(y_j)$ . If  $r_i$  is the price for input  $i$  and  $\mathbf{r}$  denotes the  $(I \times 1)$ -column vector of  $r_i$ , the firm's costs  $K$  are

$$K = \sum_{i=1}^I r_i \cdot m_i = \mathbf{r}' \cdot \mathbf{m} = \mathbf{r}' \cdot \mathbf{FM} \cdot (\mathbf{E} - \mathbf{DC})^{-1} \cdot \mathbf{x}$$

It follows that production-based approaches to cost accounting result in a complex cost function that expresses costs as a function of the firm's outputs sold to the market and all intervening variables of the production process including the effect of the production structure (i.e., whether there are production cycles or not). The approach is general enough to include linear as well as non-linear cost functions. The linear cost-volume relationships that are predominantly used in costing systems in practice are simply special cases of the general approach. They result either if there are no intervening decision variables  $y_h$  (in this case  $\text{fm}_{ij}$  and  $\text{dc}_{jh}$  are constants) or if, for whatever reason, the firm has already chosen specific values for these variables such that only the remaining decisions regarding the product mix affect the cost level. Allowing for intervening variables is certainly the more realistic approach, but it reveals a dilemma that can be found in virtually all costing

<sup>33</sup>This expression assumes that the inputs are only used for production purposes, thus there is no market dealing with the inputs themselves. However, such additional aspects can easily be incorporated.

systems in practice: To answer the question “What is the cost of a product?” one has to specify a plethora of parameters of the production process. However, the specification of these parameters is in itself an optimization problem. It follows that, strictly speaking, the costs of a product are an endogenous result of the decision problem and not an exogenous input.

The notion of production-based costs is the basis of a costing system called *Periodenerfolgsrechnung* (period-profit accounting) developed in several publications by Laßmann (1968, 1973, 1980). This system builds on the strict separation of prices and quantities, uses input–output relationships to model the quantity component of costs and focuses directly on the maximization of profits without considering contribution margins. An advantage of the strict separation between prices and quantities may be what is called *Primärkostenrechnung* (primary cost accounting) in the German literature. An inspection of the above characterization of the cost  $K$  reveals that it is completely expressed in terms of the “primary” inputs that have to be externally procured in the market. Thus, the impact of a change in input market prices on the cost is calculated by simply multiplying the given quantity component of the primary input (which already includes the effects of production planning and production structure) with the change in the market prices.<sup>34</sup>

Notwithstanding the conceptual insights from the production-based approach, its practical relevance has been considerably low. One can easily imagine that the empirical determination of the required functional relationships in a specific situation is time consuming and rather expensive; moreover, such efforts have to be repeated for each and every change in the production structure and/or equipment. While it is appealing to have an approach that is capable of incorporating non-linear relationships, those features may be difficult to handle in a practical decision problem. Laßmann, being aware of this problem, proposed linear approximations for the entries of the input–output matrices of his costing system. Furthermore, the approach focuses mainly on the functional aspects of operating and production departments, while similar aspects of service departments cannot be modeled in the same way. Hence, only part of the entire quantity component of costs is dealt with. It should be noted, though, that there is a

rich operations management and operations research literature that uses such concepts as starting point for further analyses. However, the conceptual influence of the production-based point of view is still present in the literature on cost accounting in German-speaking countries. Many introductory textbooks on managerial accounting include chapters on production theory as a foundation for cost accounting, and the presentation of costing systems is usually organized around a notion of processes and activities, which resembles the way of thinking in production-based approaches.<sup>35</sup> Furthermore, the GPK as one of the most popular German costing systems is based on a simplified version of a production-oriented approach. We discuss this system later in more detail.

#### 4.2. Costs Based on Discounted Cash Flows

A very different cost concept aims at deriving costs from cash flows within a capital-budgeting perspective. Indeed, long-term decisions are usually based on net present value (NPV) calculations rather than on cost. Embedding short-term decisions in a NPV framework would, therefore, seem to be a natural extension. This perspective leads to a major change in the definition of costs and revenues. Cost (revenue) of a particular course of action is defined as the decrease (increase) in the discounted future cash flows that can be attributed to that action. More specifically, discounted cash flows can be differentiated in the present value of cash inflows and that of cash outflows; then, costs can be defined as the increase in the present value of future cash outflows (given the present value of cash inflows). This definition of cost has become known in the German literature as the “investment-theory-based approach to cost accounting” (ITA) and has been widely discussed in the 1980s and 1990s.<sup>36</sup>

In principle, the power of the ITA lies in providing an integrative framework for the determination of the firm’s policy from the perspective of financial markets. However, this requires optimization techniques that are capable of recording all current and future transactions and their optimal changes that follow from adaptations to current market conditions. For instance, consider the (seemingly simple) decision whether an additional order should be accepted today. Suppose that the order induces cash inflows only in the current period without affecting any future

<sup>34</sup>This procedure abstracts from possible substitution effects that may occur by the change in input prices. Cost theory based on production functions has been used to describe various forms of cost behavior. See, e.g., Gutenberg (1951).

<sup>35</sup>A recent example is the cost accounting chapter by Schiller (2005) who explicitly employs a basic input–output model to present aspects of cost allocations between departments.

<sup>36</sup>See, e.g., Mahlert (1976), Swoboda (1979), Küpper (1985, 1993b), Küpper & Zhang (1991).

market conditions and/or cash inflows, which implies that the ITA-revenues are completely given by the current cash inflows. To assess the ITA-costs of this order, one has to calculate the change in the present value of future cash outflows. This present value is not only affected by the additional expenses that occur in the current period, but it additionally depends on the production plan for all future periods if there are any intertemporal interdependencies. For example, in the presence of learning effects, the future expenses for any contemplated production plan would decrease (*ceteris paribus*), and this effect has to be considered in the investment-based costs of the additional order today. Moreover, if the acceptance of this order changes the conditions for production in the future, then the given production plan is usually no longer optimal. Hence, the acceptance of the order would cause a change in the firm's future policy. This demonstrates that the ITA is a comprehensive planning tool and eventually leads to a "supermodel" of all current and future activities, which is hardly manageable and almost surely too expensive to maintain.

Notwithstanding the skepticism regarding the use of ITA-costs as direct ingredients for decision models in practice, the approach can be fruitfully employed as a conceptual link between long-term NPV-based planning and the traditional concepts of cost. Indeed, traditional costs can be derived from the ITA as special cases under certain conditions. This exercise highlights the latent assumptions in traditional cost concepts. To illustrate, consider depreciation cost. Normally, depreciation  $Dep$  is calculated as straight-line allocation of the investment over the useful life  $T$ ,

$$Dep = \frac{I - LQ}{T}$$

where  $I$  is the investment cost and  $LQ$  is the liquidation value at the end of the asset's useful life. This expression can be reconstructed from the ITA by assuming that the asset is part of an infinite chain of identical investments as follows. Let  $A_t$  denote the cash outflows of this asset resulting from the production of goods and/or services in period  $t$ . The present value  $PV_a^{\text{new}}$  of cash outflows of an infinite identical chain of this asset starting with a *new* asset (i.e., to be acquired today) is

$$PV_a^{\text{new}} = \left( \sum_{t=1}^T A_t \cdot \rho^{-t} + I - LQ \cdot \rho^{-T} \right) \cdot \frac{\rho^T}{\rho^T - 1}$$

with  $\rho \equiv 1 + i$ ,  $i$  being the discount rate.

If the asset has already been in use for  $\tau$  periods ( $\tau = 0, \dots, T$ ), the present value of cash outflows of an

infinite chain starting with the existing asset is

$$PV_a(\tau) = \sum_{t=\tau+1}^T A_t \cdot \rho^{-(t-\tau)} - LQ \cdot \rho^{-(T-\tau)} + PV_a^{\text{new}} \cdot \rho^{-(T-\tau)}$$

Then, the following holds:

$$\begin{aligned} PV_a(0) &= -I + PV_a^{\text{new}} \\ PV_a(T) &= -LQ + PV_a^{\text{new}} \end{aligned}$$

The investment-based value  $W(\tau)$  of an existing asset of age  $\tau$  is defined by

$$PV_a(\tau) + W(\tau) = PV_a^{\text{new}}$$

This definition follows from an arbitrage argument: Suppose an investor intends to commence production and can choose between purchasing an asset of age  $\tau$  or a new asset and then continue to reinvest identical assets.  $W(\tau)$  is the maximum amount that the investor is willing to pay for the used asset. ITA-depreciation can then be defined as the change of  $W$  over a period,

$$\begin{aligned} Dep(\tau) &= W(\tau - 1) - W(\tau) = PV_a^{\text{new}} - PV_a(\tau - 1) \\ &\quad - [PV_a^{\text{new}} - PV_a(\tau)] = PV_a(\tau) - PV_a(\tau - 1) \end{aligned}$$

Even though this depreciation is completely based on present values, the sum of all amounts over the asset's useful life exhibits the same "clean surplus" properties as does traditional depreciation,

$$\begin{aligned} \sum_{\tau=1}^T Dep(\tau) &= \sum_{\tau=1}^T [W(\tau - 1) - W(\tau)] \\ &= W(0) - W(T) = I - LQ \end{aligned}$$

The straight-line depreciation is a special case under two conditions. First, the periodical cash outflows  $A_t$  are constant, i.e.,  $A_t = \bar{A}$ , which implies

$$\begin{aligned} PV_a(\tau) &= \frac{\bar{A}}{i} + \rho^\tau \\ &\quad \cdot \left[ -LQ \cdot \rho^{-T} + \left( (I - LQ \cdot \rho^{-T}) \cdot \frac{\rho^T}{\rho^T - 1} \right) \cdot \rho^{-T} \right] \\ &= \frac{\bar{A}}{i} + \rho^\tau \\ &\quad \cdot \left[ -LQ \cdot \rho^{-T} + (I - LQ \cdot \rho^{-T}) \cdot \frac{1}{\rho^T - 1} \right] \end{aligned}$$

and the ITA-depreciation becomes

$$\begin{aligned} Dep(\tau + 1) &= PV_a(\tau + 1) - PV_a(\tau) \\ &= \rho^\tau \cdot \left[ -i \cdot LQ \cdot \rho^{-T} + (I - LQ \cdot \rho^{-T}) \cdot \frac{i}{\rho^T - 1} \right] \end{aligned}$$

Second, the cost of capital approaches zero, i.e.,  $i \rightarrow 0$ , or alternatively, cost of capital is measured separately

from depreciation cost. Using the fact that

$$\lim_{i \rightarrow 0} \frac{i}{\rho^T - 1} \rightarrow \frac{1}{T}$$

these two conditions imply that ITA-depreciation becomes

$$\text{Dep}(\tau + 1) = \frac{I - LQ}{T}$$

which is straight-line depreciation. With a similar line of reasoning many other traditional costs can be shown to result as special cases from ITA.<sup>37</sup>

The merit of such analyses is that traditional costs are in line with more sophisticated capital market-based concepts. If the conditions for the correspondence between traditional costs and ITA-costs approximately hold, one can safely use traditional costs as the error is probably not too high. However, the basic interdependence between the optimal actions of all periods is still present. The condition  $A_t = \bar{A}$  for the equivalence between ITA- and straight-line depreciation implies a special production plan for the future. Strictly speaking, the equivalence only holds if this plan is optimal and if this has been determined somewhere else. Hence, traditional costs are a kind of “byproduct” of the result of an unspecified decision model, and the use of these costs remains essentially an open question.

As this discussion shows, reconstructing costs from discounted cash flows has conceptual and pedagogical appeal and fits well to value-based management concepts. However, using the resulting definitions of costs and revenues directly as an input for decision models turns out to be too demanding for an efficient application in practice. We believe this is the reason that there have not been further developments of this approach in the German literature on managerial accounting over the last years.

#### 4.3. Costs and Uncertainty

The literature on cost accounting is not entirely, but to a large extent, concerned with calculating deterministic cost numbers and using them in deterministic decision models (e.g., the determination of the optimal product mix). An exception is the break-even analysis that explicitly considers uncertainty of a parameter, usually sales volume.

A major result of this literature is the well-known notion of relevant costs, i.e., costs that are affected by the decision under consideration are sufficient to consider for decision-making. In particular, fixed costs are by definition not relevant and can be

ignored. This view has been challenged by explicitly introducing cost uncertainty and risk-averse decision makers.<sup>38</sup> Key for potentially different conclusions on the relevance of fixed costs is that they can affect the risk aversion of the decision maker. If the risk aversion depends on the beginning wealth of the decision maker, then the optimal solution of the decision problem will also be wealth-dependent. For example, consider a decision maker with decreasing absolute risk aversion.<sup>39</sup> The wealthier this individual is the more beneficial are riskier investments (*ceteris paribus*).

This notion can be applied to operative decisions that are usually solved with cost accounting data. The objective function in this scenario is the maximization of the expected utility of the firm’s end-of-period wealth (in accounting terms), which is defined as the (accounting) wealth at the start of the period plus the total contribution resulting from the firm’s product mix minus fixed costs. Given non-constant risk aversion, the preferences of the firm regarding different product mixes obviously depend on the difference between the beginning-of-period wealth and the fixed costs, implying that it is no longer sufficient to focus on contribution margins in order to find the optimal solution. Hence, fixed costs may become relevant for decision-making not because they are in any way affected by the decisions under consideration (then they would not be “fixed” costs), but because they may have an impact on the valuation of risky contribution margins by risk-averse decision makers. While this basic result was first established by Dillon & Nash (1978) in the US literature, the idea was taken up in Germany by Schneider (1984) and initiated controversial debate about the decision relevance of costs under uncertainty.<sup>40</sup>

In addition to the wealth effects, whose importance is arguable, the debate has led to a much broader view of embedding cost accounting in a capital market context. The earlier literature assumes that the firm makes decisions as if it had a specific utility function. However, if the firm operates in an organized capital market, the firm’s objective is usually seen as the maximization of the market value of its shares. Then, the risk attitude should be based on the valuation in the capital market. Given no arbitrage in a market equilibrium, the valuation functional exhibits

<sup>38</sup>See, e.g., Monissen & Huber (1992), Schneider (1984), and Siegel (1985).

<sup>39</sup>Absolute risk aversion is defined by  $-U''/U'$ .

<sup>40</sup>For an overview of this debate see Ewert & Wagenhofer (2005, pp. 217–242).

<sup>37</sup>See, e.g., Küpper (1990).

the property of value-additivity. Let  $E = E_1 + E_2$  denote an uncertain stream of cash flows that consists of the sum of two cash flow streams  $E_1$  and  $E_2$  and let  $V[\cdot]$  be the valuation operator. Value-additivity implies

$$V[E] = V[E_1 + E_2] = V[E_1] + V[E_2]$$

It immediately follows that all costs that are not directly affected by a decision are again irrelevant for the resulting decision problem under uncertainty since these costs can be separated from the relevant cash flows. Hence, it would seem that the question of which costs are relevant for decision-making depends on the possibility of trading the firm's shares in the capital market, i.e., whether the firm's equity is listed on a stock market.

However, Ewert (1996) shows that even for non-listed firms a policy of "virtual" maximization of its market value is optimal provided the capital market is characterized by spanning and competitiveness.<sup>41</sup> To see this, suppose the firm would want to follow a production policy  $a$  that is different from the production policy  $m$  that maximizes its (virtual) market value. Although the firm's equity, i.e., its production policy, cannot be directly traded on the capital market, the firm can act on the capital market (without affecting the prices due to competitiveness) by buying and/or selling any portfolio of financial instruments. Given spanning, there exist portfolios with the same payoffs as those resulting from policies  $a$  and  $m$  and they have market values  $V_a$  and  $V_m$ , respectively. Now suppose that the firm switches from production policy  $a$  to policy  $m$ . Then the firm can short-sell the  $m$ -portfolio and buy the  $a$ -portfolio. This transaction results in the same end-of-period payoffs as if production policy  $a$  had been chosen but yields an additional cash surplus of  $V_m - V_a > 0$  at the beginning of the period because, by optimality of  $m$ ,  $V_m > V_a$ . Hence, production policy  $m$  dominates  $a$  if the firm can use the capital market to duplicate the uncertain cash flows from the production program. In that case, value-additivity applies indirectly and fixed costs are again irrelevant for determining the optimal production program. The key is that the production program needs not take care of diversification demands of the firm's owners but lets the capital market do that.

While the discussion of the decision relevance of costs under uncertainty had quite some impact in the German-speaking academic literature, it neither had

much in the international literature nor in practice. Reasons may be that uncertainty is not considered a big issue for short-term decision-making, and also that market value maximization would imply a major change from traditional cost accounting, which measures cost usually from an internal rather than from a market valuation perspective. Indeed, decisions would have to be based on the market values of uncertain future cash flows, which are difficult to obtain. However, we note that hedging has become a major activity, at least, by large firms, and what it essentially does is to transform the uncertain cash flows from production to another uncertain cash flow stream. We are not aware that firms choose their operative decisions and hedging activities simultaneously. Usually, hedging is done after the operative decisions have been made, although simultaneous consideration may lead to different operative decisions.

## 5. German Cost Accounting Systems

Given the strong production-theoretical background on costing, it is not surprising to find developments of elaborated cost accounting systems. However, as Table 5 shows, there is wide variety across firms in their use of cost accounting systems. It is mainly large German firms, which implemented sophisticated cost accounting systems, while smaller firms use much simpler systems. In this section, we discuss the two conceptually most refined cost accounting systems.

### 5.1. Grenzplankostenrechnung

The GPK is a widely used cost accounting system for cost planning and control purposes in German-speaking countries. Its origins are similar to direct costing, which was presented first in the US literature by Harris (1936), but it was independently developed in Germany by Plaut (1953), a consultant, and Kilger (1961), an academic. The practical success of GPK is a result of several factors: First, it strictly separates variable (called proportional) and fixed costs and concentrates on variable (i.e., relevant) costs for decision-making in the GPK; thus, it matched the development of operations research optimization techniques (e.g., linear programming) at that time. Second, implementability has always been important; indeed, GPK developed hand-in-hand with software that could handle the necessary mass of cost data (software was first marketed by the Plaut group, later GPK had been integrated into the enterprise resource planning software SAP R/3). And third, from the beginning there has been an emphasis on a production-based foundation of the system, which has been

<sup>41</sup>For a definition of these characteristics see, e.g., DeAngelo (1981).



Table 5. Use of cost accounting systems in practice.

Cost accounting system	Percent of firms (%)			
	(a)	(b)	(c)	(d)
<i>Based on actual costs</i>	–	55	53	–
Pure actual cost	–	32	–	–
Normalized cost	–	7	17	–
Budgeted cost	–	58	33	–
<i>Full or partial costs</i>				
Pure full cost	13	34	–	48
Pure partial cost	63	11	–	5
Single-step contribution	13	10	10	–
Multi-step contribution	56	25	52	–
<i>Grenzplankostenrechnung</i>	–	–	18	–
<i>Einzelkosten- und Deckungsbeitragsrechnung</i>	19	–	–	–
Combined full and partial cost	29	51	39	24

Source: See Küpper (1993a, p. 609)

Note: (a) Paper industry (Marner, 1980), (b) large industrial firms (Frost & Meyer, 1981), (c) industrial firms (Küpper, 1983), and (d) Becker (1985).

shown above to be one leading approach to conceptual thinking about costs in Germany.

The aim of GPK is to provide a consistent structure that provides relevant costs for decision-making by tracking factors of the production process through a system of *Bezugsgrößen* (BGs), which are similar to cost drivers in activity-based costing. The core of GPK is the premise of linearity (since its intention was to provide relevant data especially for linear planning models) and the use of a system of cost centers.<sup>42</sup> The firm's activities are structured into direct and indirect cost centers, which collect costs for the centers' activities and trace them by a specific system of BGs.<sup>43</sup> In the simplest case, resource usage depends only on the output quantity the center produces (output is defined center-specific, i.e., it may be an intermediary or final product or some service provided for other centers). This case is referred to as "homogenous cost tracing," and one BG suffices to capture this relationship. The homogenous case may also be valid if the center provides different types of outputs, which can be traced back for costing purposes to one common factor, e.g., machine hours. Then, the costs only depend on this common factor, and again one BG is sufficient to describe this relationship. However, even if there is only one type of

output, it may not be sufficient to employ only one BG if there are several ways of producing this output. For example, the center may consist of several production lines with different resource usages per unit of production. In this case, the costs of one unit of center-output cannot be calculated by using, say, these units as the single BG for this center, since costs depend on which production line is used. Hence, several BGs have to be used (e.g., the units of output produced on production line 1, 2, etc.), which is referred to as "process-based heterogeneous cost tracing." Similar considerations apply if a center produces several types of output that cannot be traced to one common factor, which is called "product-based heterogeneous cost tracing." Obviously, the occurrence of heterogeneity eventually depends on structuring the firm's activities in cost centers. The narrower these centers are defined, the more likely is a homogenous cause of costs, and vice versa. Hence, the structuring into cost centers and the subsequent choice of a system of BGs are interdependent.

Cost planning is performed on the center level. Variable and fixed costs are separated for each center's resource. Variable costs are assumed to behave linearly in the respective BGs. Fixed costs are stated separately for each resource, and they are not allocated to a BG or to a final product since they are not considered relevant for decision-making. Separation of variable and fixed costs can be a subtle task, and the GPK acknowledges that fixed costs contain a discretionary component that depends on the time horizon. Fixed costs are defined as those costs that occur even if the BGs in the center approach zero.

<sup>42</sup>We do not intend to give a comprehensive overview of all facets of this system but concentrate on the most essential aspects. A standard reference for GPK is Kilger et al. (2002).

<sup>43</sup>Since the GPK aims to support optimal product-mix decisions, the most important BG is production quantity.

For example, consider labor costs and assume a period of lay-off for the workers of three months. If the cost planning period is also three months, then the base wage is essentially fixed. If the planning period is 6 months, then even if output approaches zero, the base wage for 3 months could be treated as a variable cost. What happens eventually is at the management's discretion and does not occur automatically, and long-term considerations are outside the GPK system. However, this discussion shows the interdependency between the planning period, decisions outside the costing system, and the separation of costs.

Technically, the center-specific cost planning is executed by first fixing a specific value for a BG (e.g., 1,000 machine hours), which is eventually derived from the firm's planning system. Then, the resource usage for each type of input is calculated for this specific BG level and multiplied by the planned price of the input. This gives the total costs for this input conditional on the chosen BG level. Summing up the costs of all inputs that are "caused" by the same BG and dividing them by the BG results in the (linear) variable costs per unit of BG. This procedure is repeated for each BG of each cost center and gives the total planned variable costs.

Using these costs for the calculation of the cost of a final product can be difficult since some BGs are not suitable for product calculation. For example, consider a maintenance department in which hours of maintenance are used as the BG for cost planning. Clearly, in general, it is not possible to figure out how many maintenance hours are necessary for one unit of the respective product and, hence, maintenance hours are not a suitable BG for calculation. The GPK handles such difficulties by differentiating between "single-purpose" and "dual-purpose" BGs. Only the latter BGs are suitable for planning as well as for calculation purposes, while costs planned by using single-purpose BGs are allocated by overhead rates based on other BGs or direct material or direct labor costs.

This description of the essential aspects of GPK demonstrates that this cost accounting system is able to integrate a variety of determinants of costs with its BG system. Furthermore, the close relationship to activity-based costing is evident, since the BGs in the GPK and the cost drivers in activity-based costing are often identical. This may explain why activity-based costing, when it set out to conquer the management accounting world in the 1990s, was not simply adopted in German-speaking countries. The theory of cost accounting was more advanced and cost accounting systems in firms were more developed than in the rest of the world.

GPK has been implemented by many German firms and was facilitated by supporting software. Indeed, it is not uncommon that firms use hundreds or even thousands of cost centers and BGs.<sup>44</sup> However, the number of cost centers and BGs is the result of a trade-off between complexity and imprecision, both of which are prone to errors; complexity requires exact attribution of costs to cost centers and to BGs, whereas imprecision results from built-in averaging. Moreover, increasing dynamics in the firms' production environments made it cumbersome to capture the changes in a timely fashion. As a result, many firms began reducing the over-complexity.<sup>45</sup> This development contrasts with that in the United States, which was commonly considered too coarse and, therefore, strived for more precision.

A major disadvantage of the GPK was that it did not pay sufficient attention to fixed costs on grounds that they cannot be allocated on a theoretically sound basis. An implication is that the costs of overhead and service departments (which are largely classified as fixed costs relative to production volume) are also not dealt with in sufficient detail. In many industries, fixed costs represent a high proportion of total costs,<sup>46</sup> and not accounting for them properly might have them escape management's attention. Moreover, decisions became much more long-term rather than short-term. Therefore, the ideas of activity-based costing fell on fertile ground and were used to develop cost accounting systems that explicitly focused on indirect costs, capacity costs, and costs of services, which are usually considered fixed costs from a short-term perspective. Such systems are known as *Prozesskostenrechnung* and *prozessorientierte Kostenrechnung*. They also distinguish between used and idle capacities. Since they use the same structure, they could be easily embedded in existent software. Interestingly, this implementability issue has been identified as a major reason that activity-based costing systems in the United States were not generally sustained. Other developments of the GPK have been explicit designs for cost accounting systems for logistics, marketing, and other fields.

<sup>44</sup>In a recent field study, Krumwiede (2005) reports of Deutsche Telekom that uses 20,000 cost centers and cost assignments.

<sup>45</sup>See, e.g., Weber (1995).

<sup>46</sup>Although many observers would note that the share of fixed costs increased over time, empirical evidence does not support this claim. Troßmann & Trost (1996) find that the variability of the percentage of indirect costs in the manufacturing industry is high but has not significantly increased over time.

German research and practice had great influence on cost accounting in other countries in the 1960s and 1970s, including Scandinavian countries and Japan. However, exporting more of these systems had been unsuccessful in the recent years and, particularly, exporting to English-speaking countries, but this may be about to change. The current development of resource consumption accounting (RCA) in the United States brought many of the basic elements of GPK to international attention.<sup>47</sup>

### 5.2. Einzelkosten- und Deckungsbeitragsrechnung

About the same time the foundations of the GPK were developed, Riebel (1959, 1961) proposed an alternative costing system that he called *Einzelkosten- und Deckungsbeitragsrechnung* (EDR).<sup>48</sup> Riebel's main point of departure was that other costing systems, including GPK, allocated (often only implicitly) non-relevant costs to decision objects, which he found not being appropriate.<sup>49</sup> To illustrate, consider labor costs in an operating department, which include a base wage component, and its relation to a final product whose cost is to be determined. The common procedure for attributing labor costs is labor hours required for the production of one unit multiplied by the hourly labor rate. However, the base wage component of labor costs does not vary with production quantity except if the employment contracts are terminated. Contract termination is a decision different from the decision of producing an additional unit and, therefore, Riebel concluded that the base labor costs are not relevant for the production decision. In addition, EDR avoids separating short-term and long-term decisions due to their arbitrary cut-off points and provides a single system that appears suitable for supporting any decisions.

Thus, the intention of EDR is somewhat similar to that of deriving costs from discounted cash flows, although the realization is different; in particular, it does not include discounting.

<sup>47</sup>See, e.g., Sharman & Vikas (2004), Krumwiede (2005), and Friedl et al. (2005).

<sup>48</sup>Riebel expanded on the original concept and documents the ultimate version in Riebel (1994a, 1994b).

<sup>49</sup>Prior to his academic career, Riebel worked in the chemical industry and was faced with the problem of allocating joint costs to various decision objects. He concluded that decision objects resulting from joint production processes should be considered as one single object for decision-making and that every allocation of joint costs is arbitrary and may result in wrong decisions. This experience provided the motivation for developing principles of "logically admissible cost allocations" and eventually the EDR.

The conceptual key feature of EDR is its decision focus: Riebel argues that the firm's welfare results from decisions being made, so the EDR should inform about the cash flows that can be attributed to these decisions. Consequently, cost and revenue are defined appealing to the marginal cash flows from a decision rather than to the value of resources used for a specific purpose. Each decision creates or eliminates what is called *Bezugsobjekte* (cost objects), which are any objects, units, and/or activities that are affected by the decision. EDR uses the so-called *Identitätsprinzip* (identity principle) to attribute costs (and revenues) to cost objects, which strictly requires attribution of those costs and revenues that are directly and exclusively caused by the decision responsible for the existence (or elimination) of the cost object. In principle then, making decisions under EDR cost information follows a simple rule: collect all cost objects that are affected by the decision, compute the difference between the revenues and costs of these cost objects, and if this difference is positive, the decision is beneficial. This procedure results in a specific contribution margin approach.

While conceptually appealing for specific known decisions, in practice, EDR must be prepared to support any decisions the firm may face. To do so, EDR requires a basic database (*Grundrechnung*)<sup>50</sup> that records all costs and revenues for all conceivable cost objects. Cost objects are structured in hierarchies with cost objects of higher order (such as a cost center) to include subordinated cost objects (such as accepting a special order). The rule for constructing the *Grundrechnung* is to report costs and revenues at the lowest level in the hierarchy that is consistent with an attribution according to the identity principle. For example, the setup costs for a production lot cannot be attributed to a unit; hence, they are costs relative to the lot, but not relative to the production units. Each calculation of costs and revenues of a specific decision results in a multi-stage contribution costing, since a decision regularly induces various lower- and higher-order cost objects according to the hierarchy of objects in the database.

A subtle implication of the EDR is that period profit is, generally, not very useful information. Conceptually, a period is simply a special cost object with costs and revenues attributed to it according to the identity principle; thus, it is a contribution margin that results from the passage of time. It does not

<sup>50</sup>A similar database has already been proposed earlier by Schmalenbach (1948) for a variety of different objectives.

include any allocation of costs of other cost objects. For example, depreciation is not part of these costs. A machine is a cost object in itself, and the investment outlay can only be directly attributed to the decision to buy or sell the machine but not to a sub-period of its useful life. However, given the desire in practice to report a period profit measure, the EDR introduces budgeted periodical requirements for contribution margins, which may be interpreted as a kind of required depreciation.

The German literature acknowledges that EDR is a conceptually consistent and appealing way of thinking of relevant costs for decision-making, but its practical impact as a comprehensive planning and control system has been considerably low. The reasons lie in the pronounced conceptual departure from traditional cost accounting the firms are used to, in the high information requirements for the design and use of EDR (that also provide for discretion by managers), in the use of multi-period decision models for almost every decision, and in the lack of supporting computer software relative to, say, GPK, although “data warehousing” includes elements of the basic database that the EDR proposes.<sup>51</sup> However, sometimes the EDR principles for decision-making are followed for isolated important decisions, but they are then based on additional calculations and not on a unified accounting system for that purpose.

## 6. Use of Management Accounting Information

In this section, we discuss the decision-facilitating and the stewardship use of management accounting information in German-speaking countries. First, we focus on short-term and long-term decisions; then, we consider performance measurement and incentive issues in some detail. This section connects the earlier discussion of cost concepts and systems with the more current developments in management accounting.

### 6.1. Costs and Short-Term Decisions

German management accounting has always strictly distinguished between short-term and long-term decisions and, hence, between the concepts and techniques used for these sets of decisions. The distinguishing feature is whether a decision changes capacities. If a decision leads to the existence of additional capacities or to an abandonment of fixed assets, it is said to have a long-term effect, and the appropriate technique is NPV. For other decisions,

the common technique is maximization of the period profit based on information from the cost accounting system. As described earlier, the (widely applied) GPK was explicitly geared to providing relevant cost data for operative decisions and their use in linear planning models.<sup>52</sup> Hence, the discussion of the use of variable costs and contribution margins is often made simultaneously with the application of operations research techniques. Almost every German textbook in managerial accounting contains highly “technical” chapters that demonstrate the use of cost in optimization techniques for decisions such as optimal product mix under various constraints, acceptance of special orders, pricing decisions, determination of price limits (lower bounds for final products and upper bounds for input factors), selection among available manufacturing processes, and make-or-buy decisions.

The special emphasis on techniques induced an extensive discussion of the concept of opportunity costs, which have even been advanced as the basis of a specific costing system, the *Standardgrenzpreisrechnung*.<sup>53</sup> Opportunity costs capture the scarcity of resources by means of their shadow prices. Their knowledge was thought of facilitating decision-making by saving on the cost of solving a possibly large optimization model with many constraints every time a decision is to be made. While appealing at first glance, this approach is circular since opportunity costs are a by-product of the optimal solution of the respective optimization program. While the literature discussed several types of opportunity costs,<sup>54</sup> the conclusion remains valid no matter which type of opportunity cost is considered. Hence, these costs may be helpful only for *ex post* decision problems when, e.g., a basic product mix for the current period has already been determined. Then, the shadow prices are determined from the optimization program and can be used for further marginal decisions that could not be considered *ex ante*, such as the acceptance of a small special order.

A common criticism of all typical approaches to facilitate short-term decision-making is that they do not explicitly consider uncertainty and may induce wrong decisions even in the short term. To illustrate, consider a firm that has invested in capacity that is being used to fulfill a limited number of orders that come in from a market with stochastic order inflow.

<sup>51</sup>Indeed, SAP developed software that would support EDR. See, e.g., Sinzig (1990).

<sup>52</sup>Kilger (1973) comprehensively documents the applications of GPK data for operative decisions.

<sup>53</sup>See Böhm & Wille (1974).

<sup>54</sup>See, e.g., the overview in Coenberg (2003, pp. 294–310).

If an order is refused, there is no certain alternative production program but a risky program that consists of the optimal acceptance decision of the future uncertain order flow. If an order is accepted, then some available capacity is tied up and cannot be allocated to the future uncertain, but perhaps more profitable, orders. Schildbach & Ewert (1989) show that the decision to accept a given order can be expressed in terms of a lower bound for the order's price at which it is accepted, where the lower bound includes opportunity costs for the available capacity. Since the scarcity of the resource is now stochastic, the opportunity cost requires the use of stochastic dynamic programming techniques. Schildbach and Ewert also show that the lower bound for accepting orders is not necessarily monotonous over time.

### 6.2. Costs and Long-Term Decisions

The common technique recommended in the accounting literature in German-speaking countries for making long-term decisions is to employ NPV techniques, which capture all cash flow consequences over the entire planning period. However, a survey of medium-sized German firms shows that management accounting information is heavily used for decisions with long-term effects.<sup>55</sup> Indeed, capital budgeting techniques were often considered part of finance rather than accounting with the effect that few accounting textbooks and courses would cover them.

The general skepticism regarding the use of cost data for long-term decisions has changed since the early 1990s when "strategic management accounting" became popular in practice. There is much German literature that describes the techniques, such as activity-based costing (variants), target costing, and life-cycle costing, and discusses their intended and potential applications.<sup>56</sup> Kajüter (2005) provides a survey of the use of strategic management accounting techniques in German firms (see Table 6). The results suggest that they are widely used in practice. He also finds that firms pursuing a differentiation strategy are significantly more likely to use such techniques than firms following a cost leadership

Table 6. Use of strategic management accounting techniques in (a) large German firms (Kajüter, 2005, p. 91), (b) medium-sized German firms (Homburg et al., 2000, p. 249), and (c) large Austrian firms (Wolfsgruber, 2005, pp. 241, 252, 254)<sup>a</sup>.

	Percent of firms (%)		
	(a)	(b)	(c)
<i>Actual use</i>			
Target costing	55	10	16
Prozesskostenrechnung	46	2	–
Benchmarking	90	–	–
Life-cycle costing	26	4	15
<i>Planned use (in percent of non-users)</i>			
Target costing	13		
Prozesskostenrechnung	24		
Benchmarking	36		
Life-cycle costing	7		

<sup>a</sup>The frequencies relate to a continuous use of the techniques; frequencies are higher for occasional use.

strategy; surprisingly, this result even holds for the *Prozesskostenrechnung*, which is commonly seen as supporting cost leadership. Kajüter does not find a significant effect of the intensity of competition on the use of strategic management accounting techniques. Product complexity and the dynamics of technological developments significantly increase their use and, in particular, the use of target costing.<sup>57</sup>

A more theory-based literature analyzes conceptual foundations of the use of cost data for strategic decisions. Schiller & Lengsfeld (1998) consider the properties of activity-based costing used for capacity investment decisions. This is a situation in which capacity is installed at the beginning of the planning period, but the optimal product mix in future periods depends on the specific conditions that prevail in these periods. They first consider the optimal solution using an NPV approach and compare this solution with what would follow from applying activity-based costs. They find that the cost-based approach can replicate the optimal decision only if the relationship for costs and revenues is completely stationary over time. This suggests that the use of activity-based costing as a tool for making strategic investment choices seems to be suitable only if there is, in fact, no strategic

<sup>55</sup>Homburg et al. (2000) asked general managers of 119 medium-sized firms and report that cost information is used for investment/divestment (70%), value chain (51%), production quantities and pricing (50%), acquisitions (42%), production technologies (32%), and supplier (31%) decisions.

<sup>56</sup>Surveys of these aspects with respect to the different methods include Mayer (2002) and Troßmann (2002) for activity-based costing and cost management, Seidenschwarz (2002) for target costing, and Rüdke (2002) for life-cycle costing.

<sup>57</sup>Schäffer & Steiners (2005) obtain a related result from a questionnaire of 449 German firms operating in various industries. They find that the use of strategic management accounting techniques significantly increases in the respective market dynamics.

situation. While this conclusion results from a model under certainty, Budde & Göx (1999) and Göx (2001, 2002) study strategic cost-based pricing decisions in various risky scenarios.<sup>58</sup> They identify situations in which activity-based costs (that include allocated capacity costs) for pricing decisions are indeed justified.

Interestingly, target costing and life-cycle costing have developed from a highly practice-oriented view and attracted much less attention in the international theoretical literature, but there is some work in German-speaking countries. Conceptually, target cost is the difference between a forecasted future market price of the product and a target profit the firm wishes to achieve. Target costing is used to direct the activities of engineers in the early stage of the construction and design of a new product by providing them with target costs they must not exceed to make the product a success. Otherwise, the new product should not be introduced. While this procedure seems to be simple and convincing, there are some subtle difficulties involved from a conceptual point of view. Target costing is essentially meant to be a strategic tool to lead to a cost-effective product design by guiding construction activities. But cost reductions are always beneficial; hence, why would a firm want to stop with cost reducing efforts exactly when the target cost is achieved? This question can only be answered if the cost of cost reduction effort is taken into account, and this requires the consideration of possible incentive problems on the part of the engineers and product designers. Furthermore, the determination of the sales price forecast is problematic if the firm has discretion with respect to the price. In that case, the firm will determine the price based, among others, on the future cost of the product. However, the cost is influenced by the price that is the first input for the target costing process. Ewert (1997) and Ewert & Ernst (1999) analyze these interdependencies in a mechanism-design model and show how an optimal solution would have to look like. Chwolka (2003) studies target costing in a principal-agent model and finds that in order to establish a strict market orientation in cost management, it is sometimes optimal for *ex ante* incentive reasons to cancel a profitable project. These results cast doubt on the techniques commonly explained in target costing literature and used in practice.

Life-cycle costing is susceptible to similar interdependencies as target costing. Indeed, product life-

cycle costing can be viewed as an extension of target costing to multiple periods. Optimal cost reduction efforts in the process of target costing imply a trade-off between incurring additional costs in the construction stage to benefit from cost reductions in the later production stage. Hence, there are different phases of the product's life cycle involved, and finding optimal actions over this entire life cycle is the subject of life-cycle costing. We are not aware of any theoretical literature that focuses on specific life-cycle issues.

### 6.3. Value-Based Performance Measures and Incentives

The increasing importance of financing via capital markets and the globalization of markets have had significant effects on management accounting in German-speaking countries. Besides the integration of financial and management accounting discussed above, the capital market orientation led many firms to employ value-based management systems.

The German literature in accounting and finance includes high-level theoretical work in the valuation of companies, perhaps as a result of the less broad capital markets in German-speaking countries, which increase the demand for fundamental valuation. Much of this literature, at least in accounting, is conceptual and attempts to develop a consistent theory of valuation equations. A major focus is on the determination of the cost of capital that is used to discount the expected future cash flows of a firm or division. Recently, the adoption of international accounting standards with the strong use of fair values and impairment tests has spurred research that analyzes the appropriateness of these values for management accounting purposes and valuation in general. Valuation issues arise particularly for unlisted firms when they implement value-based measurement, as firm value must be proxied by valuation techniques.

One of the major issues in management accounting is the choice of the top-level value-based performance measure. It was not exactly like "metric wars,"<sup>59</sup> but the literature has controversially discussed the advantages and disadvantages of measures that differ mainly along the dimensions of how close they are to earnings or cash flow and whether they are absolute value-added measures or ratios.<sup>60</sup> A focus of the more scholarly discussion is a review of the conceptual issues and a critical analysis of the advantages

<sup>58</sup>Their model is based on and expands results in Banker & Hughes (1994).

<sup>59</sup>See Myers (1996).

<sup>60</sup>Ewert & Wagenhofer (2005, Ch. 10) discuss these measures and their incentive effects.

Table 7. Use of value-based measures in firms listed in the DAX 100 (Aders & Hebertinger, 2003, p. 15).

Measure	1999/2000 (%)	2002/2003 (%)
Economic value added	39	54
Discounted cash flow	4	9
Cash value added	3	7
Return on equity	9	6
Return on investment	4	6
Cash flow return on investment	3	5
Return on sales	2	3
Return on risk-adjusted capital, risk-adjusted return on capital	4	1
Return on net assets, return on capital employed, return on invested capital	18	0

claimed by the inventors of the measures, mostly international consulting firms.

Surveys document a large variance in firms' use of measures, too.<sup>61</sup> A study of DAX 100 firms finds that 22% use sales-based and 42% use earnings-based measures; value-based measures are used by another 22% firms (17% economic value added, 3% cash flow return on investment, and 2% cash value added).<sup>62</sup> In another study of the DAX 100 firms some years later, Aders & Hebertinger (2003) report that 23% use sales and 37% earnings before interest and taxes (and variations of this measure) as a basis for bonus payments while only the rest employ some kind of value-based measure (see Table 7). Only 53% of the firms include their lead performance measure in the determination of management compensation.<sup>63</sup>

The focus laid by these measures on shareholder value was subject to some critique from the more stakeholder-oriented perspective. The pivotal role of invested capital may also be not appealing to firms for which other resources are more crucial. In response to such critique, Strack & Villis (2001) propose other performance measures that appear to focus on the critical resources but are nothing else than a rearrangement of a value-based measure. For

example, they obtain a human capital-based performance measure from the cash value added (CVA) as follows. The CVA is defined as gross operating cash flows  $E$  less depreciation  $Dep$  and capital charge  $Cc$ ,

$$\begin{aligned}
 CVA &= E - Dep - Cc \\
 &= Sales - Mat - Pers - Dep - Cc \\
 &= \left( \frac{Sales - Mat - Dep - Cc}{Employees} - \frac{Pers}{Employees} \right) \cdot Employees \\
 &= \left( \frac{Value\ added}{Employees} - \frac{Pers}{Employees} \right) \cdot Employees
 \end{aligned}$$

where operating cash flows equal sales less material and personnel costs. Thus, CVA can be expressed as value added per employee less the average cost per employee times the number of employees, which does not explicitly concentrate on invested capital. Nevertheless, this measure does not contain any additional information over and above that used in the CVA.

Residual income attracted the greatest attention of all proposed performance measures in the German literature. Let  $I$  denote the investment cost at  $t = 0$  and  $E_t(I)$  the net cash inflow in period  $t$ ,  $t \in \{1, \dots, T\}$ , which depends on the level of investment. Assume a depreciation schedule defined by a depreciation rate  $d_t$  in each period and clean surplus, i.e.,  $\sum_{t=1}^T d_t = 1$ . For simplicity, assume depreciation is the only accrual. Accounting profit in each period  $t$  is  $G_t = E_t - d_t I$ . The book value of invested capital at the end of period  $t$  is

$$KB_t = I \cdot \left( 1 - \sum_{\tau=1}^t d_\tau \right)$$

with  $KB_0 = I$ . Residual income  $RI$  is defined as profit less the cost of capital, where  $i$  is the interest rate and  $\rho \equiv 1 + i$ :

$$\begin{aligned}
 RI_t &= G_t - i \cdot KB_{t-1} = E_t - d_t \cdot I \\
 &\quad - i \cdot I \cdot \left( 1 - \sum_{\tau=1}^{t-1} d_\tau \right)
 \end{aligned} \tag{1}$$

Simple rearrangement provides the result that at any point in time  $t \in \{0, \dots, T\}$ , the present value of future cash flows is equal to the book value of equity plus the present value of the future residual income stream:

$$\sum_{\tau=t+1}^T E_\tau(I) \cdot \rho^{-\tau} = KB_t + \sum_{\tau=t+1}^T RI_\tau \cdot \rho^{-\tau} \tag{2}$$

<sup>61</sup>Interestingly, there are articles in various publications by CFOs of large German companies explaining in some detail how they use value-based management. An example is Cordes et al. (2001) for DaimlerChrysler.

<sup>62</sup>Pellens et al. (2000, p. 1831).

<sup>63</sup>Aders & Hebertinger (2003, p. 37).

This formal result has been introduced in the German literature by Lücke (1955)—and it is often referred to as Preinreich–Lücke theorem<sup>64</sup>—and was analyzed in Klock (1981) long before it became a fashionable issue with the introduction of economic value added and the international literature. Indeed, most German research in this area takes the work by Rogerson (1997) and Reichelstein (1997) as the basis for further analyses. This literature studies performance measure design in a decentralized investment setting. Obviously, evaluating a manager's performance on residual income over the  $T$  periods induces him or her to take decisions that are in line with those of the firm. This result does not hold any more if the manager's time preferences are different from those of the firm's owners. For example, the manager may be impatient and discount future compensation with a higher interest rate than the owners or the manager potentially leaves the firm before period  $T$ . Goal congruence can be restored if each period's residual income is determined so as to provide an isomorphic measure of the NPV of the investment project.

To illustrate, suppose the future cash flows are  $E_t(I) = \theta_t E(I)$  with  $\theta_t > 0$  as the distribution of cash flows over time, which is common knowledge. The manager is privately informed about the level of cash flows,  $E(I)$ . The optimal investment  $I^*$  maximizes the NPV of the project's cash flows and satisfies the following first-order condition:

$$E'(I^*) \cdot \sum_{\tau=1}^T \theta_{\tau} \cdot \rho^{-\tau} - 1 = 0 \quad (3)$$

The manager invests  $I^*$  whatever time preferences he or she has if the first-order condition of the residual income in each period  $t$  satisfies

$$RI'_t(I^*) = \frac{\theta_t}{\sum_{\tau=1}^T \theta_{\tau} \cdot \rho^{-\tau}} - d_t - i \cdot \left(1 - \sum_{\tau=1}^{t-1} d_{\tau}\right) = 0 \quad (4)$$

This condition holds if the investment is depreciated according to the relative benefit depreciation schedule that obtains from solving eq. (4) for  $d_t$ :

$$d_t^* = \frac{\theta_t}{\sum_{\tau=1}^T \theta_{\tau} \cdot \rho^{-\tau}} - i \cdot \left(1 - \sum_{\tau=1}^{t-1} d_{\tau}\right)$$

Alternatively, condition (4) can be satisfied for an

arbitrary depreciation schedule if the interest rate in the calculation of residual income is chosen as<sup>65</sup>

$$\gamma_t^* = \frac{\theta_t}{\sum_{\tau=1}^T \theta_{\tau} \cdot \rho^{-\tau}} - d_t$$

Indeed, condition (4) requires a particular behavior of the total cost of capital, that is, depreciation plus interest cost, in the following way:

$$d_t + \gamma_t \cdot \left(1 - \sum_{\tau=1}^{t-1} d_{\tau}\right) = \frac{\theta_t}{\sum_{\tau=1}^T \theta_{\tau} \cdot \rho^{-\tau}}$$

Residual income then becomes

$$\begin{aligned} RI_t(I) &= \theta_t \cdot E(I) - d_t \cdot I - \gamma_t \cdot I \cdot \left(1 - \sum_{\tau=1}^{t-1} d_{\tau}\right) \\ &= \theta_t \cdot E(I) - \frac{\theta_t \cdot I}{\sum_{\tau=1}^T \theta_{\tau} \cdot \rho^{-\tau}} \\ &= \theta_t \cdot \left(E(I) - \frac{I}{\sum_{\tau=1}^T \theta_{\tau} \cdot \rho^{-\tau}}\right). \end{aligned} \quad (5)$$

The last term in brackets is independent of the period  $t$ , and it is easy to see that maximizing  $RI_t(I)$  results in the optimal investment level  $I^*$  as the first-order condition equals eq. (3).

This setting that is based on Rogerson (1997) and Reichelstein (1997) has generated a lot of interest in the German research literature, and much work has discussed and extended it. For example, the above model requires positive cash flows in all periods; it is evident from eq. (5) that goal congruence is not guaranteed in periods with negative cash flows ( $\theta_t < 0$ ). Mohnen (2005) suggests recognizing start-up costs or provisions in periods with negative cash flows and shows that goal congruence can then be restored for arbitrary cash flow distributions  $\theta_t$ . Pfaff (1998) discusses provisions as a means to capture future expected maintenance or clean-up costs in a goal-congruent way. Pfaff & Bärtl (1999) point out that goal congruence generally fails if the manager must decide among alternative investment projects; the residual income of different projects depends not only on their NPV but also on the distribution of the future cash flows (see eq. (5)). A potential solution is to introduce accruals on the revenue side by revenue recognition rules. However, what is essentially done is to modify residual income in the direction of an

<sup>64</sup>This reference acknowledges the apparently first observation of the relationship by Preinreich (1937).

<sup>65</sup>See Pfeiffer (2000) and Pfaff & Pfeiffer (2003). Notice that  $\rho = 1 + i$  is not affected by the change in the interest rate to  $\gamma^*$ .



annuity scheme. It would need much structure and high information requirements to implement such schemes. Baldenius et al. (1999a) discuss the measurement of assets (in particular, real estate) at market values and find that residual income provides the right incentives for disinvestment (although not necessarily for the original investment). The reason is that market values essentially break down the long-term investment project into one-period projects, i.e., keep the asset one more period or disinvest it.<sup>66</sup>

This literature can be useful to assess incentive effects of adjustments of earnings numbers often suggested by consultants. For example, a survey among German firms listed in the DAX 100 resulted in the following adjustments (in the order of the frequency): restructuring expenses, goodwill, associated companies, special depreciation, leasing, pensions, interest on prepayments, deferred taxes, and market value of real estate.<sup>67</sup> Some of these adjustments are reminiscent of the German cost versus expense debate discussed in Section 3. It also seems that some of the adjustments (such as restructurings) are often made in one period only and, thus, violate clean surplus and impede investment incentives.

Dierkes & Hanrath (2002) study the incentive effects of residual income as the performance measure in a setting in which the manager decides on the level of capacity and on the production quantities in each period. The difficulty is that the future cash flows now depend on the manager's short-term decisions. Performance evaluation with residual income for an impatient manager has two effects: (i) future cash flows are valued less and induce lower capacity investment and, consequently, lower production quantities; and (ii) the costs of capacity usage in later periods are lower for the manager, hence, creating over-investment incentives. The first effect dominates for capacity directly used for production, and Dierkes and Hanrath suggest a modified residual income measure to shift capacity costs more into the periods of usage. Diedrich & Dierkes (2003) consider procurement, production, and distribution decisions by a manager over multiple periods, where storing is constrained to few periods. They find that performance evaluation based on residual income achieves goal-congruent behavior if the stock is measured at historical cost plus appreciated interest.

Most of this literature assumes strong goal congruence between (the owners of) the firm and the manager, that is, the performance measure strictly increases in the NPV of the projects.<sup>68</sup> Given the fact that management compensation reduces firm value, a more plausible objective is goal congruence in terms of net utilities, which requires that the manager's performance measure increases in the (residual) wealth of the owners.<sup>69</sup> Gillenkirch & Schabel (2001) show that residual income combined with the relative benefit depreciation schedule also achieves this congruence, and Pfeiffer (2003b, 2004a) proves that it is both necessary and sufficient for this objective. These two papers also compare cash flow with residual income as performance measures under different depreciation schedules.<sup>70</sup>

Wagenhofer & Riegler (1999) introduce moral hazard with respect to the investment decision and subsequent operating decisions. They show that the optimal performance measure in a linear contract must shift the expected total return on the investment into the period in which the manager decides on the investment and incurs the disutility. This depreciation schedule is different from the relative benefit depreciation, which spreads the return over the life of the investment. Wagenhofer & Riegler also consider investment in human capital, which reduces the disutility of operating decisions, and arrive at a similar depreciation schedule for incentive purposes. Wagenhofer (2003) extends this model structure to risk-averse agents and shows that the depreciation rates additionally take into account risk-sharing aspects. He also considers manipulated accruals and reports conditions under which manipulated earnings outperform cash flows and vice versa.<sup>71</sup>

Renegotiation of long-term contracts can have effects on the usefulness of performance measures. The studies mentioned above show that earnings measures are weakly preferable to cash flow measures because earnings measures include cash flows as a special case. If renegotiation is an issue, this result needs not hold any more. Hofmann (2005) stud-

<sup>68</sup>Weak goal congruence would be easy to achieve in the model sketched above: Since the agent has no strong incentive to not act in the principal's interest, a fixed compensation would induce weak goal congruence.

<sup>69</sup>See Laux (1999).

<sup>70</sup>See also Laux (1998) who fixes the compensation function and, therefore, includes the level of total payment into the analysis.

<sup>71</sup>Pfaff & Stefani (2003) also discuss performance measure manipulation. Pfaff (2004) focuses on the verifiability of investment project information.

<sup>66</sup>Gaber (2005) considers investment decisions and studies goal-congruent measurement rules for finished products and receivables.

<sup>67</sup>See Aders & Hebertinger (2003, p. 18).

ies performance measures for construction contracts and finds that the use of cash flows is a means for a credible commitment by the principal not to use “too much” information in the renegotiation stage. Therefore, cash flows can be preferable over earnings under certain conditions, depending on the sensitivity of earnings and their correlation over the periods.

Riegler (2000) analyzes value-based management in a three-tier agency model with private information. Consultancy literature recommends the implementation of value-based performance measures on all levels in the firm’s hierarchy. Riegler shows that the use of performance measures at lower levels is generally not optimal because of the difficulty in managing synergies.

Another route of research studies multiple performance measures. The Balanced Scorecard is probably the best-known framework for this type of studies. The Balanced Scorecard includes financial and non-financial measures and groups them in four perspectives: financial, customer, internal business process, and learning and growth. The practice-oriented literature is full of descriptive case studies that report how the Balanced Scorecard has been implemented in a specific company context.<sup>72</sup> However, there has been little empirical research on the implementation that meets scientific rigor. A notable study is Speckbacher et al. (2003) who provide a systematic survey of the use of the Balanced Scorecard in listed firms in German-speaking countries. The exceptionally high response rate of 87% of the 201 questionnaires provides an excellent database. Table 8 contains major findings for the 45 firms (26%) that implemented the Balanced Scorecard in business units or the entire firm. Speckbacher et al., distinguish three levels of implementation and show that only half of the firms implement cause-and-effect relationships that are a major feature of the Balanced Scorecard. They test for size and industry effects, but find almost no significant differences in the level of implementation. They also do not find an indication for a stakeholder orientation that is usually attributed to firms in German-speaking countries.

Table 8 shows that a majority of firms that use the Balanced Scorecard also link it with management incentives, usually as a basis for variable compensation paid to their managers. Agency theory provides a

Table 8. Use of the Balanced Scorecard in German-speaking countries (Speckbacher et al., 2003).

	Percentage of firms (%)
<i>Perspectives used</i>	
Financial	95
Customer	93
Internal business process	98
Learning and growth	57
Other perspectives	17
<i>Number of perspectives used</i>	
Two	7
Three	20
Four	68
Five	5
<i>Link to incentives</i>	
None	29
Indirect link	18
Direct link	53
<i>Level of implementation</i>	
Minimal: Use of several financial and non-financial performance measures grouped in perspectives	50
Medium: Use of cause-and-effect chains	21
Maximal: Includes action plans/targets and link to incentives	29

number of reasons to be cautious because the usefulness of performance measures for decision-facilitating purposes may differ from that for stewardship purposes.<sup>73</sup> Multi-action agency models are particularly appropriate to study the incentive effects of multiple performance measures. For example, Wagenhofer (1996) and Schnedler (2003) analyze optimal weights on performance measures and show the potential existence of negative weights on measures that, individually, are positively correlated with output. The key is their correlation with other measures. Sliwka (2002) studies a two-period agency model in which the manager takes strategic and operational actions. The optimal renegotiation-proof contract provides insufficient incentives for strategic actions as the use of financial performance measures postpones compensation into the second period; in balance, first-period incentives are increased, thus inducing too much effort on operational actions. The use of non-financial measures in addition to financial measures

<sup>72</sup>See, e.g., Horváth & Gaiser (2000) for a summary of consulting experience with the implementation of the Balanced Scorecard.

<sup>73</sup>Pfaff et al. (2000) and Pfaff & Pfeiffer (2001) survey the results in the agency literature.

helps control the strategic actions, even if the measure is so noisy that it would not be useful in a non-negotiable long-term contract.

6.4. Budgeting and Transfer Pricing

Budgeting and transfer pricing are important coordination instruments in decentralized firms. They are at the core of the coordination focus of German *Controlling*. Indeed, Küpper (2005, pp. 43–44) mentions four general instruments for coordination: centralized management systems, budgeting systems, performance measure systems, and transfer pricing systems. We discuss performance measures above and focus on budgeting and transfer prices in this subsection.

Budgeting is another US import, although planning systems had received much attention in the German cost accounting literature as an essential part of a cost planning and control cycle. A key issue in the design of budgeting systems is what incentives they provide to division managers to tell headquarters their private information truthfully and to use their private information and take actions that are in the best interest of the firm. While the academic literature has analyzed these incentives in some depth, it seems that practice generally avoids discussing them, perhaps to avoid the flavor of having the managers' good faith called into question. There is also little empirical literature on this issue. However, the practical importance is illustrated in an article by a working group of the Schmalenbach-Gesellschaft (*Arbeitskreis Finanzierung" der Schmalenbach-Gesellschaft Deutsche Gesellschaft für Betriebswirtschaft e.V.*, 1994) that comprises academics and controllers of large German firms. Discussing the allocation of funds to investment project proposals, this article starts with acknowledging incentives of division managers to selectively provide favorable information or even misrepresent information to increase the likelihood of getting their projects funded.<sup>74</sup> The article goes on to discuss means to motivate truth-telling, including the applicability of Groves and Weitzman schemes. Both schemes consist of compensation functions that are designed to motivate the managers to truthfully report their private information.

Beginning in the early 1990s, the academic literature picked up the Groves scheme and analyzed and extended it. A Groves scheme consists of a set of compensation functions for divisional managers that implements truth-telling as a dominant strategy.<sup>75</sup>

Assume division  $j$ 's cash inflows from investment of  $I_j$  equal  $E_j(I_j)$ , where  $E_j(0) = 0$ ,  $E'_j(I_j) > 0$ , and  $E''_j(I_j) < 0$ . Headquarters has maximum funds  $\bar{V} > 0$  available; funds that are not allocated are invested in financial assets  $M$  with an interest rate of  $i > 0$ . Let  $\rho \equiv 1 + i$ . The first-best allocation is the solution to the following problem:

$$\max_{M, I_j} \rho M + \sum_{j=1}^J E_j(I_j)$$

subject to  $M + \sum_{j=1}^J I_j \leq \bar{V}$  and  $M \geq 0$  and  $I_j \geq 0$ . Using the fact that all funds are invested in the optimal solution, the following equivalent formulation with profit,  $G_j(I_j) \equiv E_j(I_j) - I_j \rho$ , obtains:

$$\begin{aligned} \max_{M, I_j} M \cdot \rho + \sum_{j=1}^J E_j(I_j) - \left[ M + \sum_{j=1}^J I_j \right] \\ = \max_{M, I_j} M \cdot i + \sum_{j=1}^J G_j(I_j) \end{aligned}$$

subject to  $M + \sum_{j=1}^J I_j = \bar{V}$  and  $M \geq 0$  and  $I_j \geq 0$ .

Now consider the case that the return functions  $E_j(\cdot)$  and, hence, the divisional profit functions  $G_j(\cdot)$  are private information of the division managers. We denote the managers' reported profit functions as  $\hat{G}_j(\cdot)$ . An incentive problem arises because each manager can increase divisional profit by trying to get more funds, which occurs if he or she reports high returns. A profit sharing scheme aligns headquarters' and division managers' interests because it makes each division manager's compensation a function of total firm profit. In equilibrium, no manager can do better than report  $\hat{G}_j(\cdot)$  truthfully. Any other report would only increase the likelihood that headquarters allocates funds inefficiently, thus reducing total profit. A difficulty is that there may exist other equilibria that are preferred by the managers but are suboptimal from the firm's perspective.

A Groves scheme is an adaptation from a profit sharing scheme that uses each manager's own actual profit function and the other divisions' reported profit functions in the performance measure, i.e., manager  $n$ 's performance measure is

$$G_n(I_n) + \sum_{\substack{j=1 \\ j \neq n}}^J \hat{G}_j(I_j) + iM$$

A compensation that linearly increases in this measure induces managers to tell their true returns independent of what other division managers may report. Given truth-telling, headquarters is able to implement the first-best allocation.

<sup>74</sup>Arbeitskreis "Finanzierung" (1994, p. 899).

<sup>75</sup>See, e.g., Groves & Loeb (1979).

The German literature takes this well-known result as starting point for additional analyses.<sup>76</sup> One strand embeds the Groves scheme in an agency model by explicitly considering the manager's utility, effort and reservation utility. For example, Pfaff & Leuz (1995) introduce risk-averse managers. The truth-inducing property of the Groves scheme remains valid if the manager acquires the private information before reporting, but it induces inefficient risk sharing. If the manager receives the information only after reporting, truth-telling is not an equilibrium any more. The manager tends to underreport to improve risk sharing. Hofmann & Pfeiffer (2003) show that the Groves scheme does generally worse than the optimal second-best truth-inducing contract mainly because the principal wants to motivate second-best actions as a result of a trade-off of information rents and risk sharing. A modified Groves scheme can implement the second-best outcome; however, it requires knowledge of the second-best solution and is more complex than the original second-best contract. Another strand of the literature addresses collusion in Groves schemes. Managers can increase their compensation by jointly deviating from their (dominant) truth-telling strategy, even if the efficient allocation is not achieved. Such collusion requires credible commitments for side payments among the managers. Collusion is not an equilibrium in a one-shot game, although it may become so in a multi-period repeated game.<sup>77</sup> This literature in part explains why Groves schemes are typically not used in practical budgeting situations, although division managers are often evaluated based on their performance relative to that of other divisions, and on total profit.

Obviously, Groves and similar schemes are special solutions that abstract from a variety of effects budgeting mechanisms can have and, given these effects are important, they may fail to achieve optimal coordination. A more general formulation of the budgeting problem uses the revelation principle that states that for any mechanism, there exists an outcome-equivalent truth-telling mechanism if communication is not restricted. This type of models is able to explain budgetary slack as a result of division managers' private information. Schiller (2001) analyzes whether managers should be granted access to the firm's cost accounting system before deciding to accept a special

order. Using this information, the manager can make better-informed decisions, but the information creates an adverse selection problem that leads to a second-best output decision due to slack opportunities (the difference between the budget and the actual cost of the production). Schiller finds that the cost information system is valuable for low revenue orders and detrimental for high revenue orders. For low revenue, the benefit from the improved acceptance decision outweighs the adverse selection effect, and vice versa.<sup>78</sup> Mayer et al. (2005) compare a setting in which a division manager is given hurdle rates for individual projects or for the sum of the projects and find that their preferability depends on the *ex ante* profitability of the projects.

Budgets can be either a target level of some output or a constraint on inputs or resources made available to the agent. Hofmann (2003) studies fixed and flexible resource budgeting schemes, which restrict the manager's action space in a different way, and finds conditions under which either of the two is preferable. Hofmann & Homburg (2004) show that resource budgets can be marginally beneficial in an agency relationship with adverse selection.

Coming back to the resource allocation problem introduced in this section, Ewert (1992) introduced empire-building preferences in the utility of a division manager of the following form:

$$U^A = \beta \cdot I + \underline{S} + \alpha \cdot \text{RI}(I, i)$$

where  $\beta > 0$  indicates the empire-building utility of investment  $I$ ,  $\underline{S}$  is fixed compensation,  $\text{RI}$  is the residual income given  $I$  and interest rate  $i$ , and  $\alpha > 0$  denotes the piece rate of compensation. Residual income implements the first-best result if there are no empire-building preferences. Maximizing his or her utility  $U^A$  gives

$$\beta = -\alpha \cdot \frac{\partial \text{RI}(I^*, i)}{\partial I} \Rightarrow \frac{\partial \text{RI}(I^*, i)}{\partial I} = -\frac{\beta}{\alpha} < 0$$

thus, the manager has an incentive to over-invest. Calculating residual income with a higher interest rate,  $(i + \beta/\alpha) > i$ , counteracts these incentives and implements the first-best level of investment. This result provides an explanation to the often-observed practice of using an interest rate that is higher than the cost of capital (besides scarce financial resources): here, it is the optimal reaction to empire-building preferences of division managers.

<sup>76</sup>Groves schemes were also discussed in the context of cost allocation (Pfaff, 1994a) and optimal production planning (Luhmer, 1999).

<sup>77</sup>See, e.g., Budde et al. (1998), Kunz & Pfeiffer (1999), Krapp (2000).

<sup>78</sup>Schiller (2000a) extends this model structure to a three-tier hierarchical structure and to a manager's decision whether or not to become informed.

Transfer pricing is another theme that has been heavily studied in the German-speaking management accounting research literature. The relationship with budgeting is obvious. For example, an internal interest rate for divisional investment projects is nothing else but a transfer price for financial funds. A difference is that budgeting can also be considered a bonding mechanism if it restricts a manager's access to a required resource. For example, Hofmann (2002) studies an agency model in which the principal provides funds for investment to a manager for use together with his or her effort to produce a required level of output. The budget effectively stipulates the manager's minimum effort, whereas the transfer price is the manager's cost of capital. Hofmann shows that both mechanisms lead to the same results if there is no renegotiation. If renegotiation is allowed, one or the other is preferred, contingent on the probability of the productivities and the actual cost of capital.

While already Schmalenbach (1908/1909) has pointed out the coordination function of transfer prices in decentralized firms,<sup>79</sup> it was not until the 1960s when techniques became available that allowed for a more formal analysis of the coordination issues. First, operations research techniques were used to study separation of decision problems. Later, agency theory was used to focus on the incentive issues. For example, a typical adverse selection situation obtains if one assumes that the upstream division's manager is better informed about the productivity of his or her division. If headquarters determines the transfer price to maximize the firm's expected profit less the manager's compensation, it must consider a productive division manager's opportunity to imitate a less productive division and to receive a higher transfer price for an intermediate product. As a consequence, a cost-plus transfer-pricing scheme obtains, in which more productive division managers earn more profit (which is an information rent).<sup>80</sup> Moreover, the optimal solution induces an efficiency loss in the less productive divisions to curb the information rents for the more productive divisions.

Most of the analytic German research compares typical transfer pricing schemes found in practice and determines conditions under which one or the other is preferable.<sup>81</sup> This research attempts to explain the wide

variety of transfer pricing schemes used in practice.<sup>82</sup> Wagenhofer (1994) models a simple two-division firm and finds constellations in which either a centralized regime or market-based, cost-based, or negotiated transfer prices outperform the others.

Incomplete contract models with efficiency-enhancing specific investments by the divisions provide another convenient structure for studying transfer pricing schemes because they lead to the classical hold-up problem. With a paper in a German journal, which compares cost-based and negotiated transfer prices, Baldenius & Reichelstein (1998) spawned this literature.<sup>83</sup> They assume that the costs of the upstream division and the revenue of the downstream division depend on a random event and both divisions can make upfront specific investments to reduce cost and enhance revenue, respectively. Investments are not contractible. Negotiation takes place after the investments are made and the uncertainty is resolved, thus leading to an *ex post* efficient transfer quantity of the intermediate product. However, the negotiation allocates the joint profit and reduces each division's incentives to undertake specific investments because they incur the full cost but receive only a share of the profit. If one of the divisions can set the transfer price (monopolistic price) after the uncertainty has resolved, its incentive for specific investment can be higher although the *ex post* quantity transferred is inefficient and the investment incentives of the other division may be reduced. However, there are conditions under which one or the other transfer pricing scheme performs better.<sup>84</sup> Pfeiffer (2002) extends this analysis by introducing cost-plus transfer prices set by headquarters and finds that these can outperform the other schemes and Pfeiffer (2004b) considers the value of providing division managers with more information.

Pfeiffer (2003a) considers a division manager's performance measure that includes total profit in addition to divisional profit, which ameliorates the underinvestment problem and adds compensation risk but, in case of a correlation between the divisions' profits, also additional information. Chwolka & Simons (2003) study the performance of revenue and profit sharing schemes and find that they dominate the optimal constant transfer pricing scheme (which

<sup>79</sup>Albach (1974) emphasized the close relationship between transfer pricing mechanisms and the organization of the firm.

<sup>80</sup>See, e.g., Wagenhofer (1992b) and Schiller (1999).

<sup>81</sup>The search for an optimal mechanism would often lead to a non-tractable problem. The disadvantage is that it is unclear how well the preferable scheme in fact performs.

<sup>82</sup>There are only few surveys in German-speaking countries (see Ewert & Wagenhofer, 2005, pp. 586–587, for an overview). Their results are no different from surveys in other countries.

<sup>83</sup>This paper is a precursor of Baldenius et al. (1999b).

<sup>84</sup>Such schemes can be improved by including the allocation of decision rights. See Korn et al. (2001) for a discussion.

is a cost-plus scheme in their setting). Lengsfeld & Schiller (2003) compare transfer prices based on actual and on standard costs. Standard-cost transfer prices induce higher specific investments, whereas actual-cost transfer prices incorporate the *ex post* realization of production costs and allow fine-tuning of the trading quantity. Whichever control problem is more serious determines which transfer pricing mechanism performs better.<sup>85</sup>

Transfer prices exert control over division managers by structuring the prices for which the intermediate product is transferred. Budgets, on the other hand, can control the quantity of the product. Hofmann & Pfeiffer (2006) compare the performance of negotiated transfer prices and output budgets. They show that transfer prices dominate budgets for high uncertainty and heterogeneous divisions (and vice versa). The advantage of transfer pricing lies in the induced *ex post* efficient transfer quantities, whereas budgets generally induce higher specific investment levels.

Besides their coordination function within the firm, transfer prices can also be used as a commitment device by a firm to influence its competitive position in the product market. To illustrate the strategic effect of transfer prices, consider a duopoly situation with Bertrand competition. Each firm could improve its equilibrium profits if it increased its sales prices above the equilibrium prices. If it pays managers according to its divisional profit and sets the transfer price higher than actual production cost (e.g., a cost-plus price), the managers increase the sales price in their own best interest. Given observability, this structure is a credible commitment to loosen competition, and both firms benefit from it.<sup>86</sup> Schiller (2000b) points out that the commitment effect is lost if there is even a slight noise in the observation of the transfer price. In such a case, the strategic effect of transfer prices requires another reason to deviate from the originally optimal (i.e., marginal cost) transfer price.<sup>87</sup> Göx (2000) shows that observability of the adoption of an absorption costing system can substitute for the observability of the transfer price. Göx & Schöndube (2004) introduce risk-averse division managers and assume the

managers' compensation is divisional profit less a payment to headquarters that depends on the linear transfer price. They show that the optimal compensation implies a cost-plus transfer price, which is due to risk-sharing demands. Such cost-plus transfer prices also have a strategic effect that occurs even if they are mutually unobservable. The optimal transfer price trades off the risk sharing and the strategic effects. Dierkes (2004a, b) compares the performance of strategic transfer prices and relative performance evaluation based on profits and finds that the latter dominates in a product market with Bertrand competition or is an equilibrium outcome in a market with Cournot competition.

### 6.5. Variance Analysis

Variance analysis has been a focus of management accounting for a long time.<sup>88</sup> One area of interest in theory and practice has been the breakdown of the total budget variance into variances that point toward the causes for the total variance. Outside German-speaking countries, variance analysis is typically portrayed in the following simple way: let  $K = r \cdot q$  be the cost function, i.e., price  $r$  times quantity  $q$ . The index  $p$  denotes standard and  $i$  actual cost and cost drivers, respectively. The cost variance  $\Delta K$  then is defined as

$$\begin{aligned}\Delta K &= K^i - K^p \\ &= r^i \cdot q^i - r^p \cdot q^p \\ &= \underbrace{(r^i - r^p) \cdot q^i}_{\text{Price variance}} + \underbrace{(q^i - q^p) \cdot r^p}_{\text{Usage variance}}\end{aligned}$$

This disaggregation elegantly avoids discussion of the information content of the individual variances and their use as performance measures. Indeed, the first issue already is why  $\Delta K$  is defined as actual minus standard costs and not the reverse and what is the basis for a variance,<sup>89</sup> while such a discussion appears to be moot, it is not innocuous if one considers different ways to break down the total variance.

Another issue is how to deal with variances that are caused by more than one factor. The German literature has discussed several methods for a disaggregation. In the following, we sketch the most

<sup>85</sup>Lengsfeld (2006) extends the comparison to specific investments in one division that benefit other divisions.

<sup>86</sup>See Göx (1998, 1999). A similar strategic effect is obtained with a cost allocation scheme for central services (Wagenhofer, 1995) and with biased cost of capital (Neus & Nippel, 1996).

<sup>87</sup>Schiller (2000b) also shows that the introduction of additional uncertainty about the competitor's marginal cost can reestablish the commitment effect.

<sup>88</sup>See, e.g., the overview in Kilger et al. (2002, pp.45–46).

<sup>89</sup>For performance evaluation, the decision should be guided by, e.g., what information he or she has available at the time of making decisions and whether decisions should adjust to such information. Using standard cost as the benchmark may not provide incentives for a manager to react to changes in the environment. See, e.g., Ewert & Wagenhofer (2005, pp. 328–330).

common methods.<sup>90</sup> Consider a cost function  $K$  that depends on  $n$  cost drivers  $y_i$ . The total variance is

$$\begin{aligned} \Delta K &= K^i - K^p \\ &= K(y_1^i, y_2^i, \dots, y_n^i) - K(y_1^p, y_2^p, \dots, y_n^p) \end{aligned}$$

The so-called alternative method based on actual cost compares the actual cost  $K^i$  with the (fictitious) cost that would obtain if only one cost driver  $y_i$  were set to its standard value. This procedure results in the following series of variances:

$$\begin{aligned} \Delta K_i^{(1)} &= K(y_1^i, y_2^i, \dots, y_i^i, \dots, y_n^i) \\ &\quad - K(y_1^i, y_2^i, \dots, y_i^p, \dots, y_n^i) \end{aligned}$$

Alternatively, this method can be based on standard cost  $K^p$  and results in

$$\begin{aligned} \Delta K_i^{(2)} &= K(y_1^p, y_2^p, \dots, y_i^i, \dots, y_n^p) \\ &\quad - K(y_1^p, y_2^p, \dots, y_i^p, \dots, y_n^p) \end{aligned}$$

Both variants isolate the effect of the change of a single cost driver by holding everything else constant. The disadvantage, of course, is that the variances generally do not add up to the total budget variance. The remaining (positive or negative) difference is due to mixed variances that are caused by an interaction among several cost driver variances. The method preferred in the theoretical literature is the differentiating method, which discloses the mixed variances in aggregate or differentiated according to the number of interacting drivers:

$$\Delta K = \sum_{i=1}^n \Delta K_i^{(1)} + \text{Mixed variances}$$

While theoretically appealing, the difficulty with this approach in practice is that it usually generates discussion among managers who is responsible for these mixed variances—a discussion that has no clear answer.

The most common method is the so-called cumulative method that assumes a sequence of causes (without loss of generality numbered from 1 to  $n$ ) and calculates the variances in the following way:

$$\begin{aligned} \Delta K_i &= K(y_1^p, \dots, y_{i-1}^p, y_i^i, y_{i+1}^i, \dots, y_n^i) \\ &\quad - K(y_1^p, \dots, y_{i-1}^p, y_i^p, y_{i+1}^p, \dots, y_n^p) \end{aligned}$$

The first variance,  $\Delta K_1 = K(y_1^i, y_2^i, \dots, y_i^i, \dots, y_n^i) - K(y_1^p, y_2^p, \dots, y_i^p, \dots, y_n^p)$ , is equal to  $\Delta K_1^{(1)}$ ; the  $n$ th variance is equal to  $\Delta K_n^{(2)}$ . The advantage of the cumulative method is that the individual variances add up to the total budget variance. However, the amount of

the variances clearly depends on the assumed sequence. For  $K = r \cdot q$ , the practice to start with the price variance implicitly assigns the mixed variance  $(r^i - r^p) \cdot (q^i - q^p)$  to the price variance and isolates the usage variance. An assumption that would support such an approach is that the manager is held responsible for efficiency but not for price deviations.

The symmetric method attempts to equally allocate mixed variances to the original variances. For two factors, this method gives an intuitive result: let  $\Delta r \equiv r^i - r^p$  and  $\Delta q \equiv q^i - q^p$ . Then

$$\begin{aligned} \Delta K_r &= \Delta r \cdot q^p + \frac{\Delta r \cdot \Delta q}{2} = \Delta r \cdot \frac{2q^p + (q^i - q^p)}{2} \\ &= \Delta r \cdot \frac{q^p + q^i}{2} = \Delta r \cdot \bar{q} \\ \Delta K_q &= r^p \cdot \Delta q + \frac{\Delta r \cdot \Delta q}{2} = \Delta q \cdot \frac{2r^p + (r^i - r^p)}{2} \\ &= \Delta q \cdot \frac{r^p + r^i}{2} = \bar{r} \cdot \Delta q \end{aligned}$$

Finally, the min-method specifies an allocation rule for mixed variances according to the minimum of the remaining cost drivers.<sup>91</sup> This method avoids the separate disclosure of mixed variances that, *de facto*, do not exist and avoids compensatory effects of variances. Consider again the case of  $K = r \cdot q$ . Then

$$\begin{aligned} \Delta K &= \Delta r \cdot \min\{q^i; q^p\} + \Delta q \cdot \min\{r^i; r^p\} \\ &\quad + \begin{cases} \text{sign}(\Delta r) \cdot \Delta r \cdot \Delta q, & \text{if } \Delta r \cdot \Delta q > 0 \\ 0, & \text{otherwise} \end{cases} \end{aligned}$$

While most of these analyses are conceptually motivated and search for consistent, “correct” or “fair” variances, a more recent literature focuses on incentive effects and the information content of variances.<sup>92</sup> The focus of this research is the applicability of the controllability principle that states that managers should be held responsible only for variances they can influence. It is well known that this principle does not hold in an agency context, as it is the informativeness of a variance that is crucial for the value of an information system. For example, if cost drivers are correlated, it is generally useful to include all their variances in the performance measure of a manager even if he or she cannot influence them.<sup>93</sup> As a consequence, even though the differentiating

<sup>91</sup>See Wilms (1988, pp. 111–114) and Glaser (1999).

<sup>92</sup>Wagenhofer (1992a) discusses variance analysis as an information acquisition device and its implication on determining the standard costs in an agency setting.

<sup>93</sup>See Budde (1999). Lengsfeld & Schiller (2001) study the performance of different variance calculations in a setting with multiple risk neutral agents.

<sup>90</sup>See Ewert & Wagenhofer (2005, pp. 335–346).

method is appealing from a consistency perspective, it ignores information in the other variances and is generally not optimal for performance evaluation. [Kopel \(1998\)](#) finds that a contract that pays different incentive rates for the expected output and the output variance is useful to provide incentives for effort and for the use of private information by the manager.

Another area that generated attention in the literature is the variance analysis for multi-stage production processes. This literature is based on the production-based cost theory discussed earlier. For example, [Kloock & Dörner \(1988\)](#) study how to deal with induced variances that are triggered by a variance in an upstream production stage.<sup>94</sup>

Revenue variances are often ignored in the international literature but were studied in some detail in the German literature. A distinguishing feature from cost variances is that revenue drivers are typically related. Consider the case of revenue  $E = p \cdot x$ , where  $p$  is the market price and  $x$  is the sales quantity of a product. Usually,  $p = p(x)$ . Thus, a price variance induces a sales quantity variance and must be attributed to the price variance. [Albers \(1989\)](#) introduces a variance analysis for revenues in that he distinguishes between uncontrollable (external) and controllable (internal) variances in the following way: Revenue  $E$  is

$$E = p \cdot x = (p_r \cdot p_m) \cdot (x_r \cdot x_m) = \underbrace{(p_r \cdot x_r)}_{\text{internal drivers}} \cdot \underbrace{(p_m \cdot x_m)}_{\text{external drivers}}$$

Let the sales price  $p$  be the product between the industry price  $p_m$  and the relative price  $p_r$ , i.e.,  $p = p_m \cdot p_r$ . The standard quantity is adjusted for the price change, i.e.,  $x^s = x(p^i)$ , and broken down into

$$x_r^s = x_r(p_r^i) = \frac{x^s}{x_m^p}$$

This structure allows to decompose the revenue variance into an industry price variance,  $(p_r^p \cdot x_r^p) \cdot (p_m^i - p_m^p) \cdot x_m^p$ , a market volume variance,  $(p_r^p \cdot x_r^p) \cdot p_m^p \cdot (x_m^i - x_m^p)$ , a marketing effectiveness variance,  $(p_r^i \cdot x_r^i - p_r^p \cdot x_r^p) \cdot (p_m^p \cdot x_m^p)$ , and a price effectiveness variance,  $(p_r^i \cdot x_r^i - p_r^p \cdot x_r^p) \cdot (p_m^p \cdot x_m^p)$ . [Albers \(1992\)](#) further distinguishes advertisement and distribution effects based on empirical reaction functions. [Bauer & Fischer \(1998\)](#) discuss the benefits of a multiplicative relative to an additive disaggregation of sales variances. [Dierkes \(2001\)](#) introduces planning variances into the revenue variance analysis.

Interestingly, while theory provides advanced techniques for cost and revenue variance analyses, practice has not adopted them heavily. A survey among mid-sized firms revealed that few firms applied revenue variance analyses, which are considered too detailed (6.1 on a scale from 1 = not true to 7 = perfectly true) and too demanding (5.4).<sup>95</sup> In practice, most companies use a cumulative cost variance analysis, perhaps because it is the method integrated in management accounting software (including SAP software).

## 7. Conclusions

This chapter surveys major conceptual and theoretical management accounting research as well as practices in German-speaking countries. A general observation is that German management accounting has a strong quantitative bias, which mirrors the research that is published in the major German academic journals and in leading textbooks. German management accounting developed from financial accounting, from production theory, and more recently from information economics and finance. There has been little research using qualitative methods in management accounting.

A central feature of German management accounting is its basic distinction from financial accounting. The most popular German cost accounting systems were explicitly designed for internal management decision and control purposes, and the provision of data for valuation in the financial accounts was often viewed as a supplementary function. The advantage of this view is that several sophisticated cost accounting systems originated from the intention to fully model and capture the operational and decision-oriented interdependencies in firms. Furthermore, the techniques advanced in these cost accounting systems often preceded similar developments elsewhere (e.g., activity-based costing (ABC)). A potential disadvantage of a strong separation between cost and financial accounting is the emergence of different earnings figures, which always causes confusion about which earnings are “right.” We currently observe a trend to harmonize cost and financial accounting and it seems that German cost accounting practice is moving towards the Anglo-Saxon tradition where cost accounting and financial accounting are much more aligned. Interestingly, in light of the recent development of resource consumption accounting (RCA), several authors explicitly acknowledge that the emphasis on financial reporting in the US may be responsible for the fact that “U.S. management accounting systems

<sup>94</sup>See also [Betz \(1999\)](#) and [Lengsfeld \(1999\)](#).

<sup>95</sup>See [Witt \(1990\)](#).



aren't as sophisticated as those in some other developed countries of the world,"<sup>96</sup> and this statement is followed by the call to integrate elements of German cost accounting systems into US systems.<sup>97</sup> We view this as evidence that there are merits in analyzing problems of decision and control independently from issues of financial accounting, and we expect that in the next years, some of the techniques and ideas embedded in German cost accounting systems will be exported to other countries.

We also describe some specific German cost accounting concepts that may contribute to understanding costs from different and perhaps "unusual" perspectives, such as costs derived from discounted cash flows and the explicit introduction of uncertainty, but also note that their impact on practice has not been large as yet. While the focus of the earlier literature lies in the conceptualization of cost and the design of cost accounting systems, the more recent literature takes a perspective toward the usefulness of management accounting. We show that much of the current research and practice has been sparked or is even driven by developments in the United States. Examples are strategic management accounting techniques and the Balanced Scorecard. We document, though, that there is German research literature that studies conceptual and incentive issues with these techniques. A typical research strategy is to pick up a particularly neat result in the international (typically US) literature, critically analyze it, and extend it. We discuss this approach using examples mainly from the analytical research, such as Groves schemes and residual income measures. Finally, we discuss variance analysis issues. With a more quantitative (e.g., shareholder value) orientation of management these conceptual studies affect not only research but also practice.

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<sup>96</sup>Clinton & Webber (2004, p. 22).

<sup>97</sup>See Clinton & Webber (2004) for more details.

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# The History of Management Accounting in the U.S.

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**Abstract:** This chapter chronicles the history of management accounting in the U.S. from 1800 to 1970. A major theme of the first century covered was the search for the origins of purposeful cost accounting in venues such as the New England textile industry, the Springfield Armory, the railroads, and the metal-working firms where the scientific management movement was born. The rise of the mega-corporation and the genesis of managerialism are key events of the early twentieth century. Standard costing and budgeting were essential developments. The chapter concludes with our analysis of certain components of management accounting's conventional wisdom as of 1970, accompanied by a view of the discipline's future directions.

## 1. Introduction

It is a bit paradoxical that a heightened interest over the past two decades in historical research into management accounting in both the U.S. and the U.K. has stemmed from seminal books on management authored by scholars whose most identifiable expertise is economic history rather than accounting. Alfred Chandler's *Strategy and Structure* (1962) (also, *The Visible Hand: The Managerial Revolution in American Business*, 1977) and Sidney Pollard's *The Genesis of Modern Management* (1965) both reflected a depth of accounting awareness that sent a generation of accounting historians in the U.S. and U.K., respectively, scurrying to the archives to learn more.

Also paradoxical is the fact that in both countries an impetus to research came from a perceived need to refute an erroneous contention launched by an influential scholar. In the case of the U.K., it was the same Sidney Pollard (1965, p. 248) who wrote: "The practice of using accounts as direct aids to management was not one of the achievements of the British industrial revolution." On the other side of the Atlantic, it was Johnson & Kaplan (1987, p. 12) who sounded the call to arms when they spoke of managerial accountancy's lost relevance in the 1980s in these terms:

By 1925, virtually all management accounting practices used today have been developed: cost accounts for labor, material, and overhead; budgets for cash, income, and capital; flexible budgets, sales forecasts,

standard costs, variance analysis, transfer prices, and divisional performance measures.

This chapter begins by examining those episodes in U.S. history that have been advanced by scholars as the origins of sophisticated or purposeful managerial accounting. In chronological order, these venues are the New England textile industry, the Springfield Armory, the railroads, and the metal-working industries where scientific management was born. The chapter continues with the rise of the decentralized corporate behemoths of the 1920s, with particular focus on DuPont and General Motors (GM). The 1920s was also the decade in which business budgeting was adapted from governmental origins, and the National Association of Cost Accountants (NACA) was created as the professional organization for managerial accounting practitioners. The depression decade of the 1930s saw the passage of the National Industrial Recovery Act (NIRA) as an antidote to the extraordinarily hard times and the passage of the Securities Acts to forestall the possibility of recurrence. The national emergency of World War II had mixed repercussions for cost accountants. The 1950s and 1960s brought the development of controllership as both an art and a science. Direct costing and responsibility accounting were also much discussed. The chapter concludes in 1970 by addressing the issue as to whether the preceding 45 years had witnessed any meaningful advances in managerial accounting methodology. A vision for the future of the discipline as it might have been foreseen in 1970 is considered.



## 2. The Origins of Purposeful Cost Accounting in the U.S.

### 2.1. *The New England Textile Industry*

Cost accounting information, broadly interpreted, was first used in a managerial and purposeful fashion in the New England textile industry of the early 1800s.<sup>1</sup> Prior to that time, most businesses were small and entrepreneurial, and owners were hands-on managers. Large-scale textile manufacturing in New England reflected the transition from mercantile to industrial accounting in the U.S. The New England mills were fully integrated and employed hundreds of full-time resident workers and professional managers. They were formed as joint stock companies and were directed by an interlocking network of Boston financiers.<sup>2</sup> In accordance with Massachusetts law, corporate treasurers prepared financial reports that were distributed to those stockholders who served as mill directors. Each mill was supervised by a factory agent who was chosen for his managerial skills and executive ability. There were no middle managers *per se*, but overseers and “second-hands” were fully accountable to the factory agent for production, quality, staffing, and record keeping.

The annual treasurers’ reports included a variety of cost accounting information. Chief among these reports was the comparative costing between different mills, different time periods, and individual products and product lines. Comparative cost data were used in a number of managerial ways: (1) deciding whether to make or subcontract particular products; (2) identifying which mills were relatively more or less efficient than others; (3) determining if the prices charged for cloth fully covered the costs of production; and (4) deciding if production facilities should be expanded and if new building walls should be constructed out of mortar or brick (Tyson, 1992, 1998). In addition to non-routine or one-off costing, certain accounting reports were more formal and were routinely prepared. Total and average print cost per pound and per yard of cloth were computed for each mill on a regular basis. The April 15, 1826 inventory of cloth at Merrimack Manufacturing Company was broken down into 32 different style categories. An October 1827 report

included the total and unit costs of nine distinct manufacturing operations (bleaching, dyeing, blacking, etc.). Although average and total cost figures were derived from rather simple allocation procedures, evidence suggests that mill directors regularly monitored and used these data to support important managerial decisions despite the fact that the cost data were inaccurate, imperfect, or suboptimal.

In retrospect, it is not surprising that treasurers and directors compiled and compared cost information on their network of mills owned in common. The New England mills faced foreign and domestic competition in markets with steadily falling prices during a period of frequent technological innovation. The absence of norm-based costing or systematic depreciation is also understandable although some scholars have characterized these accounting “deficiencies” as indicative of pre-modern accounting development. The concept of depreciation as a loss of value was clearly understood by the early 1830s. Massachusetts law required existing corporations to provide an estimate of the value of real and personal corporate property. Revaluations of long-term assets were required whenever additional stock was issued, and machinery book values and residual corporate profits were reduced whenever revaluations took place. The reductions did not occur each year, in part because there were no regulations requiring them, but there was an awareness of depreciation. Expenditures to maintain, renew, and improve existing machinery were recorded in a repairs account that was fully charged to income. In point of fact, the use of periodic revaluations and adjustments to residual profits was an effective way of funding fixed-asset replacements. In summary, our detailed examination of mill accounts and records enables us to fully support Lubar’s (1983, p. 147) conclusion that “accounting was used in the textile mills of the nineteenth century as an instrument of managerial control.”

It should be noted that the traditional interpretation of early nineteenth-century New England mill costing (e.g., see Dawley, 1976; Lubar, 1983; Tyson, 1992) as both purposeful and beneficial to mill owners and managers was countered by Hoskin & Macve (1996) who argued that the New England mill cost reports were based on arbitrary allocations and were clearly suboptimal and thus lacked managerial utility. Rather, these authors argued that cost data only became useful to managers after norms had been established (i.e., at the Springfield Armory in the early 1840s) so that managers could then discipline workers, hold them accountable to empirically based standards, and improve labor productivity. Tyson (1998) acknowledged that *formal* ledger-based cost

<sup>1</sup>We count ourselves among those scholars who view cost management/management accounting information to incorporate both formal accounting data and informal cost reports and memoranda.

<sup>2</sup>For example, 29 mills in Lowell, Massachusetts were organized into nine corporations that were capitalized at over \$500,000 in \$1,000 share increments and which, by 1840, produced over one million yards of cloth a week (Montgomery, 1970).

reports did result from simple averaging and allocations, and that labor norms were never established at the New England mills. Notwithstanding, mill owners and managers clearly made do with suboptimal information to make important and ongoing business decisions (i.e., make or buy, special order, pricing, etc.). The nature and role of early nineteenth-century costing information was more fully played out in the debate regarding the Springfield Armory.

### 2.2. The Springfield Armory

Accounting practices at the Springfield Armory during the pre-Civil War period served as the forum for a heated debate between traditional and “new” accounting historians in the early 1990s. The Springfield Armory was established as a national armory by Congress in 1794 and became the first and largest prototype of a modern factory establishment.<sup>3</sup> Formal processes and detailed reports were established to coordinate and control the flow of products through the armory’s integrated manufacturing facility. The armory produced interchangeable parts, substituted capital for labor, and faced competitive pressures from private manufacturers to keep costs under control.

Hoskin & Macve (1988a, b) re-examined the Springfield Armory archives and concluded that it was the birthplace of norm-based costing in the U.S. in the early 1840s.<sup>4</sup> According to Hoskin & Macve (hereafter H&M), post-1840 productivity improvements were attributable to the “invention” of managerialism, which H&M later defined as managers’ ability to enforce accounting norms and exert discipline over labor (Hoskin & Macve, 1996). H&M contend that modern accounting emerged from the confluence of two critical events at the armory: (1) Daniel Tyler’s formal inspection and revised piece rates in 1832 and (2) the establishment of a military superintendent in 1841.

Tyson (1990) also re-examined the armory archives and discovered that US armories had been placed under military jurisdiction as early as 1815 and that a comprehensive piece-rate system was established at that time. Tyson concluded that economic factors

(falling prices, skilled-labor surpluses, technological improvements, etc.) better explained management’s desire and ability to reduce piece rates and explain the significantly increased productivity at the armory after 1841. In addition, Tyson (1990) cited the actual report of the 1841 Inspection Board to support his view as to why existing piece rates were reduced and why post-1841 rates were not “norm-based” (Benet 1878, p. 405):

The board have no doubt that, taking into consideration the perfection of the machinery, the mechanics [at the Armory] are paid nearly 50 per cent higher than is paid for the same work in private establishments. Under the impression that the Government should observe some consistency in its rates of compensation, they have adopted a scale of prices intermediate between those now paid and the wage paid elsewhere.

H&M’s interpretation, which was explicitly based on Foucauldian principles of panopticism, functional disciplinary, and discontinuity,<sup>5</sup> was refuted by Tyson (1990, 1993) and reaffirmed by H&M (1994, 1996) in a series of point/counterpoint articles and conference debates in the 1990s. The debate even encompassed the interpretation and significance of accounting in the New England textile mills (Tyson, 1998). In essence, Tyson argued that H&M’s arguments were theory driven rather than fact based, that they inaccurately predated the birth of norm-based standard costing by almost 50 years, and that they imputed the use of norm-based standards when none existed.<sup>6</sup>

## 3. Nineteenth-Century Cost Management

### 3.1. The Railroads

Chandler (1977) saw little of contemporary significance in the operations of the New England textile industry. The Springfield Armory was an important antecedent of contemporary managerialism, but it was an isolated event. It was not until the birth of the railroads in the late 1840s that he found “the first modern business enterprises” as he labeled his chapter on the early railroad empires (p. 87). It was only then that a separation occurred between ownership and management, a development as central to the advent of the modern corporation in Chandler’s way

<sup>3</sup>According to Chandler (1977), the Armory was the most sophisticated US manufactory by the early 1840s.

<sup>4</sup>According to H&M, armory workers were expected to produce a certain level of output and were disciplined if they did not reach that level. Tyson argued that piece rates were set such that armory workers would produce different outputs and earn different total wages based on individual skill differentials. There is no evidence that shows that armory workers were ever disciplined or dismissed because of differential skills or earnings.

<sup>5</sup>See Ezzamel et al. (1990) for a Foucauldian interpretation of events at the Springfield Armory.

<sup>6</sup>We have noted that well-known critical and traditional accounting scholars also date the birth of norm-based standard costing in the U.S. to the early twentieth century. See, for example, Chandler (1977), Nelson (1979), Johnson & Kaplan (1987), Miller & O’Leary (1987), Hopper & Armstrong (1991) and Miller & Napier (1993).

of thinking as the labor-control mechanisms at the Springfield Armory were to Hoskin and Macve's declaration that here was the genesis of modern management. In terms of accounting development, Chandler felt that railroad accounting signaled the emergence of accounting from bookkeeping (p. 109). By 1860, there was more accounting and auditing going on with the railroads than in state and federal government (p. 110).

The prime movers in railroad accounting were Benjamin Latrobe of the Baltimore & Ohio and J. Edgar Thomson of the Pennsylvania. Latrobe was particularly instrumental in the development of financial accounting, while Thomson's major contribution was the popularization of accounting innovations in railroad trade journals such as Henry Varnum Poor's *American Railroad Journal*. In terms of cost accounting, the name of Albert Fink predominated, particularly with regard to his development of the ton-mile for the Louisville & Nashville. The ton-mile became the basic measure of unit cost on the railroads and the primary control measure for the evaluation of managers, supplanting earnings or net income (pp. 99, 109, 116–117; see also, Heier, 2000).

Perhaps as important as the accounting innovations was the managerial structure engineered by Thomson for the Pennsylvania. Here, the first appearance of a decentralized, line-and-staff, divisional form of organization that became a model for most post-Civil War reorganizations of the railroads was in evidence. This divisional structure required a greater flow of accounting records, as well as documentation, other than the functional departmental structure common in Britain and typified in the U.S. by the New York Central. Chandler (pp. 106–107) also traced the Pennsylvania's influence to the Carnegie steel enterprise and an even more evident reincarnation at GM nearly three-quarters of a century later.

### 3.2. *Oil and Steel*

The two decades following the Civil War brought a remarkable growth in the size of American business enterprises with little in the way of a concomitant improvement in accounting sophistication. This growth was more linked to technological advance than a broadening of a managerial perspective that would have mandated accounting innovation. Industries such as tobacco, oil refining, and distilling featured mass production with continuous processing by an array of new machines. The accounting was reflective of a highly centralized, top-down management environment. At Standard Oil, for example, management received monthly cost statements that dealt adequately with easily derived prime costs but with no attempt to

deal with more difficult concepts such as overhead or depreciation (Chandler, 1977, p. 258).

The epitome of the giant corporation relying almost solely on prime costs in terms of its accounting was the Carnegie Steel Company, the forerunner of what was to become US Steel. Andrew Carnegie had been trained for management on the Pennsylvania Railroad where he had learned to focus exclusively on costs and to allow the profits to accrue naturally to the enterprise. Carnegie was "obsessed" by cost sheets, which became his primary control mechanism. Data were used to evaluate managers and processes, control raw material inputs, make product-line decisions (especially by-products), and determine prices. Still absent was attention to overhead costs and depreciation (Chandler, 1977, pp. 267–269; Fleischman, 1996, p. 131; Johnson & Kaplan, 1987, pp. 32–34). Johnson & Kaplan (1987, pp. 42–43) wondered why accounting was not more instrumental in the planning and control of physical assets and capital investment. They hypothesized that the enormous growth of markets following the depression of 1873 rendered every investment decision a success. This explanation was similar to the one Pollard (1965) offered in dismissing British Industrial Revolution costing; namely, profit margins were so huge that entrepreneurs were unconcerned about costs. Of course, Pollard was wrong in this analysis (Fleischman & Parker, 1991). A further explanation lies in the reality that these huge firms remained single-activity enterprises. Their growth was the result of vertical integration associated with that single product or service. Thus, relevant investment data tended to be limited to a series of closely linked outsourcing decisions related to the vertical expansion. Perhaps as significant was the fact that the highly centralized nature of the enterprises created an information overload for top management, which was more concerned with vertical integration issues.

### 4. Scientific Management

One of the foci of managerial accounting history research in the U.S. has been an effort to turn back the clock to the point in time when the origins of purposeful cost accounting actually occurred. Decades ago, the conventional wisdom held that cost accounting was embryonic until the scientific management movement of the late nineteenth century (Chatfield, 1977; Garner, 1954; Littleton, 1933; Solomons, 1952; Wells, 1978). As we have seen, this verdict has been debated by many scholars. Johnson (1972), Porter (1980), and Tyson (1992, 1998) have written favorably of the accounting in the New England textile industry; Chandler (1977) and the prolific team of Flesher, Previts, & Samson (Flesher et al., 2003a, b; Previts & Samson, 1999–2000, 2000; Samson et al., 2003) have

opted for US railroading; Hoskin & Macve (1988a, 1994, 2000) for the West Point discipline introduced at the Springfield Armory. Additionally, Boyns & Edwards (Boyns, 1993; Boyns & Edwards, 1997; Boyns et al., 1997; Edwards, 1989; Edwards et al., 1995; Edwards & Newell, 1991) and Fleischman & Parker (1990, 1991, 1992, 1997) have sought origins across the Atlantic in the British Industrial Revolution. Notwithstanding these chronological adjustments, the theoretical outpouring of scientific management literature makes the quarter century precedent to World War I an important formative era in American management accounting history.

The growth of huge enterprises in the 1870s was driven by technological developments in the main. Now in the 1880s, growth was more a function of managerial coordination and control (Chandler, 1977, p. 272). In terms of accounting, Captain Henry Metcalfe's *The Cost of Manufactures* (1885) commenced the lengthy transition to a broadening of cost awareness beyond the prime-cost focus prevalent in practice. In particular, Metcalfe, who was a descendent of the same military tradition as Roswell Lee of the Springfield Armory, was the first in the U.S. to distinguish indirect or overhead costs. The other major figures of the decade of the 1880s were Henry Towne and Frederick Halsey, both of whom were to be future presidents of the American Society of Mechanical Engineers. They firmly established the leadership of the engineering profession in early scientific management. Towne, the chief executive of the Yale and Towne Manufacturing Company, turned his lock-making enterprise into one of the earliest prototypes of a factory run according to scientific management principles (Towne, 1886). Halsey introduced a premium plan to reward efficient workers who exceeded output standards established on the basis of historical data.

Frederick Winslow Taylor, whose name has become synonymous with scientific management, worked as an engineer at Midvale Steel and later at Bethlehem Steel in the 1880s and 1890s. There he implemented his theories about work organization although his first paper on the subject did not appear until 1895. Nelson (1980, p. 102) categorized Taylor's strategy into five stages. Initially, firms needed to address issues such as machine layout and design, tool standardization and tool-room reorganization, standard purchasing and stores methodology, and supportive accounting procedures and system. Second, production control was to be instituted based upon a formalized system of planning, including a planning department. The three remaining stages were not sequential in nature. These included functional foremanship (the proliferation of supervisors, each with a

specialized expertise), stopwatch-based time study, and incentive wage schemes. Taylor believed that time study was more scientific than merely the repetition of observations, stopwatch in hand. He was convinced that managers could improve productivity by studying the most efficient way to perform each task physically, and, to some degree, psychologically and by then communicating these work routines to individual workers. Work expectations were embodied into both labor standards and incentives, but the process was far different from what Halsey had envisioned. First, they were scientifically derived rather than based upon historical data. Second, they reflected what a superior workman could accomplish rather than an average performer. Finally, Taylor's incentive system included disincentives, the "stick" as well as the "carrot," for those who did not work up to scratch (Taylor, 1903, 1911).

A substantial core of management consultants and industrial engineers followed in Taylor's footsteps, including such luminaries as Harrington Emerson, Frank Gilbreth, Henry Gantt, Carl Barth, Charter Harrison, and Sanford Thompson. Each had a slightly different set of priorities for their clients, but these variations were of little consequence in the wider scientific management movement. Perhaps the most important theorist of the age, apart from Taylor, was Alexander Church, a British émigré, who had a basic disagreement with Taylor. Church felt that Taylor's concentration on tasks at the micro-level failed to integrate jobs to benefit the organization as a whole (Chandler, 1977, p. 177). Church (1908, 1914) built upon Metcalfe's identification of indirect costs by developing a methodology for the application of those costs to individual products (Vangermeersch, 1986). Johnson & Kaplan (1987, pp. 52–58) focused particularly on Church as a prime mover in the scientific management movement because he envisioned a system in which virtually all costs of the industrial enterprise would be allocated to product for the purposes of product costing and profit evaluation rather than the determination of financial reporting numbers.

#### 4.1. The Search for Standard Costing

The single innovative management accounting technique most frequently identified with scientific management is standard costing and the analysis of variances between estimated and actual costs. While historians might disagree about what constitutes sophisticated standard costing and its prevalence in practice, there can be little doubt that its theoretical statement appeared initially in the first decade of the twentieth century (Emerson, 1908–1909; Whitmore, 1908).

Accounting historians of the three most prominent paradigms have analyzed scientific management and its impact upon American industrial development and labor relations. All seemingly agreed that standard costing was widely implemented by firms who had hired in one of the consultants whose shingles were prominently displayed in the immediate pre-World War I period.

Johnson & Kaplan (1987, pp. 49–50), from an economic-rationalist viewpoint, wrote of the managers of metal-working firms:

...these 'scientific managers' focused their attention on predetermining 'standard' rates at which material and labor should be consumed in manufacturing tasks. The methods they devised to determine standards for material and labor inputs included engineering design of bills of material and time-and-motion study.

Miller & O'Leary (1987, p. 238), from a Foucauldian perspective, expanded the development of scientific management beyond a discourse on efficiency and standards. Addressing standard costing as a central component of the scientific management movement, they observed:

Standard costing is, we suggest, intertwined with other attempts within the enterprise and outside it to embark on a vast project of standardisation and normalisation of the lives of individuals...It is the positive conditions of a complex group of relations with which accounting exists that we should address.

Finally, Hopper & Armstrong (1991, p. 433), drawing deeply on the writings of Marx and the labor-process revisionism of Braverman (1974), saw in Taylorism and scientific management an efficient device to “de-skill” the labor force by transferring craft knowledge to managers and to accomplish in due course a “speed-up” of work. They concluded:

Standard cost systems were pioneered as an aspect of the fragmentation and deskilling of craft labour, which had hitherto resisted employers' attempts at intensification through piecework payment schemes. Once American industrial engineers had gained control over working methods, it became possible for them to make 'scientific' decisions on the pace of work, and to issue these in the form of standard costs.

Peter Drucker said of scientific management that “altogether it may be the most powerful as well as the most lasting contribution America has made to western thought since the Federalist Papers” (quoted in Braverman, 1974, p. 88). Despite this high praise, there is substantial doubt whether scientific management

enjoyed a wide application in the first two decades of the twentieth-century concomitant with its theoretical grounding. Typical of the misconception were the three statements above attesting to the practical importance of standard costing. The preponderance of evidence strongly suggests that the impact of scientific management on industrial practice was minimal. Kanigel (1997, pp. 502–503), a recent Taylor biographer, collected a number of estimates of Taylorite installations from various sources but characterized these results as “unimpressive numbers.” Other key figures in the movement commented on the low adoption rate. Harlow Person observed that the number of plants that were worthy of being called scientific management installations could be counted on the fingers of one's hands (Nadworny, 1955, p. 142). Morris Cooke was quoted as saying in 1919, “we could not sell scientific management thirty years ago, we can hardly sell it today” (Haber, 1964, p. 120).

Why is it that so many of the commentators on scientific management have failed to appreciate or even to mention this theory/practice schism in accounting history? Probably, the most compelling explanation is a failure to do archival research into the period or to listen to those scholars who did (Tyson, 1995). Fleischman (2000) drew upon the investigations of two researchers who had visited the Taylor Collection at the Stevens Institute of Technology. Epstein (1978, pp. 166–167) mentioned only 36 business enterprises that he had found referenced as Taylorite installations; Nelson (1974, pp. 488–490) listed only 45. Additionally, in 1915, R. F. Hoxie, a University of Chicago economist, undertook a survey of scientific management for the US Commission on Industrial Relations. He requested of Taylor, Gantt, and Emerson nominations of representative firms that had hired them as consultants and had instituted their recommendations. Hoxie's (1920, p. 40) conclusion was:

Far from being the invariable and purely objective matters that they are pictured, the methods and results of time study and task setting are, in practice, the special sport of individual judgment and opinion, subject to all the possibilities of diversity, inaccuracy, and injustice that arise from human ignorance and prejudice.

In any event, the number of nominations put forward by the three leading consultants was 30. Fleischman (2000, pp. 622–623) amalgamated the three lists, eliminated duplicate entries, and found only 80 firms that could be identified as embracing scientific management to any significant degree.

Scientific management is further important in US managerial accounting because it is one of the very few

events that has been rationalized and analyzed by historians representing different paradigmatic schools. From an economic-rationalist perspective, the Taylorite program was designed to define a new role for middle managers in newly emerging organizational structures that would contribute in significant ways toward increasing the efficiency of workers and, inevitably, the augmentation of profits. Miller & O'Leary (1987), from a Foucauldian perspective, saw scientific management as a first step in creating visibility throughout the organization. They observed that the progression from scientific management to standard costing and eventually to budgeting would make all members of the business enterprise, worker and manager alike, both visible and accountable. In their seminal article, Hopper & Armstrong (1991) elaborated many of the themes generated by Braverman, Marx, and other labor-process authors. They reviewed how workers were coerced under scientific management (p. 410), the way in which "social conflict is embedded in historical change" (p. 412), deskilling as a component of the transition from piece rates to craft labor to scientific management (pp. 417, 433), among others. The labor intensification issue was highlighted by their perception that Taylorism was an "assault" upon "systematic soldiering," the tradition that skilled craftsmen could restrict output through their knowledge of the craft (pp. 419–420).

Fleischman (2000) attempted to synthesize these differing motivations for Taylorism in an effort to show how they each contributed additively and synergistically to a fuller understanding of the movement. He concluded that Taylorism in its attempt to create labor discipline for the mutual advantage of all members of the organization had definite Foucauldian parameters and underscored what Hoskin & Macve, at least, found to be the genesis of modern managerialism at the Springfield Armory. The resistance of labor, functioning through the unionization movement, was a clear reaction to the view that Taylorite discipline represented the subsumption and alienation of labor in keeping with Marxist ideology. Meanwhile, Taylorism's failure at large-scale adoption into practice was part and parcel of an economically rational decision on the part of entrepreneurs who felt the huge costs of implementation would not provide sufficient benefits, at least not over an acceptable time horizon.

The search for the large-scale adoption of standard costing and variance analysis has continued beyond the age of Taylor and scientific management. The archival record of those episodes in the U.S. history that featured the large-scale intervention of the central government into the economy is immense. Three such

occasions in twentieth-century U.S. history were the two world wars and the Great Depression. In the myriad mass of business records that were collected during these times, there is virtually no indication that standard costing was a common way of doing business, even for firms of substantial size (Fleischman & Marquette, 2003 for World War II; Fleischman & Tyson, 1999 for the Great Depression; Fleischman & Tyson, 2000 for World War I).

### 5. The 1920s: The Rise of the Decentralized Mega-Corporation

Johnson & Kaplan's claim that all in American managerial accounting was known by 1925 was less about accounting advances associated with scientific management and more about the accounting innovations developed to support the rise of multidivisional firms DuPont and GM over the two decades precedent to 1925. Johnson & Kaplan (1987, p. 98) wrote, drawing upon Williamson (1970):

Multidivisional organizations arose to supplant these markets [labor and capital] by internalizing the multi-activity operations of several integrated firms to earn higher asset returns than the market could elicit from the same firms if they operated independently.

H. Thomas Johnson, the historian of the *Relevance Lost* team, as well as Alfred Chandler, his intellectual forerunner, did extensive archival research on these two firms. Chandler's first major work, *Strategy and Structure* (1962), had lengthy chapters on both enterprises that together comprise nearly half the book. Subsequently, Chandler & Salisbury (2000) wrote a monumental tome on Pierre DuPont and the two companies he headed—DuPont and GM. Johnson (1980a, b) published articles on the accounting systems developed at each, both of which appeared in the *Business History Review*. *Relevance Lost*, although a rather brief work for a chronology that ran from the early nineteenth century to the 1980s, contained a chapter on each. Nowhere in this immense scrutiny was there a mention of standard costing, time-and-motion studies, or the scientific development of work routines, although Pierre DuPont was impressed by the raw material and labor cost controls important in the Taylorite system (Johnson, 1980a, pp. 193–194). Furthermore, Alfred Sloan (1964), long chief executive of GM and architect of its managerial structure, made no mention of scientific management being practiced there.

#### 5.1. DuPont

The history of the DuPont Powder Company for the two decades following its initial founding in 1903 is the story of the transition from a single to a multi-activity firm. As the organization became increasingly

diversified during the World War I years and beyond, it became increasingly necessary to devise a management accounting system to control the value chain and to harmonize departmental performance with ownership interests. DuPont was the first major industrial firm in the U.S. to be decentralized, although it continued to manifest certain centralized features that had characterized nineteenth-century firms. Each of its mills was run as a single-activity operation with traditional accounting reports (e.g., mill-specific cost sheets and profit-and-loss statements) forwarded monthly to the central office. There raw material usage and output were compared to predetermined expectations and the performance of other mills of the same function. The Executive Committee was concerned ultimately with long-term planning, particularly capital investment decisions, and rarely intruded on the operational decision making at the various mills. In a reorganization undertaken in 1921, the Executive Committee was trimmed to five members, none of whom were heads of department. The organizational chart reveals five product-line departments, eight staff or auxiliary departments, and the treasurer's operation.

DuPont as a path-finding, decentralized organization did reflect a number of innovative managerial accounting methods that sound more contemporary than a product of the early 1920s. It was at DuPont that Donaldson Brown, initially an explosives salesman who was to become vice president of finance at GM and who is a leading player in US managerial accounting history badly in need of a biographer, developed a very elaborate return-on-investment (ROI) measure that was to serve a number of functions for both organizations. ROI was primarily used to make decisions about alternative uses of capital than its more familiar role as a mechanism to evaluate managerial performance. Because Pierre DuPont loathed incurring debt financing for expansion, great care was necessary for allocating funds for capital investment. An operating maxim at DuPont was that no funds were to be allocated if the same money could be more profitably applied elsewhere. Of course, this focus on capital investment decisions was a new development that came with the diversified entity. Single-activity firms did not have the internal competition for funds so that the accounting information required rarely transcended mere cost data. Chandler pointed out that Brown's ROI formula was also used for more routine analyses of each mill's performance, the locating of inefficiencies, and the adjustment of plans and processes when appropriate.

DuPont was also very involved in business forecasting for inventory control and its central

purchasing. In this regard, it stands as an early example of a demand-pull manufacturing environment as later expanded and refined in Japan as the just-in-time approach.<sup>7</sup>

### 5.2. General Motors

During the mid-1910s, the DuPont family was in the process of buying shares of GM stock. As a result, in 1918, Pierre DuPont was able to oust William Durant, the firm's founder. The DuPonts were upset by Durant's failure to provide an organizational structure to the enterprise. Pierre assumed the presidency in 1920 and brought Donaldson Brown to GM the next year. There has been interesting discussion as to whether GM became a clone of the Powder Company as a result of this interface. Johnson (1980b) argued that Brown implemented DuPont's accounting and financial control systems at GM. However, Alfred Sloan, who ascended to the presidency in 1923, claimed credit in his autobiography for establishing a standardized accounting methodology for the various divisions and that the organizational plan at GM predated the DuPont impact. The two organizational schemes did not share details, only the commitment to a managerial philosophy of decentralization. Sloan pointed out that the two firms arrived at the same place but came from different directions. DuPont started as a single-activity, highly centralized firm while GM under Durant was decentralized to a point where there was virtually no divisional coordination whatsoever.

Many DuPont innovations of an accounting nature did find their way into GM's arsenal to be sure. Brown's ROI formula was used prominently but more traditionally to evaluate divisional and managerial performance than at DuPont where it was deployed in the first instance for capital investment decisions. ROI is currently disrespected in managerial accounting because of its potential to induce suboptimal decision making on the part of divisional managers, but Johnson believes that if all investment decisions are made centrally, this drawback can be eliminated.

The art of forecasting was well developed at GM. Sales were estimated four months in advance and revisited every month so that reaction to changed conditions was timely. The annual price studies for each auto line took into consideration the growth of the industry, seasonal variations, general business conditions, and the activities of competitors. Chandler said

<sup>7</sup>This discussion of DuPont is based upon material synthesized from Chandler (1962, pp. 56–112); Johnson (1980, pp. 185–204); and Johnson & Kaplan (1987, pp. 62–87).

of Brown that he moved the organization forward from decision making based on past and present performance to anticipated conditions in the future.

GM was a pathfinder in introducing a number of accounting and managerial methods common in today's world. A bonus plan was introduced in 1919 that rewarded meritorious managers with company stock. Flexible budgeting was introduced in 1923 even though the literature suggests that it did not become a frequently used technique until the 1930s. GM introduced market-based transfer pricing in the 1920s and maintained the autonomy of its divisions by allowing them to purchase components externally even if they were manufactured internally. Of interest also is the fact that Brown averred that GM did not use standard costing for control during the 1920s.

The competition between Ford and GM in the early days of the US auto industry provides some interesting comparative features. GM chose not to compete against Ford on the basis of price but rather along quality and functionality parameters, the other components of the survival triplet that Robin Cooper (1995) popularized in describing "lean" enterprises in Japan. It is also the case that Ford was highly centralized, while GM became a model for other firms with a decentralized organizational structure, at least in Chandler's estimation (e.g., Standard Oil of New Jersey). GM did not hide its light under a bushel in an effort to preserve corporate secrecy. However, in a speech before the 1927 annual convention of the American Management Association entitled "Centralized Control with Decentralized Responsibilities," Donaldson Brown doubted whether the GM model would have wide applications in the business world.<sup>8</sup>

### 5.3. Budgeting

Another compelling piece of evidence that supports the thought that scientific management practice substantially lagged theory was the lengthy delay in the coming of business budgeting. It is hard to imagine that standard costing and variance analysis would be prevalent without a frequent formulating of budgets to compare standard expectations with actual results. However, budgeting was a feature only of municipal accounting until well into the 1920s.

H. M. Lane presented a talk on business budgeting to the American Society of Mechanical Engineers in 1896. Given his audience, it is not surprising that

Lane's proposals were closely linked to scientific management. Notwithstanding, another 20 years were to pass before budgeting appeared prominently in the business literature (Marquette & Fleischman, 1992, pp. 131–132).

US budgeting was an outgrowth of the Progressive movement when a multitude of urban reformers combined to fight against the corruption and jobbery that made American cities the "most corrupt in Christendom" (Cleveland & Buck, 1920, p. 70; Righthor, 1916, p. 401). The first significant municipal budgeting article appeared in 1908 in the *Proceedings of the National Municipal League*, authored by Harvey Chase who was also deeply involved in the movement for uniform municipal accounting (Chase, 1908). Budgeting was also a feature of the municipal research bureau movement, which grew exponentially in the decade precedent to America's entry into World War I. The most famous was the New York Bureau of Municipal Research, which was funded by such luminaries as Carnegie, Morgan, and Rockefeller (Dahlberg, 1966, pp. 166–167). Herman Metz, the Comptroller of New York City, endowed the distribution of a series of "handbooks" to 300 other municipalities. Metz and the New York Bureau also started a graduate school to train future municipal administrators in methods that included budgeting (Marquette & Fleischman, 1992, p. 128).

President Taft became interested in budgeting, and in 1911, appointed Frederick Cleveland, a founder of the New York Bureau and author of a book on governmental budgeting (Cleveland & Buck, 1920), to head a committee to establish a federal budgeting process. The effort failed, but a decade later the first federal budget was instituted.

Though standard costing was an innovation of industrial engineers and accountants to a lesser degree, there is ample evidence to suggest that budgeting was a lesson conveyed from government to business during the 1920s. At the 1922 conference of the NACA, Stephen Gilman (1922, p. 263) of the International Accountants' Society, Inc. claimed that "the modern business budget is an inheritance from the municipal and governmental budget." Walter Vieh (1925, p. 173), writing for the *Journal of Accountancy*, began his article "Why the Budget?" by admitting that "most of us think of budgets as having something to do with public finance or with the successful managing of a household." In 1921, J. O. McKinsey, a Chicago CPA, published a series of nine articles in the newly established journal, *Administration*. These articles provided a cogent rationale for business budgeting, followed by an in-depth development of a master budget. He also described the importance of a budget committee and

<sup>8</sup>This discussion of GM is based upon material synthesized from Chandler (1962, pp. 119–162); Sloan (1964, pp. 42–144); Brown (1980, pp. 3–16); Johnson (1980b, pp. 490–517); and Johnson & Kaplan (1987, pp. 93–116).



internal lines of authority and responsibility for effective budgetary control (McKinsey, 1921a–1921i). The overall emphasis on budgeting shifted very quickly from government to business. The 1921–22 *Supplement of The Accountants' Index* saw the number of articles on governmental budgeting decline from over 100 in 1920 to 50 in 1921–1922 while those on business budgeting grew from 12 to 140. In the *Second Supplement*, which covered 1923–1927, the shift was even more dramatic with but 40 on governmental topics and almost 300 on business (Marquette & Fleischman, 1992, pp. 132–133). The same trend can be seen in the *Journal of Accountancy* and in the publications of the NACA.

#### 5.4. The Foundation of the National Association of Cost Accountants

One of the classic pieces of critical scholarship is Anne Loft's (1986) study of the advance of British cost accountancy during World War I. By virtue of the accounting profession's meritorious service during this dangerous time, particularly to the Ministry of Munitions, cost accountants "came into the light," and in 1919 as an outgrowth of their pronounced elevation in professional status, formed the Institute of Cost and Works Accountants (ICWA) (Loft, 1990).<sup>9</sup>

Fleischman & Tyson (2000) did not find a corresponding advance on the part of cost accountants in the U.S. during the war perhaps because of its short duration and the absence of a clear and present danger. Other factors might include the more fluid social and professional structures evident in the U.S., which precluded the need for so intense a struggle by costing practitioners, as well as the fact that American CPAs had been organized as a profession for only a quarter century. British CA societies, by contrast, had been in existence for a half century longer, and thus were more entrenched in power. In 1919, at a Council meeting of the American Institute of Accountants (AIA), a cost accounting section within the pre-eminent CPA organization was proposed. This suggestion was rejected on the grounds that the primary purpose of the AIA was to serve practicing public accountants. Immediately subsequent to this stinging rebuff, the NACA was formed (Carey, 1969). This

organization continues today as the Institute of Management Accountants.

Notwithstanding the need to form a separate group, early membership statistics do not support the contention that American CPAs stood aloof from the fledgling professional organization for cost accountancy. A list of 95 "Charter Members of the Association" included the names of some of the most distinguished CPAs in the country—Arthur Andersen, William Castenholz, Stephen Gilman, William Lybrand, Robert Montgomery, J. B. Niven, C. H. Scovell, C. O. Wellington, and J. R. Wildman (NACA, 1919, pp. 14–16). All of the officers of the NACA in its first year were CPAs. Its second president in 1920–1921 was no less a luminary than William H. Lybrand. The membership numbers confirm the thought that, despite the unpleasantness of the formation process, the NACA had the firm backing of public accountancy. This degree of support contrasted markedly with the experience of the ICWA in Britain. The *NACA Bulletins* and the *NACA Yearbooks*, which were transcriptions of programs at the national conventions, provide a wealth of information about the history of cost accounting in the U.S.

## 6. The 1930s

### 6.1. The National Industrial Recovery Act

The heart of the early New Deal's prescription for recovery from the Great Depression was the NIRA of 1933, which provided in Section 3(a) that each industry through its trade association should author a code of fair practice that would then be approved by the National Recovery Administration (NRA). The majority of the codes placed a floor on wages and a cap on weekly hours. They empowered the trade associations to divide work among member firms and prohibited price cutting below certain levels.

As the contents of the *NACA Year Book* and the *NACA Bulletins* in 1933 show, spirits ran high immediately following the passage of the NIRA. The legislation offered the promise to cost accountants that they would provide two vital functions with respect to the codes. First, the NRA, in a thinly disguised attempt at price fixing, ordained that it was to be illegal for firms to set prices so low as to drive competition out of business. Hence, code authorities were encouraged to have provisions that "selling below cost" would not be tolerated. Second, the establishment of code definitions for a specific industry's code necessitated a uniform method of cost ascertainment (Whiteside, 1933).

The 1933 NACA convention was a back-slapping affair as the speakers universally proclaimed the arrival of a golden age of cost accountancy (Bullis, 1933;

<sup>9</sup>It should be noted that Marriner (1980) does not share Loft's view that World War I was a period in which significant advances were made in cost accountancy. However, Marriner's focus was on cost accounting methodologies while Loft studied the period from the perspective that relationships were developed with chartered accountants that would result in the professionalization of the costing wing of the profession in the immediate aftermath of the war.

Gaskill, 1933). H. F. Taggart (1934, p. 149), a leading CPA serving on the NRA who was responsible for approving all cost accounting plans, quoted in the pages of *The Accounting Review* Eric Camman's<sup>10</sup> observation that "many a cost accountant must have felt that...the NIRA was going to do for cost accounting what the income tax law had done years before for general accounting."

These dreams, however, were roundly dashed even before the NIRA was declared unconstitutional in 1935. The NACA failed to provide the necessary leadership for cost accountants to take a common stand on issues such as uniform cost accounting procedures and the appropriate cost components to include in the determination of the normative, industry-wide selling prices mandated by the NIRA. If strong leadership had emerged, the self-interest of the business community might have been harnessed. However, the failure to achieve the same level of professionalism as characterized the financial side of accounting in response to the Securities Acts that closely followed is reflected in the fragmentation of costing theory today. In our view, the inability to achieve consensus on key cost accounting concepts and procedures presaged the so-called "Dark Ages" of accounting in the U.S.—a period in which financial reporting predominated over cost management (Bromwich & Bhimani, 1989; Johnson, 1992).

The subjective, judgmental, and inexact aspects of cost accounting were widely reported during the NIRA's brief 2-year lifespan. The inability to delineate the concept of reasonable costs or to specify uniform methods evidenced that cost accounting was far more an art than a science. The failure during the NIRA period both to establish agreed-upon costing principles and to differentiate cost from price led to the obfuscation of this branch of the accounting profession that was to continue for decades.

### 6.2. The Securities Acts and Their Impact on Accounting

The U.S. Congress passed the two Securities Acts in the early 1930s in response to financial reporting abuses of the 1920s, the resultant collapse of the securities markets, and the loss of investor confidence. In brief, the Securities and Exchange Commission (SEC) was created to monitor U.S. capital markets and to administer the acts. Its mandate was "to ensure full and fair disclosure of all material facts concerning securities offered for public investment" (Skousen, 1987,

p. 6). Many abuses pervaded the securities markets and had stimulated the creation of the SEC. Securities prices were manipulated, misleading financial statements were issued, insider trading was commonplace, and important information was secreted from investors and creditors. Congress was under intense pressure to restore confidence in the capital markets. Together these acts were to profoundly affect the accounting profession. Not only did they establish a regulatory climate and governmental oversight of accounting, but also led to the predominance of financial reporting as the major functional domain of accountants in corporate America.

The impact of the SEC on the accounting profession has been incalculable. For one, the Securities Acts formalized the audit process, limited it to certified public accountants, and, consequently, glamorized that side of the accounting profession. Clearly, the highest prestige in the profession was afforded to those accountants who worked for "Big Eight" firms and who led the engagements of large, well-known U.S. corporations. In essence, SEC audit regulations helped reinforce a CPA-based accounting career path that could culminate in an equity partnership. While it is impossible to prove that the best and the brightest minds were drawn to public accounting, the CPA designation certainly had a 50-year head start over other competing professional certifications like the Certified Management Accountant and the Certified Internal Auditor. Moreover, public accounting firms endowed professorships and were highly visible on major college campuses. Corporate accountants and other observers often lamented the portrayal of cost accountants and bookkeepers as second-class accounting citizens. For example, Young (1953, p. 644) titled his brief article, "Wanted: Added Lustre for Cost Accounting," noting that "the student may come to associate cost accounting with the green eye shade, the high bookkeeper's stool and an endless diet of dry mathematical computations. Something must be done."

Thus, it does not seem unreasonable to conclude that the predominance of public accounting came at the expense of the cost accounting side of the profession and further reversed the promise of the NIRA as a stimulus for cost accounting's re-emergence. In essence, cost accounting was often seen as a dead-end occupation rather than an exciting career. In our view, much of the criticism leveled against cost and management accounting in the early 1980s can be attributed to the greater glory achieved by the financial reporting side of the accounting profession. Johnson & Kaplan (1987), in their seminal indictment of U.S. managerial accounting, similarly argued that accounting's lost relevance and lack of innovation in the

<sup>10</sup>Eric Camman was a partner at Peat, Marwick and Mitchell and was to be the president of the NACA in 1935.

second half of the twentieth century emanated from this relative inequality.

### 7. The 1940s: The Nation Goes to War

American cost accountancy expertise was at a low ebb as the world moved toward war in the late 1930s. The *NACA Bulletins* and *Yearbooks* contained numerous articles on standard costing and variance analysis (e.g., Howell, 1942; McEachren, 1940). These efforts were quite simplistic, given that the theory had been around for four decades, and distressingly repetitive, traits that were especially distressing since their authors were preaching to the choir. It was almost as if the NACA's prime movers were begging for additional adoptions to strengthen the reputation of the profession.

The outbreak of hostilities in Europe saw the American industrial sector gear up for war production well in advance of American entry into the war in order to deliver on Roosevelt's promise that the U.S. was to be the "arsenal of democracy." What standard costing there was quickly disappeared in this environment because the government preferred to contract with its war materiel providers on the basis of actual rather than standard costs. Additional factors that precipitated this backsliding included an inexperienced work force, high labor turnover, unfamiliar products, lack of time-study engineers, material shortages, small-lot emergency purchases, specification changes, numerous artificial controls, and the list goes on (Caminez, 1944; Hoyt, 1943). Burke (1944, p. 253) put the blame squarely on the head of government:

Standard costs have received a definite setback in favor of actual costs. The existence of CPFF [contract-plus-fixed fee] contracts and the manufacture of new products under rapidly changing conditions have been factors in this trend, but a more basic reason is the insistence of government officials on costs that are as near actual as possible. Standard costs were accepted only where they could be converted to actual by the application of actual variance percentages.

Noted accountants Kohler & Cooper (1945, p. 306) concluded their 41-page survey of World War II accounting in *The Accounting Review* by observing that "accounting practice suffered perceptibly and even degenerated as a result of the war."

Fleischman & Marquette (2003) did archival research on the Sperry Corporation, a primary governmental contractor during World War II and purveyor of over 300 products associated with the aircraft industry. Sperry had been in business since World War I and had been a comparatively well-managed business during the interwar years.

Although the firm did not use standard costing, it had embraced scientific management with respect to the establishment of job routines through time-and-motion studies. While these activities dissipated during the war, Sperry developed a number of very sophisticated managerial accounting methodologies, some of which have a distinctly modern ring. Sperry and the military began planning for armed forces provisioning as early as 1936. The timetable of the contracts reflected the impact of learning curves. Sperry became the paragon for effective subcontracting (see its 12-point "subcontracting creed" in Fleischman & Marquette 2003, p. 91). The firm was fully committed to large-scale research and development expenditure and had the wisdom to allocate design-phase costs to product. Sperry was able to effectuate labor control without standards by breaking down craft skills into routine tasks that could be performed by the unskilled workers who "manned" the plants during the war. Finally, Sperry had a long history of managing time along with cost, an awareness more typical of Japanese management. As early as 1920, then factory superintendent I. H. Mills (1920, p. 131) observed in the firm's newspaper:

The importance of time can scarcely be overemphasized. It forms the larger part of the cost of production and when its value is fully appreciated, the way is opened for economics of production which make it possible to conduct a business profitably and allow it to be established on a sound financial basis. It is a widening circle—economy in the use of time, lessens the cost of production...

During the war, the firm required variance reports from its subcontractors measured in time rather than cost. Gauging the degree to which the cost accounting at Sperry was typical of the U.S. industrial sector more generally is left for further research.

### 8. The 1950s and 1960s

*8.1. Simon et al. and the Art/Science of Controllorship*  
One of the key events that identified the separate field of management accounting (as opposed to cost accounting) was the 1954 field study led by Herbert Simon (Simon et al., 1954). The research team conducted over 400 interviews at seven major U.S. companies. They created a framework and established terminology that is still included in leading U.S. cost and managerial textbooks. In brief, the study reported that accounting information was to support three distinct functions of controllership within a firm: (1) scorekeeping, (2) attention directing, and (3) problem solving. In essence, scorekeeping related to how the firm was performing in financial terms (i.e., financial statements and cost summaries); attention

directing arose in conjunction with actual-to-budget cost comparisons; and problem solving involved special cost studies to evaluate special decisions such as make-or-buy comparisons or product-pricing alternatives.

The study also noted that executives considered standard cost and variance data as a valid measure of manufacturing efficiency *only* when they had full confidence in the data. Managers and executives also said that they relied on other sources of information, and that “they had already learned of the problems from other sources before accounting reports appeared” (Simon et al., 1954, p. 26). Howard Greer, treasurer of Chemstrand Corporation, echoed the Simon study findings when he wrote that executives and high-level managers relied on a variety of information to make important business decisions (Greer, 1954, p. 175):

From some of the current literature on the subject one might suppose that management consists largely, if not entirely, of taking action based on the statements submitted by the accounting department....This is absurd. From the vantage point of a good many years' experience in both management and accounting, I observe that while accounting reports facilitate good management they are certainly not its exclusive, or even its most important component. They are of vital, but limited, usefulness.

Greer's remarks and the Simon study suggest that the role of formal management accounting information on managerial decision making must be evaluated carefully. Their comments presaged accounting's future critics. While many noted scholars would bemoan accounting's irrelevance and inadequacy in the early 1980s, it appears that management accounting information may never have been all it was held up to be, at least in the mid-1950s. In retrospect, it is understandable why executives and top managers would not rely on formal accounting information, especially when information systems were not computerized and incapable of helping executives solve real-time problems.<sup>11</sup> In point of fact, management accounting served a variety of roles in an organization, perhaps the least of which was real-time decision making. Although no standard definition of management accounting has or could ever be established, the one proposed in 1958 by the American Accounting Association's (AAA) Committee on Management Accounting captures many

activities that were identified by the NACA in their 1946 document (AAA, 1972, p. 1):

Management accounting represents the application of appropriate techniques and concepts in processing the historical and projected economic data of an entity to assist management in establishing plans for reasonable economic objectives and in the making of rational decisions with a view toward achieving these objectives. It includes the methods and concepts necessary for effective planning, for choosing among alternative business actions, and for control through the evaluation and interpretation of performance. This definition captures the multifaceted role of management accounting in the 1950s and 1960s, the decades that immediately preceded computerization and the onset of global competition.

### 8.2. Direct Costing/Responsibility Accounting

During the 1950s, a major contretemps erupted that impacted both managerial accounting and financial reporting. Direct (variable, marginal) costing has been known since the mid-1930s and grew in popularity among cost accountants as appropriate for internal decision making. Peaceful coexistence with absorption (full) costing advocates was undermined during the decade when the direct costing forces aggressively advanced the theory that contribution margin income statements would be more beneficial externally as well as internally. Previt & Merino (1998, pp. 323–324) identify the combatants in the controversy that ensued.

The 1950s and 1960s featured the advent of responsibility accounting with an emphasis on cost control via standard costs, as well as the emergence of noted academic accountants, such as Charles Horngren, William Vatter, and Carl Devine, among others, who prioritized the cost/management side of accounting and the need for cost and budgetary control. Horngren's name has become synonymous with the textbook that has dominated the cost accounting market for decades. Vatter's textbook, *Managerial Accounting* (1950), was a pioneering effort that advanced new theories about cost allocation techniques and stressed the more modern notion that the timeliness of reports made to managers was more vital than the absolute accuracy of the accounting numbers. Devine was a pathfinder in the realm of the behavioral aspects of accounting and its ethical ramifications. These managerially oriented accounting academicians, combined with the emergence of well-funded business schools, led to the development and standardization of an academic discourse on managerial accounting topics within the business curriculum that continues to the present day.

<sup>11</sup>See Mintzberg (1975) for a full discussion on the weaknesses of formal information systems and the reasons that managers utilized informal information.

Cost control was defined by the NACA in 1946 as actions taken “to achieve a conformity of the actual results with the planned results” (NACA, 1968, p. 113). Costs could be controlled either by responsible persons at the time of incurrence or through actions taken subsequently (and prospectively) as a result of accounting reports. The NACA (1968, pp. 107–108) noted that the accountant’s role in cost control occurred principally through the latter action in the form of standard costing and variance analysis:

The control of costs involves the adoption of standards of comparison... Control is achieved through efforts to keep actual costs in line with predetermined standards and by comparison of actual costs with these standards to reveal out-of-line performance in order that steps may be taken to remove the causes.

It appears that US academic organizations adopted a naively unproblematic view of the interface between standard costing and cost control during the 1950s. In 1956, the AAA Committee on Cost Concepts and Standards (AAA, 1956, p. 188) stated that “cost data therefore are devices by means of which management can direct individuals within organizations to carry out plans.” The effectiveness of actual-to-standard cost comparisons for control purposes may have been widely accepted and promoted because accountants dominated the design, content, format, and distribution of management accounting information at that time.

Few if any of the later critics of standard costing acknowledged that standard costing was established to control costs or that it was *ever* designed to achieve cost reduction. The NACA (1958, p. 9) expressed this point directly:

While it is sometimes said that an unattainable tight standard provides an incentive to reduce costs, it seems that this use of the standard confuses the objectives of cost reduction and cost control. Cost reduction proceeds by finding ways to achieve a given result through improved design, better methods, new layouts, incentive plans, etc. hence cost reduction results in the establishment of new standards. On the other hand, cost control is a process of maintaining performance at as near existing standards as possible.

The world of accounting began to change in the early 1970s as US domination began to wane. Global pressures, especially from Japan and Germany, spurred a re-examination of various assumptions that existed during the early and mid-1900s. The effectiveness of large hierarchical and bureaucratic organizations that stressed individual accountability (i.e., responsibility accounting) was widely questioned, especially in organizations that prioritized team building, group

decision making, and worker empowerment. Caplan (1966, p. 506) was one of the earliest published academic accountants who questioned the theoretical effectiveness of standard costing in establishing responsibility. For example, he wrote that:

Many management accounting techniques intended to control costs, such as budgeting and standard costing, may virtually defeat themselves because they help to create feelings of confusion, frustration, suspicion, and hostility.<sup>12</sup>

Caplan’s remarks, and more critical monographs by Hopwood (1972) and Braverman (1974), spurred the development of a counter-culture of literature and publication venues that have become the mainstream in accounting history scholarship.

## 9. Denouement: 1970

*9.1. Pre-1970 Antecedents of Contemporary Methods*  
Contemporary methods of costing, such as activity-based costing, value-added cost analysis, and life-cycle, target, and strategic costing are all founded on the belief that cost information must aid managers in decision making, especially their efforts to continuously reduce costs in response to unrelenting global competition. Kaplan (1983), Berliner & Brimson (1988), Cooper & Kaplan (1988), Bromwich & Bhimani (1989), Sakuri (1989), and Shank & Govindarajan (1989) are a few of the well-known proponents who have argued that labor-based standard costing should be replaced by cost management procedures more attuned to strategic issues and more aligned with the cost structures of automated manufacturing. Traditional standard costing, however, had been developed in an era that prioritized cost control rather than cost reduction. Achieving currently attainable standards would no longer suffice in the globally competitive world of the 1970s and beyond. From an organizational perspective, the post-1970 era is marked by continual change and innovation, multi-task flexibility, customer-focused creativity, and the need for continual cost reduction. As noted by Shillinglaw (1989, p. 41), the shift from cost control to cost reduction was “a radical change in focus.” Traditional, labor-based standard cost systems assumed a clearly defined responsibility and accountability framework. They were simply not designed to handle an environment of

<sup>12</sup>Caplan’s arguments were increasingly echoed in the late 1980s and early 1990s (Johnson, 1992; Johnson & Kaplan, 1987). For example, Johnson (1992) argued that standard costing was detrimental because it focused on efficiency rather than effectiveness and encouraged employees to manipulate processes to achieve desired accounting results.

constant change, flexible relationships, and continuous innovation.<sup>13</sup>

We agree with critics who contend that cost accounting became a second-class accounting activity in the 1930s when SEC regulations elevated the role of the corporate audit. Our views differ from those critics who imply that cost accounting had once been the only source of relevant information in the early part of the twentieth century. Clearly, many early writers who promoted the use of standard costing systems were consultants with vested financial interests, but, despite their best efforts, there were relatively few companies that embraced standard costing in its pristine form. Alternatively, our research convinces us that less formal cost accounting information was used for managerial purposes in nineteenth-century enterprises.<sup>14</sup>

## 10. Conclusion

In our estimation, Johnson and Kaplan were badly misguided in claiming that all in American managerial accounting was known in 1925 when DuPont and GM had ironed out the kinks in the control systems instituted to operationalize the decentralized megacorporation. Even though their observation was written 20 years ago now, they failed to appreciate the value of much that had occurred after 1925.<sup>15</sup> Innovations introduced prior to the 1970 date assigned to us to bring this chapter to its conclusion included the development of a number of new mathematical techniques—linear programming for determining profit maximization or cost minimization given constrained

resources; improved methodologies for the investigation of variances; probability analysis under conditions of uncertainty. Direct costing came into its own as appropriate for managerial decision making and even confronted absorption costing advocates as superior for financial reporting as well.

The Cold War and the concurrent growth of the military industrial complex stimulated the development of the Planning, Programming and Budgeting System (PPBS) and the Program Evaluation and Review Technique (PERT) as formal devices by which the federal government planned, budgeted, and managed the resources for complex, long-term projects. For example, the development of the U.S. Navy's Polaris submarine was the project for which PERT was originally devised. It is impossible to discern how widely these quantitative techniques were adopted by private sector companies. One budgeting innovation introduced initially at Texas Instruments in the late 1960s that was more appropriate for smaller enterprises was zero-based budgeting (ZBB). However, ZBB has never really caught on except in the public sector, primarily at the level of state government.

We would like to make one final point about the pre-1970s period. While personal computers are now an aging technology, they were new phenomena just over 30 years ago. For example in 1970, a prominent accounting scholar acknowledged that computers facilitated cost allocation procedures in large firms, although he was far less sanguine about further advancements (Anthony, 1970, p. 470):

Although most companies will use computers, it is by no means clear that most companies will have their own computers. Because of the great advantage that large computers have over small computers in terms of cost per calculation, it is quite possible that all but the large companies will use time on computers owned by someone else.

Clearly, hindsight enables contemporary scholars to castigate Anthony for his misperception about the importance of computerization. Nevertheless, the essence of accounting measurement clearly reveals its close ties to data collection and storage. For example, Wilkinson's (1986) key steps of data collection (capturing, measuring, and recording data onto source documents; validating and classifying data; and transmitting data from processing) have all been accomplished more accurately, reliably, and quickly through computerization, especially through bar coding and electronic data interchange. It is also noteworthy that the speed, direction, and application of computers to accounting were largely unforeseen.

<sup>13</sup>While the post-1970s period does not fall under our purview, we want to point out that standard cost systems that embraced target costing do appear to better fit the current environment. Standards that represent ideal, long-range targets for cost reduction, rather than standards that are currently attainable, short-run yardsticks for cost control, are far more appropriate and effective. Target standards that are price-based and externally focused help a firm attain its market-share goals by revealing the need for major design changes and the elimination of non-value-added costs.

<sup>14</sup>We have always interpreted cost accounting broadly to include all forms of cost data such as memoranda, cost-based contracts and summaries, etc. rather than double-entry systems and the presence of particular cost "accounts" as called for by Yamey (1949).

<sup>15</sup>Johnson & Kaplan (1987, p. 18) acknowledged in a footnote that Hopwood had pointed out to them the significant innovations that had occurred in the area of project management that would include PERT and zero-based budgeting. However, they claimed that these procedures related only to the defense industries. To the best of our knowledge, Johnson & Kaplan have never formally amended the statement they made in 1987.

The choice of 1970 as a closing date is particularly fortuitous as there was a conference that year at which leading academics considered the way forward in various accounting sub-disciplines. Writing for managerial accounting was Robert Anthony of Harvard. Anthony identified a number of “fruitful directions,” defined as those advances he envisioned that would be of practical use to managers.

Anthony (1973, pp. 39–63) classified these potential growth areas into three groupings as follows:

#### I Information Content

- measurement of the value of information
- human resources capitalization (citing Brummet et al., 1968)
- determining the appropriate discount rate for calculating the cost of capital
- deriving better transfer prices principles
- measuring output in the absence of physical products (e.g., service industries)
- deriving non-monetary performance measures
- establishing cost standards for government and non-for-profits

#### II Analytical Tools

- probabilistic estimates (decision trees, Monte Carlo approach, sensitivity analysis)
- improved methodology for handling PERT probabilities
- the use of probability in budgeting
- deepened analysis of variances
- determination of optimum spending on discretionary costs

#### III Control Systems

- behavioral aspects of budgeting
- use of computers to integrate information systems
- project control systems for new products and processes
- allocation of overhead costs to cost centers when reciprocal relationships exist

We leave it to the reader to judge the degree of Professor Anthony’s omniscience.

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# Development of Cost and Management Accounting Ideas in the Nordic Countries

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**Abstract:** This chapter examines the historical development of the theory and practices of cost and management accounting in the Nordic countries: Denmark, Finland, Norway and Sweden. The study focuses on the twentieth century and highlights only those cost and management accounting issues which, at different times, have dominated cost and management accounting theory and practice, or which merit attention because of their specifically Nordic and innovative nature. Most cost and management accounting ideas have come to the Nordic countries from larger leading industrial nations, such as Germany, the UK and the USA. In addition to this fact, cost and management accounting ideas have travelled from one Nordic country to another.

## 1. Introduction

This chapter examines the development of the theory and practices of management accounting in the Nordic countries. “Norden” or “the Nordic countries” is a term used collectively for five countries in Northern Europe and includes Sweden and Denmark, the oldest countries, Norway and Finland, which gained sovereignty in the early twentieth century, and Iceland, which received independence from Denmark in 1944. The five Nordic countries established the Nordic Council in the 1950s. In addition, three autonomous territories, Åland (which belongs to Finland), the Faroe Islands and Greenland (both of which belong to Denmark), are associate members of the Nordic Council. The term Nordic countries is used here in a restricted sense to refer only to Denmark, Finland, Norway and Sweden.

What is the point of surveying the development of management accounting in the Nordic countries in particular? This group of countries, although consisting of independent nation states, forms a geographically united area within Europe and has a good deal of shared history. The following passage from Engwall (1998) provides an admirable justification for the decision behind selecting Denmark, Finland, Norway and Sweden as the subject of this chapter:

it is important to note that in the past the four countries have been related to each other in many

combinations. Until the seventeenth century, parts of the present Sweden belonged to Denmark and Norway. For most of the nineteenth century (1814–1905), Norway was united with Sweden, and for many centuries before that (1380–1814), it was united with Denmark. Until 1809, Finland belonged to Sweden. These arrangements have not always resulted in friendly relationships. Nevertheless, to a large extent the Nordic countries share a common culture. An important uniting factor in this context has been that the Danish, Norwegian and Swedish languages are close enough to permit citizens in the three countries to communicate with each other in their mother tongues. To a certain degree this is also true for Finland, although a majority of the inhabitants speak Finnish, which has no connection to other Nordic languages. ... communication between Finns and other Scandinavians has been facilitated by the fact that Swedish has been compulsory in Finnish schools. (Engwall, 1998, p. 66).

Originally, it was our intention to produce a fairly comprehensive history of management accounting in the Nordic countries, but we decided to abandon this goal. Management accounting in the form of cost accounting and calculation practices, and as a business school subject, has a long history in the Nordic countries. As a result, it would be a major undertaking to examine the history and development of management accounting thoroughly and comprehensively, at both

the practical and the theoretical levels for all of the four Nordic countries mentioned above. We thus confine our examination to a few topics that we deem to be the most important and interesting in the historical development of management accounting in the Nordic countries. Our study focuses on the twentieth century and highlights only those cost and management accounting issues which, at different times, have dominated cost and management accounting theory and practice, or which merit attention because of their specific Nordic and innovative nature. Most cost and management accounting ideas have come to the Nordic countries from larger leading industrial nations, such as Germany, the UK and the USA. In addition to this fact, the Nordic countries in this paper are seen as an area where there is interaction between the countries and where ideas concerning accounting thought and practices spread from one country to another.

There are several articles examining the development of management accounting in a single Nordic country (see, e.g. Ask & Ax, 1992; Ask et al., 1996; Israelsen et al., 1996; Israelsen & Rohde, 2005; Jönsson, 1996a; Loft et al., 2003; Näsi, 1994; Norström, 1997; Virtanen et al., 1996) or some particular aspect of management accounting, such as budgeting, in the different countries (e.g. Hägg et al., 1988). Some volumes (Grønhaug et al., 1997; Jönsson & Mouritsen, 2005a; Pihlanto, 2001) shed light on the whole field of accounting in Scandinavia or the Nordic countries. As worthwhile and relevant as this literature is for us, it is, however, by no means exhaustive enough to give any ready answers to our research question concerning the main ideas and migration of management accounting ideas to and among the Nordic countries. Therefore, our study involves not just a synthesis of the earlier research, but also interpretations and an attempt to paint a picture of the travels, imitations and translations of management accounting ideas between and in the Nordic countries.

The aim of this study is to identify the most important developments of cost and management accounting in the Nordic countries in the twentieth century. The main focus is on the dominant ideas and fashions of cost and management accounting. Our examination reveals when and how these ideas and fashions travelled into and between the Nordic countries.

This study can be characterised as a historical research. As to the taxonomy of accounting research (Chua, 1986; Hopper & Powell, 1995; Ryan et al., 2002), our study lies somewhere between mainstream and interpretative research as it has characteristics of both. Even our choices for the topics that represent

the most important management accounting developments in the Nordic countries during the last century are, at least to some extent, subjective, turning the focus from the mainstream towards interpretative research. Our primary concern is the functioning of management accounting and we study accounting history in terms of the progressive development of different techniques and practices. At the same time, our basis is generally not only a question of the historical progress of accounting systems (cf. Hopwood, 1987), but also of the migration of ideas and fashions as well as different translations in time and space. Questions concerning when, from where to where and how management accounting ideas migrated may have quite objective answers, showing that our study is inclined towards objectivism and the mainstream research field. Explaining why cost and management accounting developed as it did presupposes a very profound understanding and interpretations of the development. This issue is excluded from our study.

The structure of this chapter is as follows. First, the theoretical framework and the “Travels of Ideas” are introduced. Thereafter, the development of management accounting is examined, dividing it into three periods, including the first decades of the twentieth century up to World War II, the 1950s to approximately 1980 and the last 25 years up to 2005. The first period is characterised by the birth of the German style business schools, and debate on cost accounting principles and standardized charts of accounts. The second period right after World War II brought several management accounting innovations and fashions to the Nordic countries, including marginal costing, which challenged the central idea of full costing. The Nordic countries created their own accounting innovations that even travelled to neighbouring countries. The last 25 years have been characterised by the spread of international (generally American) management accounting fads and fashions, but even today, the Nordic countries have their own foci, especially on the management accounting research and theory level.

## **2. Theory—“Travels of Ideas”—Imitations and Local Translations**

The spread of ideas is traditionally discussed in terms of diffusion (Levitt & March, 1988; Rogers, 1962). Instead of using the diffusion of innovations framework we have chosen another phenomenon to study management accounting change. We use the “Travels of Ideas” (see Czarniawska & Joerges, 1996; Powell & DiMaggio, 1991) and “Imitation” phenomena (see Merton, 1965/1985; Sahlin-Andersson, 1996; Sahlin-Andersson & Sevón, 2003; Sevón, 1996) to

analyse and interpret cost and management accounting developments in the Nordic countries. This is because these frameworks are not only very popular among the Nordic organisation researchers, but also because they fit better with our understanding of how accounting develops, which occurs less frequently as planned innovations and more often as environmental adaptations (cf. Czarniawska & Joerges, 1996, p. 14). We attempt to trace when and from where management accounting innovations, master ideas and fashions have come to the Nordic countries. We examine whether the ideas have travelled between the Nordic countries and who were the key bearers or mediators of the ideas. Furthermore, we attempt to discover what was the role of imitation and local translations in the development of management accounting in the Nordic countries. Special attention is paid to the Nordic management accounting innovations or innovative local translations as well as their migration and influence in neighbouring countries. Sahlin-Andersson and Sevón (referring to Merton, 1965/1985) write:

We live in a world in which nothing is absolutely new, in which there are no truly original ideas or actions. In such a world, every act is related to one's own ideas, experiences and actions and to those of others. At the same time, however, no idea or action is a perfect copy from other organizations or individuals, for ideas are adopted and translated into something that fits one's own context. In this way, actions, although imitated, may become different. (Sahlin-Andersson & Sevón, 2003, p. 249).

We insist on the travel metaphor and believe that ideas on management accounting travel; ideas are imitated and translated to better suit local purposes. Educational programmes and publications such as business books and journals, as well as consultants, international consulting firms and gurus, play an important role as the mediators of ideas, spreading new ideas, mediating and transferring ideas, experiences or models from one place to another (cf. Sahlin-Andersson & Sevón, 2003, p. 259). Czarniawska and Joerges write:

... there seem to be "idea-bearing" organisations and professional roles which deal mainly with translations. This is, to an increasing extent, the role of professional consultants. Like travelling salesmen, they arrive at organizations and open their attaché-cases full of quasi-objects to be translated into localized ideas. (Czarniawska & Joerges, 1996, p. 36).

As to the role of academia and consultants bearing ideas, Jönsson & Mouritsen (2005b), who use the

gate-keeper metaphor, state that a shift has taken place in the course of the twentieth century:

For a long time, academics have been the gate-keepers and thus have been able to influence significant parts of common sense thinking in Nordic business communities. Among business executives there is still a strong sense of being part of a knowledge-community, not least in the area of accounting, where a few accounting professors have influenced so many present business executives. (Jönsson & Mouritsen, 2005b, p. 7).

Later in the same text, Jönsson and Mouritsen state that the connection between academia and business practice was partly broken in the academic expansion from the 1970s onwards. Even though the old tradition of access and openness towards research in industry remains largely intact, they say that "... gradually consultants took over the role of gate-keepers towards practice." (Jönsson & Mouritsen, 2005b, p. 9).

Ideas also spread as smaller countries imitate the larger, leading ones and as new and small companies imitate the more established and better known ones. A recent phenomenon has been that public sector organisations have imitated the more highly regarded and prestigious private businesses (see Sahlin-Andersson & Sevón, 2003, pp. 258–260).

Fashion, the expression of which is modern, is a collective translation process, and also functions as a release from the responsibility of individual choice (Sellerberg, 1987). To follow fashion is to be both conformist and creative. Czarniawska and Joerges write:

Master-ideas serve as focus for fashions and build a bridge between the passing fashion and a lasting institution. ... The power of master-ideas resides in the fact that they are taken for granted, unproblematic and used for all possible purposes. (Czarniawska & Joerges, 1996, p. 37).

We can also speak of a dominant idea in a given time and space. Salin-Andersson and Sevón write that:

New techniques aimed at better management are repeatedly introduced and widely imitated around the world. In small and open cultures, like the Nordic culture, organizations have frequently adopted labels, desires, and models of strategic thinking and organizing from abroad, often with the help of US-based consulting companies and Nordic researchers. (Salin-Andersson & Sevón, 2003, p. 250).

The authors mention techniques such as Divisionalized Organization, Quality Management and, in recent times, Business Process Engineering, Benchmarking and balanced scorecard (BSC). Concerning the

question of what is imitated, Sahlin-Andersson and Sevón write:

When organisations imitate others they do not imitate everything. Some activities are more readily imitated than others, and some aspects are imitated more than others. Change receives greater attention than no change; and dramatic changes are more likely to be imitated than are less dramatic changes, incremental changes, or non-changes. Moreover, models that are “packaged” so they can “be transported” are more easily imitated. (Sahlin-Andersson & Sevón, 2003, p. 260).

We have a strong notion that new management and management accounting ideas are developed and “packaged” (often using a three-letter acronym such as TQM, activity-based costing (ABC)/ABM, BSC, etc.) in leading industrial countries such as the USA and Japan. The new ideas travel very quickly with the help of various mediators and are copied or imitated by organisations all over the world. Earlier, circumstances were different, and the “travel” of ideas was perhaps not as easy as it is today, even the range of mediators was narrower.

In the following sections, the “Travels of Ideas” metaphor is used and the spread of management accounting ideas as imitations and local translations is considered. We also understand that some ideas can be seen as master ideas or dominant ideas that are taken for granted, forming bridges between the old and new ideas. The spread of ideas, of course, also needs idea-bearers or mediators, i.e. people, actors to do the work of spreading the ideas.

### 3. The “Travel” of the German Business School (Handelshochschule) Concept to the Nordic Countries

As various historians have shown, attempts to arrange bookkeeping courses, for example, met with opposition in traditional universities at the beginning of the twentieth century. In the eyes of its opponents, bookkeeping was too practical or unscientific to be accepted as an academic discipline (see, for example, Engwall (1994) on Uppsala University, Brunsson (1981) on Lund University and Hatfield (1924/1968) on the USA). Despite the opposition, a small amount of instruction in bookkeeping was in fact given (among other places, at the University of Helsinki, at least in the 1870s and 1880s (Näsi, 1990) and at the Royal Institute of Technology in Stockholm in the 1890s (Olofsson, 1980)). It was, however, the advent of a new institution, the school of (business) economics, conforming to the German model that gave birth to academic commercial education in each of the Nordic countries in the early decades of the twentieth century (Stockholm, 1909; Helsinki, 1911; Copenhagen,

1917; Bergen, 1936). These new business schools started offering university level teaching in accounting, which, to begin with, focused mainly on financial accounting, bookkeeping, balance sheet doctrine and auditing, but did include some “calculation” or cost accounting, too.

The first Nordic business school, the Stockholm School of Economics, was founded in Stockholm in 1909 and was a project of the business community. In 1913, Marcus Wallenberg donated 100,000 Swedish crowns for a business school in the name of his half-brother Knut, primarily with a view to improving the reputation of businessmen (Engwall, 1994, pp. 46–47). Sweden’s second business school was founded in Gothenburg in 1923. The professors in the new discipline, who had to be recruited from abroad, came from Germany, something that in itself served to create a strong German tradition in this new institution of higher education. The first teacher of accounting (*handelsteknik*) in the Stockholm School of Economics, Ernst Walb, who started as a teacher in 1909 at the age of 29, was a pupil of Eugen Schmalenbach. He became the first professor of accounting in 1910, but returned to Germany in 1911 to become a professor at the Cologne Business School, and later Freiburg University, but subsequently returned to Cologne (Albach, 1995a). His successor at the school was Oscar Sillén, a Swede, who had graduated from the business school in Cologne in 1905 and had also been one of Schmalenbach’s pupils. Sillén was working in a Swedish company in Berlin when he was recruited for the business school in 1912. The idea was that he should serve partly as a professor and partly as head of a consultancy bureau of the newly established Federation of Swedish Industries. Although not qualified as professor when he was hired, he became the first Swedish professor of accounting at the Stockholm School of Economics in 1915 and served as a professor until 1951, when he retired (Engwall, 1995; Jönsson, 1996a; Norström, 2003a; Wallerstedt, 1995).

In 1923, the next school of economics in Sweden was established in Gothenburg. Walter Mahlberg, a student of Eugen Schmalenbach and Fritz Schmidt, was recruited the same year from Germany, on the recommendation of Schmalenbach, as the first professor of business economics. Mahlberg stayed for only a short time in Sweden and left in 1926 to pursue a career in Freiburg, Germany (Albach, 1995b). His successor, Albert ter Vehn, who was a pupil of Fritz Schmidt, was hired at the age of 26 as the new professor of business economics. He was also chosen on the recommendation of Schmalenbach and served as a professor at Gothenburg for 41 years from 1926 to 1967 (Jönsson, 1995, 1996a). His long career as an

accounting professor and his involvement in several kinds of activities in the field of cost accounting meant that ter Vehn was an important, influential German mediator and cost accounting idea-bearer, not only in Sweden, but also in the Nordic countries. The teachers of business economics, not only the Swedish ones (e.g. Nils Westhagen and Sven-Erik Johanssen), but also, for example, the Norwegian ones (the education of the first Norwegian professors, Dag Coward and Eilif W. Paulson, will be described later) were ter Vehn's students. ter Vehn also served as an expert evaluator when the Norwegian Business School elected its first professor of business economics in 1935 (Jönsson, 1995).

The influence of both long-term professors, Oscar Sillén and Albert ter Vehn, on the history of accounting in the Nordic countries has been enormous, the former mainly in the field of financial accounting and the latter in cost accounting. Jönsson writes:

Both Sillén and ter Vehn were more interested in conceptual issues than in the nature of the firm. An unproblematic conception of the firm, directly inspired by Schmalenbach, can be discerned as a background theme in their writing; but they did focus on the 'technology' of accounting. Sillén dealt mainly with the principles of financial accounting, ter Vehn with the logic of cost accounting. (Jönsson, 1996a, pp. 437–438).

It is interesting to note that very shortly after the founding of the Stockholm School of Economics, the next business school was established in Helsinki in 1911, where once again it was businessmen who took the initiative. Evidently, it appears as though Finland has attempted to copy Sweden in many respects, and this could well be an example of ideas travelling and being imitated. The business school project had indeed been around for a long time, but now it was finally realised, though, even at this date, not completely without opposition. Among the justifications put forward for the project were the example of other cultivated nations, as well as the development of international trade, the intensification of competition and the need for cooperation between the realms of theory and practice (see Kaupparkeakoulu, 1911–1961). Established in 1927, the next two business schools in Finland, the Swedish School of Economics and the Åbo Akademi School of Economics, were Swedish-language institutions; the former was developed from the Swedish Commercial High School, which had been founded in Helsinki in 1909.

In Finland, the first men to fill the chairs at the School of Economics were Finns who had made their reputations as commercial college teachers. Kyösti

Järvinen, I.V. Kaitila and Ilmari Kovero were active in the period from 1910 to 1950. All three had doctorates, and the mere fact that the language or most of the references in their doctoral theses were German demonstrates the strength of German influence. Kyösti Järvinen, who received his doctorate from the University of Kiel in 1921, wrote the first comprehensive Finnish textbook in Business Economics (Järvinen, 1923). Doctoral theses in accounting dealt with balance sheet doctrine, usually with questions relating to asset valuation. The first doctorate at the Helsinki School of Economics, awarded in 1937, was on the subject of the structure of the annual balance sheet and was, of course, written in German (Nurmilahti, 1937).

Dr. I.V. Kaitila held the first and only chair of accounting (*liikelaskentaoppi*) from 1921 to 1945. Kaitila was very influential in the development of accounting at all levels: education, legislation and actual practice in Finland. Professor Kaitila wrote books on all areas of accounting, e.g. bookkeeping, financial accounts and cost accounting. Kaitila was greatly influenced by the German literature. For instance, the reference list of his cost accounting textbook, which was the first Finnish textbook in this field (Kaitila, 1928), and in which the German term '*Rechnungswesen*' was translated for the first time into Finnish (*laskentatoimi*), had a total of 63 references with 10 in English and 2 in Finnish, the remaining 51 references being from German-language books and articles (written by German professors, e.g. Lehmann, Schmalenbach and Walb) (Näsi & Näsi, 1997).

In Denmark, the idea of designing a business school based on the German model had been around for many years. But it was only in 1917 that the Copenhagen Business School was established on the initiative of Marius Vibæk, who also seemed to be inspired by the establishment of the Stockholm School of Economics in 1909 (see Loft et al., 2003, for more details). Hans Christian Riis, who taught bookkeeping at the School of Commerce, was chosen to build up the teaching within accounting. He had no formal academic training in the area and had educated himself, especially by reading the German literature. Starting with bookkeeping and the balance sheet, Riis extended his focus to cost accounting. His articles and books show a heavy influence from German authors such as Schär, Leitner, Gerstner, Schmalenbach and Rehms, and later by Schmalenbach's pupil, Ernst Walb. He too, however, was influenced by Swedish writers, especially Oscar Sillén.

Riis was influential, but it was Max Kjør-Hansen, an economist educated at the University of Copenhagen, who had the academic overview necessary to



develop the subject of business economics in Denmark and to place accounting in its context in this framework. Max Kjær-Hansen was one of the teachers recruited early by Marius Vibæk. In 1926, he took leave from the school for a year to study business economics under Professors Dr. Eugen Schmalenbach and Dr. E. Geldmacher at the *Handelshochschule* in Cologne. Max Kjær-Hansen's period of study came to influence not only his own work, but also the development of business economics at the Copenhagen Business School. On his return from Cologne, he wrote a textbook in Danish entitled "*General Business Economics*" (*Almindelig Bedriftsøkonomi*), where the concept '*bedriftsøkonomi*' is defined in Danish for the first time (Kjær-Hansen, 1928). In the book, he builds on the terminology and ideas of the Cologne school, and in his work on accounting, he directly borrows Schmalenbach's terminology. He notes that the Cologne school also involved Professors Walb, Mahlberg and Geldmacher, who focused on the balance sheet, costing and industrial operations (see also Loft et al., 2003). Max Kjær-Hansen became a professor of business economics at the Copenhagen Business School in 1937.

The third person who had a major impact on business economics before World War II was the German Julius Hirsch, who, in 1933, visited as a guest lecturer from Berlin. In 1936, he became the first professor at the Copenhagen Business School in commercial science (*handelsvidenskab*). Although his stay in Denmark was relatively short as he was forced to flee to the USA via Sweden in 1941, he had an important influence on the school. Hirsch, who was generally concerned with the challenges facing business, had discovered that one of the major challenges of business economics was how to make it relevant in practice (Hirsch, 1937). This came to be the basis for Palle Hansen in his work on the standard chart of accounts and costing in the following years.

In 1939, like the Copenhagen Business School, the Aarhus Business School (*Handelshøjskolen i Århus*) began as a private organisation. The situation in Aarhus, however, was rather different from that in Copenhagen regarding the place and context of the development of business economics and accounting. In Copenhagen, a kind of division of academic labour in the area had occurred in which the University of Copenhagen dealt with economics and the Copenhagen Business School dealt with business economics. In Aarhus, the university dealt with both economics and business economics. The activities and writing of the three men from the University of Aarhus, Eric Schneider (see e.g. the text book 1939), Thorkil Kristensen and Vagn Madsen, especially had a major

impact on the development of business economics and accounting in Denmark and the other Nordic countries, too.

In 1936, the Norwegian School of Economics and Business Administration (*Norges Handelshøyskole*) was founded in Bergen, the first academic-level business school in Norway. Amdam and Norstrøm write:

Even though Norway acquired its first business school 20–25 years later than the other Scandinavian countries, its school was established in the same German tradition as its Scandinavian neighbours. (Amdam & Norstrøm, 1994, p. 66).

In the early years, the new institution relied heavily on the help of Swedish professors, who evidently exerted considerable influence, especially in the field of business economics and accounting. The first scholar hired at the school, Robert Kristensson from Sweden, began as an associate professor and later became a full professor in December 1937. Kristensson received his degree in engineering from the Royal Institute of Technology in Stockholm in 1919, and later in the same year a degree in business economics from the Stockholm School of Economics. Before he came to the Norwegian School of Economics and Business Administration, he had had a varied career in different industrial companies and also a teaching career at the commercial school level. He left the school under dramatic circumstances on 9 April 1940, the very day Norway was invaded, and returned to Sweden. Another important person at the Norwegian School of Economics and Business Administration at that time was Eilif W. Paulsen, who had a degree in engineering. Like Kristensson, he, too, had held different jobs in industry before becoming, in 1935, the leader of a newly established research institute in Bergen, which later became part of the Norwegian School of Economics and Business Administration in 1937 (Norstrøm, 2002a,b). In 1936–1937, he supplemented his education by studying business economics under ter Vehn in Gothenburg. In 1940, Paulsen was asked to function as a full professor of business economics, a position which became permanent just after World War II and which he held until leaving the school in 1963.

The third person worth mentioning here is Dag Coward, who earned a master's degree in economics at the University of Oslo in 1931. In 1935–1936, he studied business economics in Gothenburg under ter Vehn and in the autumn he went on a study trip to Germany, where he met the distinguished professors, Eugen Schmalenbach, Frits Schmidt and Ernst Walb. In 1937, he went on a scholarship to the USA and studied at Harvard University and the University of

Chicago. Coward was hired by the Norwegian School of Economics and Business Administration in 1939, taking up a vacant position as an associate professor in business economics at the same time Eilif W. Paulson obtained his professorship in 1940. Coward, who became a full professor in 1954, stayed at the school until his retirement in 1977 (Norström, 2003b).

As can be seen, Germany and its *Handelshochschule* model had a major impact on the formation of higher business education in business economics in the Nordic countries. The ideas travelled at different points in time to the Nordic countries, starting with Sweden, then Finland and Denmark, and finally Norway. In the early stages of the business school, Schmalenbach's German pupils and colleagues travelled to Sweden and received professorships on his recommendations. But Nordic scholars educated by Schmalenbach in Cologne, especially Oscar Sillén, Sweden, and Max Kjær-Hansen, Denmark, also played a major role through their work in the development of the subject business economics and the establishment of their local business schools. Sillén and ter Vehn, in particular, had a major impact on accounting, not only in Sweden, but also in Norway by educating their Norwegian colleagues and by being members of academic committees. In Finland, the inspiration for establishing the business school institution seems to have come from Sweden and Germany. The German influence, however, did not travel to Finland through German scholars as directly and concretely as it did to the other Nordic countries, but indirectly through Finns educated at German universities (especially Professor Kyösti Järvinen) and by reading and the translating of German business economics and accounting ideas into Finnish.

#### 4. Translations of Unified Costing Principles and Standard Chart of Accounts

Before and during World War II, the most important accounting ideas brought to the Nordic countries from Germany especially involved establishing uniform costing principles and standard chart of accounts (*normalkontoplan*).

In Sweden, the establishment of uniform principles for full costing was put on the agenda by the Royal National School Board in 1927, when the Swedish Institute of Standards (SIS) was asked to take action to produce a uniform terminology for full costing for use in schools (Ask et al., 1996; ter Vehn, 1934a). Many parties were represented in the preparation committee set up by the SIS, including associations, consultancies, industrial companies and academics. The participation of internationally orientated

industrial companies meant that there was a conflict between the German and American modes of practice. Ask et al. recount the following (see also Jönsson, 1995):

The point of decision for a standard on costing procedure was approaching. The standard on terminology had already been adopted. There was a clash between one camp, represented by ASEA and Ericsson, who wanted to integrate cost calculation into the cost accounting system in the German tradition, and another camp, represented by SKF and Volvo, who argued for standard costing and for keeping cost calculation and cost accounting separate, along American lines. (Ask et al., 1996, pp. 203–204).

The intervention of Professor Albert ter Vehn in the debate in the form of a series of articles published in the journal *Affärsekonomi* was crucial in explicating the differences of opinion. In 1934, ter Vehn (1934a) described the development of unified costing principles from its very beginning in 1927 to 1934 as well as how the preparation committee had expanded with new members as a consequence of the criticism expressed by the director of SKF, Forsberg, in 1928. To clarify what the disagreement among the parties representing the different companies was about, ter Vehn (1934b, c, d) made a very detailed analysis of the systems in SKF, Volvo, ASEA and L.M. Ericsson. He showed the strengths and weaknesses of the two camps' positions and proposed that:

... since good reasons existed for some types of firms to do cost accounting according to accounting principles and adapt calculations to the situation at hand, the committee should provide variants where practical reasonableness did not contradict what was right in principle. The issue was settled in line with the principle that a costing system, must be able to produce various kinds of cost information ("different costs for different purposes"), and this was the leading principle when the standardization of cost system entered a new phase. (Ask et al., 1996, p. 204).

In three articles, ter Vehn (1934e, 1935a, b) went into more detail, commenting on content, terminology and principles in the so-called STF plan, thus influencing on the final proposition, upon which he commented briefly in an article from 1937 (ter Vehn, 1937).<sup>1</sup>

The next stage in the standardization of cost accounting was the construction of standard charts of accounts (*normalkontoplan*) to support costing procedures. The work was done in committees by several

<sup>1</sup>Albert ter Vehn considers the introduction of German Terminology as one of his most important contributions (Norström, 2003b).

industrial associations using Schmalenbach's graphical method of describing accounting systems as a help and inspiration (Ask et al., 1996). There were two professors, Robert Kristensson, who had returned to Sweden in 1940 from Norway, and Albert ter Vehn, who invested a great deal of time in the Trade Association of the Swedish Mechanical and Electrical Engineering Industries (*Mekanförbundet*) chart of accounts project (Jönsson, 1995). The *Mekanförbundet*'s standard chart of accounts (the M-chart), which was adopted in 1943, was subsequently adopted by other branches of industry and, in a somewhat modified form, by municipalities as well.

In Norway, too, there was a debate on the standardization of costing principles and chart of accounts. On the initiative of *Den Norske Ingeniørforening* and *Norges Standardiseringsforbund* (NSF), a committee was established in 1935 with the task of developing a proposal for terminology for industrial costing. The work was made public for the first time in 1937. In a critical article, Coward points out that the proposal would bring the Norwegian terminology into conflict with Swedish and German definitions of corresponding words within managerial economics (Norström, 2003b). As a consequence of that criticism, Coward was asked to be a member of the committee, first as a Vice Chair and later as the Chair of the committee. A proposal from 1941 shows that the terminology was clearly inspired by the terminology developed by E. Schmalenbach in Germany in the 1920s and brought to Sweden by Albert ter Vehn. One difference compared with the first proposal was a rejection of the terminology used where there had been an unsuccessful interpretation and confusion regarding the term's costs and expenses. The final work led to a total of three standards, which are seen as a major contribution to the terminology within business economics in Norway (Norström, 2003b).

Whereas both Norway and Sweden introduced their own calculation principles in 1937, similar to the developments that had taken place in the UK, Germany and the USA, a serious debate began in Denmark with the foundation of the *Nordic Journal of Technical Economics* (*Nordisk Tidsskrift for Teknisk Økonomi*) in 1935. Among the members of its editorial board were Ivar Jantzen (D. Tech) and the German Erich Schneider (a professor of managerial economics at the University of Aarhus). Israelsen et al. comment:

Up to and including the early war years, the journal was at the centre of intensive Nordic and international research and debate on the cost and management accounting problems of the time. The main

focus in the early years was on standardizing the recording systems and calculation principles. (Israelsen et al., 1996, p. 32).

With the task of proposing uniform Danish cost concepts and methods of product costing, a group of people closely connected to the journal was formed into a committee under the Academy of Technical Sciences (*Akademiet for de Tekniske Videnskaber*). The standardization work continued throughout the war years and afterwards. The heart of the issue was the difference in the views held, on the one hand, by technicians, and on the other hand, by managerial economists. Israelsen et al. (1996, p. 32) write that, "The two sides failed to overcome their differences. This also effectively barred any possibility of establishing uniform costing principles".

The pervasiveness of German influence at that time can be seen from what is considered to be the first Danish textbook in cost accounting (Hansen, 1940). Even if Hansen took his starting point in the challenges facing managerial economics mentioned by Hirsch<sup>2</sup> (1937), it is worth noting that the book is foremost a description of the work of standard chart of accounts made by Schmalenbach and R.K.W., and also, to a minor extent, the work done by the Swedish S.I.S. commission. Despite the lack of a general agreement on a uniform system of standard chart of accounts, many Danish companies decided to develop their own charts of accounts based on German and the Swedish.

In Finland, the standardization and introduction of uniform cost accounting systems had been a topic of theoretical thinking and articles written by Professor I.V. Kaitila, published in the professional journal *Liiketaito* in the 1930s (e.g. Kaitila, 1933, 1934). A more serious discussion of the standardization of cost accounts only began in Finland in the 1940s as a consequence of the wartime economy, including price controls. The state authorities needed information on the manufacturing costs of products in order to determine fair selling prices for products. In 1943, an ordinance was proclaimed by the Ministry of Public Welfare that made cost accounting for manufactured goods obligatory for the first time in Finland. Debate on a modern and complete cost accounting system and on the standard chart of accounts was quite lively in Finland (see Näsi, 1990, 1994). Sweden and Norway had already developed their standard charts of account and Finland was able to learn

<sup>2</sup>In 1933, Dr. Julius Hirsch came from Berlin as a guest lecturer at Copenhagen Business School in commercial science and became professor in that field in 1936.

from their experiences. Professor Albert ter Vehn of Gothenburg made a visit to Helsinki in 1945 at the invitation of the Association for Industrial Economics (*Teollisuustaloudellinen yhdistys*) in order to lecture on *Mekanförbundet's* standard chart of accounts. According to *Liiketaito* (3/1945), over 400 people from different companies and other organisations attended his presentations.

Finnish guidebooks on industrial cost accounting and bookkeeping published during the 1940s bear witness to Swedish and German influence. A guide initiated and published by industrial associations (*Virkkunen & Wuorenjuuri, 1946*) refers to Sweden's *Mekanförbundet's* standard chart of accounts, and its bibliography consists of German and Swedish sources, the latter concerning, for example, Swedish costing principles and the M-chart of accounts. In 1953, Professor *Virkkunen (1953, p. 51)* wrote, "Actually this M-standard chart of accounts has been rather widely adopted here, too, although usually in a somewhat modified form".

*Virkkunen, who later (1961a)* criticised the standard chart of accounts, describes the standard charts as a straitjacket. He felt that the most difficult task was to make the standard chart of accounts flexible enough to take the organisation, size and other such issues into consideration. In the same book, *Virkkunen* introduced Sweden's *Mekanförbundet's* standard chart of accounts, referring to *Skare et al.'s (1954)* book as his source material. In a lecture given in 1961, *Virkkunen* nevertheless referred to the existence of fanatical chart of accounts perfectionists in Scandinavia and drew the following conclusion:

The earlier and by no means rarely occurring notion that the effectiveness of accounting and its qualitative level only (or almost only) depends on the "racial freedom" and that the introduction of a standard chart of accounts will automatically solve all problems has—fortunately—gradually disappeared. (*Virkkunen, 1961b, p. 20*).

That the ideas on uniform costing principles and standard chart of accounts in the Nordic countries were mainly influenced by Germany and German scholars is incontestable, as evidenced by the debate on uniform costing principles initiated in Sweden, where Albert ter Vehn played a major role in the formation of the principles. In Norway, the first proposal on costing principles was criticised by Dag Coward, who was influenced by Schmalenbach, and by his former teacher, ter Vehn. As a member of the committee from then on, Coward and the German ideas played a major role in the formation of a new terminology and costing standards in Norway. In

Denmark, the debate continued among leading scholars, but no agreement was ever reached on uniform costing principles. Even if that had been the case, the influence from Germany and Sweden was strong, which can clearly be seen in textbooks, but also in the way companies organised their costing systems. Even though the thinking on costing principles in Finland had started earlier, it was only in the 1940s that a discussion really started as a consequence of the war. Inspiration came from Sweden and here especially *Mekanförbundet's* standard chart of accounts was imitated and translated in Finland. And in this instance, ter Vehn had an influential role as an idea-bearer of German and Swedish accounting ideas.

### 5. The Translation of "The Marginalist Idea" in the Nordic Countries

Whereas the first half of the twentieth century, in all the Nordic countries, was a time markedly characterised by full costing as well as by standard charts of accounts, the 1950s and 1960s were a time characterised by a debate on the theme of full costing vs. variable or direct costing. The M-chart produced by Sweden's *Mekanförbundet* was used not only in Sweden, but also in Danish and Finnish industry. *Ask et al. (1996)* suggest that the secret of the M-chart's popularity might well lie in its suitability for both models (full costing and variable costing) of cost accounting thought. *Ask et al.* write:

The M-chart was a very useful framework for teaching introductory accounting at business schools, since it was built on a well-integrated set of cost concepts and contained provisions for variable- as well as full-costing systems. Not that variable costing was in much use during the first decades after the war. (*Ask et al., 1996, p. 205*).

Even if full costing was the dominant concept used in the Swedish manufacturing industry at that time, there seems to have been an openness to new ideas and an acceptance of the need for different costs for different purposes.

According to *Ask et al. (1996, p. 204)*, marginal costing, the microeconomic idea from the London School of Economics, was introduced in Sweden in 1949, starting a debate on different cost accounting solutions. *Ask et al. (1996)* refer to academic intervention through the empirical mapping of practices with solutions that advocated standards that could accommodate different situations. *Jönsson* writes:

Marginal costing was debated and included in the practices of some industries (such as steel) from the early 1950s, but here it appears that the marginalist ideas, brokered by academics from the London

School of Economics were confirmed by practical experience and accepted as relevant. (Jönsson, 1996a, p. 445).

The debate took place at the meetings of the Association of Business Economics (*Företagsekonomiska Föreningen*) and in the professional journal *Affärsekonomi* in Sweden in 1950 and 1951. Participants were mostly practitioners, directors of business firms. Allocation of the fixed costs to products or other objects for purposes such as pricing and profitability analysis was the topic of several articles written by directors Tore Ericsson and Ragnar Liljeblad. There was also a third participant in the debate, Professor T. Palander, but his viewpoints were hardly taken into account except as footnotes. Tore Ericsson was of the opinion that industrial bookkeeping and cost accounting could be simplified by eliminating the fixed cost allocations from many of the calculations made for different purposes. He took the view that what he called the direct method (*direkta metoden*) could be useful for many accounting purposes (Ericsson, 1950a, b, c, d, 1951). Director Liljeblad referred to the history of uniform full costing principles and argued that full cost information was needed for pricing as well as for profitability analysis purposes, even though in some situations it could be complemented by variable cost information (Liljeblad, 1950a, b, 1951). The debate in *Affärsekonomi* was even followed in other Nordic countries, at least in Finland, and it very obviously also increased interest in direct costing methods throughout the Nordic countries.

The idea of marginal costing was brought first hand to Denmark by economists, especially Pedersen (1949). It was, however, first and foremost the scholars Palle Hansen, Vagn Madsen and Zakken Worre who played a crucial role in developing and bringing the ideas into accounting, and from there into the Danish business world (see also Israelsen et al., 1996; Israelsen & Rohde, 2005; Loft et al., 2003).

Palle Hansen, who had started at the Copenhagen Business School in 1938, was particularly inspired by American ideas on accounting and management after World War II. In 1954, he was chosen by the Ministry of Trade's productivity committee to lead a delegation on a 6-week visit to the USA, financed by the Marshall Aid Programme. At that time, it was generally admitted that Danish companies had started using costing methods and budgeting only to a very modest extent.

On his trip to the USA, Hansen was influenced by the debate on costing, budgeting and standard cost control, and especially by the relative benefits of direct

over indirect costing (*Handelsministeriets produktivitetsudvalg*, 1957). He abandoned his earlier standpoint on the indirect costing principle and began to advocate the direct costing principle, which he, in Denmark, called the contribution margin principle. His opinion was that accounting systems should build on principles in line with those of managerial economics (Worre, 1994/1995).

In the years following his visit to the USA, Hansen started to organise courses on which he taught the new costing thinking based on the contribution margin principle and managerial economics to the Danish business world. His courses were based on the philosophy that accounting systems should be made more flexible to enable better control of costs and profitability in companies and that traditional cost accounting models were too sophisticated for most Danish companies. According to Israelsen et al.:

Hansen was so successful in this that his version of the direct costing principle became the dominant one—to such an extent, in fact, that it also served as the guiding principle in Danish financial accounting. (This remained unaltered until the passing of the first Danish Financial Statement Act of 1981, which was based on the (then) EEC's fourth directive). (Israelsen et al., 1996, p. 33).

In 1957, Hansen started a journal, *Leadership and Profitability* (*Lederskab & Lønsumhed*, 1957–1986), aimed at bringing his ideas to an even wider audience, not merely a Danish audience, but a Scandinavian one. Some of the articles were written by Hansen and his staff or by Danish businessmen reporting how they dealt with a particular problem. However, a number of articles reported developments in American business practices (Hansen, 1957, and later editions). Even though some of his colleagues did not find Hansen academic enough, he had a major impact on Danish accounting, especially in bringing American ideas on cost accounting to Danish companies. Through his extensive course and consulting activities, he can be said not only to have imported ideas and techniques, but also to have exported them, especially to other Nordic countries.

At the Copenhagen Business School, a second important personality in management accounting was Zakken Worre. He was to some extent inspired by the ideas and work of Hansen, whom Zakken Worre himself describes as a “teacher, catalyst and inspirational source ever since my studies at Copenhagen Business School and recently as a colleague” (Worre, 1991, p. 3). Worre's doctoral dissertation, completed in 1958 (published in 1967), should primarily be regarded as a contribution to the managerial economist

discussion of how revenue and cost/expenditure can be related to one another. The foreword to his thesis states:

In one of the schools of managerial economics the treatment of problems is based on a very abstract and simplified model, very different from the form in which the data material of a company is found. At the other extreme, is found a long series of more technical accounting descriptions of the possibilities for processing the data of a company, often quite far from the information goals, which the data processing should have met. The middle ground between the two extremes has first seriously been represented in the managerial economics literature in the last 10–15 years. (Worre, 1967, foreword).

Thus, Worre places himself between the classical technical accounting tradition and the abstract modelling of economists. The thesis focuses on cost classification through the definition of the variability and tracking of different costs to different segments. Worre describes his thesis as a preparatory study for a systematisation of the interaction between data manipulation and data utilisation in practical financial management. The content of his dissertation had a major impact on his later works on cost accounting frameworks, the application to the theory of constraints and budgeting.

The third and, in certain academic circles, perhaps the most respected Danish scholar within management accounting at that time was Vagn Madsen, who took over from his mentor, Professor Eric Schneider, as professor at the University of Aarhus in 1953 after Schneider was forced to leave the university in 1945. In the beginning, his work concentrated on how to integrate and reflect business management in the accounting system, but later became more concerned with strategy, budgeting and organisation.

Madsen began to concern himself with accounting systems in his doctoral thesis (1951), which was entitled “A Contribution to the Elucidation of Rationalisation Problems in Industrial Enterprises” (*Bidrag til Belysning af Rationaliseringsproblemerne i Industrivirksomheder*). It was the first time that the idea of so-called ‘variability’ accounting was presented as an integrated and nonarbitrary cost accounting system that would be able to cater for all the issues covered by the then threefold variation in accounting systems: the order accounting system, the organisational entity accounting system and the contribution accounting system (Madsen, 1951, 1959/1963; see also Israelsen, 1993, 1994).

The purpose of the system is a desire to have all the necessary information available for making economically founded decisions aimed at a better utilisation

of a firm’s resources. In addition, Madsen was of the opinion that accounting systems should solve different problems. First, an accounting system has to enable the calculation of profits for external purposes. Second, it might be used for product costing and pricing decisions. Third, an accounting system should help with the control of organisational units, and fourth, an accounting system should be directed at evaluating the consequences of decisions taken in planning and budgeting (Madsen, 1959/1963, p. 18). To be able to accomplish all these tasks, the cost dimensions in the variability accounting system were constructed so that all cost data should be posted simultaneously in three dimensions covering the resources supplied (production factors) where they are used (cost centres) and what they are used for (objectives), avoiding arbitrary allocations by the use of cost hierarchies.

Inspired by both Erich Schneider and by American B. E. Goetz (1949), whom he had met in the USA, Madsen argued that a categorisation of costs must depend on the situation and wrote that:

The main task of variability accounting systems is an entry/registration accounting system, but in relation to what should costs be registered? It must be in relation to the factors with which cost vary. (Madsen, 1959/1963, pp. 132–133).

Madsen’s ideas on variability accounting have been applied in accounting systems in many Danish firms, mostly through the efforts of his former students. Madsen’s ideas still command some attention, particularly in Jutland, where there are representatives of variability accounting. It is worth noting that Madsen’s variability accounting was included in business school curricula, even in Finland, during the 1960s and 1970s. As late as the beginning of 1980s, the main ideas of variability accounting were applied in the internal accounting system of the central governmental units of Finland. The idea of an internal accounting system with a cost databank and avoidance of all arbitrary cost allocation was very clearly expressed and published in a handbook, but the implementation of the system was not successful, possibly for several reasons, including the inadequate contemporary information systems.

In Finland, the Swedish debate conducted in 1950–1951 (in the journal *Affärekonomi*) juxtaposed the traditional full costing and the new variable costing from the profitability of products and product group point of view (Näsi, 1990, 1994). Henrik Virkkunen, teacher and professor of accounting at the School of Economics in Helsinki, 1948–1963, was surely one of the first people to promote contribution margin

thinking in Finland. In 1949, Virkkunen wrote an article on standard cost accounting and stated:

At the moment our first priority should be to push 'the true cost of the product' down from the throne that an uncultivated mechanistic way of thought and the 'step-by-step cost allocation mentality' have raised it to. This can be accomplished by informing those who deal with cost accounting about 'the dynamics of costs' (fixed and variable costs, marginal costs, the size of the production run, etc.) and about relativity of the premises that the calculations are built on. (Virkkunen, 1949, p. 456).

The motto of Virkkunen's then revolutionary campaign was "from knowing costs to analysing and monitoring costs". In 1950, he gave a presentation for business people entitled "An X-ray of the Firm's Profit Breakeven Chart", in which he examined breakeven point analysis based on the division of costs into the categories fixed and variable (see Virkkunen, 1950). Palle Hansen, a Danish professor of accounting, is said, in this matter, to have had a great influence in Finland, too. Referring to the conferences organised in Finland in middle of the 1950s, Virtanen et al. (see also Ahola, 1966) write:

Assisted by his Finnish colleagues, Hansen arranged seminars for the top management and accounting staff of Finnish companies. In these successful gatherings, he propagated and popularized the United States-inspired new accounting message: the principles of contribution approach and variable costing. Soon, contribution analysis and variable costing had gained a firm following among managers and accounting practitioners, inspiring a large number of often vociferous proponents. (Virtanen et al., 1996, p. 58).

Even Martti Saario, professor of (financial) accounting at the School of Economics in Helsinki and creator of the Expenditure–Revenue Theory of Accounting, gave his support to variable costing. In one of his articles, Saario wrote:

It has turned out to be impossible to find the right principles that can be used to divide overhead costs for products since the overhead costs are not caused by any one particular product. The buyer's market has taught us that we cannot get the cost money back by calculating it but that the contribution is achieved in sales. (Saario, 1955, p. 43).

Saario had developed a so-called "priority order of costs" theory (Saario, 1949) that was not a derivative of contribution margin thinking but an independent theory construction (see Pihlanto & Lukka, 1993). Saario's arguments for his theory were more complicated but the main idea was that the resources assigned to production later get their share of the sales

revenue prior to the resources invested earlier in the production. This kind of thinking was very compatible with contribution margin thinking, i.e. the short-term resources (causing variable costs) receive their share of the sales revenue before the long-term resources (i.e. fixed or capacity costs). The order of priority for resource costs receiving coverage from sales revenue was the following: work, materials, other variable costs, organisation, machines, buildings, land area, external funding (loan interest), society (taxes) and finally the owners and entrepreneur (salary and dividends).

In Finland, contribution margin thinking was promoted mostly by practitioners, including Pentti O. Ahola (1962) published a book on "Principles of Contribution Margin Accounting" (*Katetuottolaskennan perusteet*). Ahola started his book with Saario's cost priority order theory, which means that Saario's theory is often linked to contribution margin thinking. The priority order of costs and the division of costs into variable and fixed (or capacity) costs have influenced Finnish accounting thinking in many different ways for a long period of time. Variable costing received support in Finland from the book-keeping legislation until the 1973 Accounting Law stipulated that the valuation of stocks was to be based solely on variable manufacturing costs. This priority order of costs model was applied to the Finnish income statement layout based on the 1973 legislation. In Finland, as in Denmark, it was only EU membership and the application of the EEC's 4th Directive that made the valuation of stocks on the full cost principle possible. In Finland, this happened in 1992, when the accounting legislation was reformed in preparation for EU membership. Since then, it has been possible to include fixed manufacturing costs in the stock value if the share of the fixed costs of a firm's costs is considerable.

In Norway, microeconomics had also an influence on business economics and the development of accounting after World War II. Olav Harald Jensen writes:

I entered the field at a time when the links to micro-economic theory came into focus, and my view on business economics has been strongly influenced ever since by the fundamental basis the field, according to my view, had obtained. And I think that I was not alone in Norway with this view. This was not widely determined by the dominating influence that Ragnar Frich had on Norwegian economics, but some of us, at any rate, who had entered the field in Norway before and during the war, considered it obligatory as well as to have read our Sune Carlson, Eric Schneider and von Stackelberg, our Winding Pedersen and

Thorkil Kristensen, and our John Maurice Clark, Joan Robinson and Edward Chamberlin. (Jensen, 1980, p. 65).

The same tendency can also be seen in the Norwegian textbooks written and used at that time. Whereas the textbooks used before 1955 were heavily influenced by German thinking, the period from 1955 to 1970 was dominated by references to the American literature, and according to Trond Bjørnenak, a change in the subjects of the books:

The main features of this period are that the contribution method (minimum cost) and standard cost accounting received greater coverage. This development is found especially in Skare/Jensen (1957) and Johansen/Riise (1967). In relation to standard cost accounting, it refers especially to the American literature (for example, NACA, 1951), while the work of the Dane Palle Hansen (1950) influenced the significance of the contribution method. (Bjørnenak, 1994, p. 80).

Even though marginal thinking came from the UK and the USA to different Nordic countries, the idea of contribution margin thinking also travelled between the Nordic countries, gaining advocates among scholars and practitioners. The influence from Denmark and its accounting professors has been quite considerable in management accounting thinking, including variable costing and contribution margin thinking in the Nordic countries. All in all, after World War II, Nordic professors (e.g. Madsen and Worre in Denmark and Saario in Finland) created innovative ideas in the field of cost and management accounting.

### 5.1. Variable Costing in Practice

There have been various empirical studies on costing practices in Norway (see Bjørnenak, 1994). In a survey from 1948 (Jensen, 1949), all companies used some kind of full costing. From then on, there was a transition, to a greater extent, towards the use of variable costing. In a survey from 1963 (Langholm, 1964), as many as 45% of the companies used variable costing, but that share increased to almost two out of three companies in 1975 (Vågesether, 1975). A survey from 1993 (Bjørnenak, 1994) shows that 71% principally used variable costing, 45% full costs and 16% both variable and full costing. In a comment on the development of costing practices, Bjørnenak explains:

The contribution margin orientation is consistent with research on Norwegian calculation practices in 1963 and 1975, which show that Norwegian enterprises had had the contribution margin tradition since the 1960s. A comparison of costing principles with corresponding international research shows that costing principles cannot explain these uniquely

Norwegian traits. A likely explanation of the difference therefore must lie in the contrasting breakthrough of contribution margin thinking in the 1950s. (Bjørnenak, 1994, p. 113).

In a footnote, Bjørnenak argues that the Dane Palle Hansen's works undoubtedly had a great impact on the diffusion of the contribution margin concept at the end of the 1950s and afterwards, which can be seen, for example, in Skare & Jensen (1957).

In Denmark, some empirical studies have been made on firms. In a study by Andersen & Rohde (1994), 6 out of 10 firms reported that they based their product cost calculation on one or another form of the contribution margin principle. The same proportions are approximately applied in price determination, as well as in the profitability analyses of products and/or customers, cost control and inventory valuation (see also Israelsen et al., 1996). In their survey, Sørensen & Israelsen (1994) found that 9 out of 10 firms carried out profitability analyses of products and/or customers in stepped contribution margin hierarchies on one (product-unit and/or single-customer level) or more levels.

In Finland, Lukka & Granlund (1996) carried out a questionnaire-based survey of cost accounting practices in Finland in 1992. Hyvönen and Vuorinen (2004) conducted a new study using the same form 7 years later. There were clearly more users of marginal costing in the 1992 survey than in 1999, with more in medium-sized companies than those in large ones. In 1992, 46.5% of medium-sized companies used only marginal costing, 28.7% used only full costing and 23.8% used both methods. The corresponding figures for 1999 were 30.3%, 43.3% and 28.8%.

According to some of the surveys conducted over the years in Sweden, marginal (variable) costing is in widespread use in Swedish industrial enterprises, even though full costing dominated the entire period. According to a study carried out at the beginning of the 1990s, around 40% of Swedish industrial companies used marginal (variable) costing either exclusively or else in combination with full costing (see Ask & Ax, 1992; Ask et al., 1996; Jönsson, 1996a). Referring to an empirical survey made by Ask and Ax in 1992, Jönsson has the following to say about product costing practices in Sweden:

Marginal costing was debated and included in the practices of some industries (such as steel) from the early 1950s, but here it appears that the marginalist ideas, brokered by academics from the London School of Economics, were confirmed by practical experience and accepted as relevant. The principle of different costs for different purposes has been kept visible all along and even if absorption costing



dominates in the manufacturing industry, as many as 44 per cent of larger companies used costing systems built to provide for variable as well as absorption costing. (Jönsson, 1996a, p. 445).

It is, however, also worth noting that only 9.9% of all the companies, and none of the larger companies in the survey, used variable costing exclusively (Ask et al., 1996, p. 206).

It should be kept in mind that individual studies are not directly comparable because of the differing ways of sampling companies and for other reasons. In Norway, Denmark, Finland and, to a lesser extent, Sweden, however, the empirical studies conducted in the 1990s show that marginal (variable) costing is still quite common in Nordic companies.

## 6. The Advent and Translations of Budgeting in the Nordic Countries

The scope of management accounting remained almost unchanged from the 1910s to the end of the 1940s in the Nordic countries. Cost accounting systems and ex post calculations had played a major role in the management accounting area. The enormous changes in economic life after World War II required more modern management thinking and new tools. The dismantling of wartime price controls alone provided an opportunity to develop cost accounting and management accounting more freely than had been the case before. As Israelsen et al. write:

The beginning of the 1950s marked a watershed, which had important consequences for future developments. One of the most important changes was the considerable easing of price controls in connection with the abolition of the price law and the consequently greater freedom to develop cost and management accounting systems on the basis of managerial economic criteria. (Israelsen et al. 1996, p. 33)

In the 1950s, accounting thinking underwent a sweeping change. The new accounting thinking did not have its roots in German-speaking countries; economics and the theory of the firm alone no longer served as the theoretical base for accounting. People now sought to learn mainly from the USA. The management process school had a strong influence, even from the accounting point of view.

In Finland, Henrik Virkkunen published a textbook in 1954 entitled *Accounting as the Tool of Management* (*Laskentatoimi johdon apuna*). The subtitle of the book was “*A Systematic-Theoretical Study of the Tasks of Management*”. Virkkunen’s clear message was that “accounting is a management tool without any right to an existence of its own”. This meant harnessing accounting to serve business management in planning,

control, information and communication tasks. Accordingly, accounting was classified into planning, control and information calculations, and the recording systems were worked into commercial bookkeeping and factory accounts.<sup>3</sup> The recording task was seen as secondary to the managerial tasks and the information needs of managers. This new way of thinking was a major departure from what the emphases on the principles of costing and the standard chart of accounts had earlier represented.

In his book, Virkkunen, (1954) refers at several points to the Anglo-Saxon world<sup>4</sup> and its accounting literature, for instance, when describing the adoption of the term “Management Accounting” in Anglo-Saxon countries “as an indication of those new tasks which accounting has to perform in supporting business management and which are regarded as coming within the scope of the earlier terms ‘General Accounting’ and ‘Cost Accounting’”. The scope of management accounting was wider than that of cost accounting. A significant expansion was the explicit inclusion of the future, especially in the form of budgeting, as an accounting dimension.

Since the early twentieth century, budgeting had been listed as a routine belonging to accounting (but only in accounting doctrine, seldom in practice). According to the accounting literature, budgeting did not represent a common practice before the 1950s in the Nordic countries (see, e.g. Arwidi & Samuelson, 1993; Lamppu, 1960; Näsi, 1990; Samuelson, 1986). Finnish accounting textbooks from the 1940s, for example, presented a short chapter on budgeting using the public sector budget term for estimate of expenditures (*talousarvio*) and focused on expenditure and cost control. The idea of budgeting in the modern sense only spread to the Nordic countries from the USA during the 1950s. Management visits to the

<sup>3</sup>A different point of departure, but as with Virkkunen a broader conception than before of accounting’s range of tasks, is illustrated by the six-point list of tasks presented by Professor Vagn Madsen. In his work published in 1959/1963, Madsen presents the tasks of accounting in the following way: profit measurement task (*overskudsopgaven*), calculation and price-setting task (*kalkulations- og prisfastsaettelseopgaven*), control task (*kontrolopgaven*), choice of alternatives (*alternativopgaven*), budgeting task (*budgetopgaven*) and recording tasks (*registreringsopgaven*) (see Madsen, 1959/1963 and also 1970, where the Swedish term “*upplysningsuppgifter*—information tasks—has been added to the list).

<sup>4</sup>Almost half the entries in Virkkunen’s bibliography had English titles. Virkkunen’s book was also translated into German, allowing some pay-back of accounting ideas to the German-speaking countries.

USA as part of the Marshall Plan Aid served as an important mediator of budgeting.

Samuelson describes at length the advent of budgeting practice in Sweden with the following words:

... in general budgetary control has developed within the companies, often in answer to top management demands. ... U.S. companies had acquired the reputation of being well managed. From the beginning of the 1950s study trips to the U.S.A were organized, sometimes by one of the associations of enterprises. Budgetary control was found to be a major control system. Manuals were brought back to Sweden and were passed around between Swedish companies. A great many courses and conferences on budgeting were also organized, using this kind of material. As a result of these activities top managers began to apply budgetary control more and more during the 1950s.

... top management was the leading group of stakeholders in the launching of budgetary control. Manuals, first from U.S. companies and later on from other Swedish companies, were used as models. In this field however, no formal models emerged resembling the uniform principles of costing. (Samuelson, 1989, pp. 299–300).

Samuelson (1986, p. 40) writes that initially the motive behind budget implementation seemed to be one of imitating the behaviour and attributes of financially successful companies. Furthermore, he claims that the acquisition of subsidiaries formed another channel for US budgeting models to reach Sweden. The following comment by Samuelson on practical budgeting activity in Sweden at the end of the 1980s can most probably be applied to describe the situation in the other Nordic countries (for Finland, see Näsi, 1990):

Budgetary control has been employed in a few companies before World War II. In the 1950s this tool was more widely adopted, and nowadays it is used in most companies. The low level of standardization probably delayed the introduction of this tool in many companies, while at the same time it also gave companies great flexibility to change their practice whenever necessary. (Samuelson, 1989, p. 300).

The Swedish contribution to budgetary control was, according to Samuelson, virtually nonexistent, at least until the 1990s. Samuelson writes:

There appear to be few contributions in the field of budgetary control. Budgeting systems have used the models of product costing and accounting systems. No specific models for the development of budgeting have been designed. Projects in this field have commonly been devoted to the definition of concepts and to study trips, for example to the U.S.A. (Samuelson, 1989, pp. 303–304, 309).

This may not be the whole truth with regard to Sweden (see the quote below). An article written by Swedish researchers concerning budgetary control research in the Nordic countries appeared in the journal *Accounting, Organizations and Society* (see Hägg et al., 1988) and made the following general comment:

Research on budgeting in the Nordic countries has displayed a certain distinctiveness. For one thing, there is now quite a long tradition of research grounded in *behavioural and organizational understandings*, in part reflecting the strength of organizational research in the Nordic area and in part, the often *applied orientation of research endeavour*. ... Considerations of actual organizational process and system utilization have been seen as important, as have questions of both pragmatic system design and system implementation. ... budgeting research in the Nordic area also has a long history of using *detailed case studies*, their role for informing our *understandings of management accounting in action* being recognized well before their more recent rise in fashionability. (Hägg et al., 1988, p. 535) (Italics added by the authors.)

This statement serves to describe Nordic research on management accounting even more widely than that only in the field of budgeting. The article, however, surveys budgeting research in the four Nordic countries and divides budgeting research into three categories: procedural, behavioural and social or societal. The writers wish to stress that by the end of the 1980s, much research on budgeting had indeed been done. They nevertheless refer to a Nordic symposium held in 1974 on “Budgeting and Accounting as Tools for Control” and to a statement from the symposium (see Wideback, 1974, p. 393) describing the results of budgetary control research as being characterised by a relatively small degree of development and especially by a small degree of generalisation of the schemes, models, theories, etc., that had been used in studies on budgetary control.

In Denmark, the authors of the above article identified four different schools of accounting research beginning with Palle Hansen and continuing with names such as Worre, Dullum, Melander, Neergaard, Mouritsen, Madsen and Christensen from different business schools and universities in Denmark. These scholars looked at budgeting from different perspectives, beginning with handbooks for practitioners (see, e.g. Hansen, 1975) and ending with analytical, management science and economic theory-based perspectives (represented in particular by John Christensen). Especially the works of Professors Zakken Worre and Vagn Madsen on budgeting in the 1970s might be

regarded as important for the development of the literature and the implementation of budgeting in practice.

In 1958, Worre began to take an interest in budgeting and how it could be linked to the strategy of a firm. This led in 1970 to a major work “The Control Orientated Accounting in the Melting Pot” (*Det Styringsorienterede Regnskabsvæsen i Stobeskeen*) (unpublished, 1970). Worre was very much inspired by Herbert Simon’s discussion of the complexity of the decision process and the various possible limitations on making rational decisions (March & Simon, 1958; Simon, 1948, 1957, 1960). Worre used Simon’s work to discuss a reformulation of the tasks and concepts of accounting in order to support different analysis and decision scenarios. But he also drew inspiration from Simon’s decision theory to develop a total budget system in which the role of the budget is discussed in a hierarchy of decisions, consisting of (1) “structural decisions” (organisational setup and strategy), (2) “process decisions” (procedures for producing products, servicing customers, etc., and subject to change when needed), (3) “period decisions” (decisions applicable for only one budget period) and (4) “action-dated decisions” (the content of these only constrained by the decisions within the previous three) (Worre, 1970, 1978a, b). At the same time, Worre attempted to describe and explain the financial results of a business as a cause and effect relationship between actions, quantities and prices, and revenues and costs. This was done in relation to budgets *ex ante* as well as accounting *ex post*. According to Worre, the prerequisite for establishing such cause and effect relationships is the application of the contribution margin principle, which he considered the only principle suited to making the revenue and expenditure functions of neoclassical economics applicable to the multifaceted analysis and decision scenarios that exist in businesses.

Developments in the second period of the Madsen era were more focused on organisation, budgeting and the relation between budgeting and strategy. In his book on budgeting (Madsen, 1970), he gained, like Worre, his organisational foundation especially through the work of Simon (1960) and Cyert & March (1963), whereas the accounting concepts used were based on his own variability accounting concept (see Section 5). But surprisingly, he then introduced the idea of the contribution margin principle, which he was initially opposed to, in the form of contributions in several layers. His interest in budgeting and long-term budgeting provided a natural transition to his interest in the connection between strategy and budgeting (Madsen, 1976). The aim of this book was

to “bring more culture into budgeting and more realism into the strategy debate in the business” (Madsen, 1976, p. 13), which is also evident in Madsen’s last and only work in English, entitled “Human Factors in Budgeting—Judgement and Evaluation” (Madsen & Polesie, 1981).

By 1988, the amount of budgeting research done in Sweden was quite considerable. In the bibliography of the article by Hägg et al., there were numerous Swedish titles, starting with works published in the 1930s and continuing through the decades, with some 20 researchers mentioned by the end of the 1980s. Names such as Sandor Asztély, Göran Widebäck, Thomas Polesie, Lars Samuelson, Olof Arwidi and Sten Jönsson are encountered in the Swedish budgeting research. To mention just a few examples of budgeting researchers and the themes of their work, Polesie (1976) studied target budgeting (*ändamålsbudgetering*) in his doctoral thesis, Arwidi and Samuelson investigated the historical development of budgeting in Sweden (see Arwidi & Samuelson, 1993) and Samuelson studied the conflicts between the different roles of budgeting (Samuelson, 1986), while Jönsson examined budgetary behaviour in local government. The influence of the Danish professor, Vagn Madsen, has been obvious in Sweden, not just in the field of variability accounting, but also in budgeting.

Hägg et al. sum up Swedish budgeting research in this way:

In general, the Swedish tradition in budgetary research has been oriented towards both the study of practice (empirical) and the generalization of these findings into models and/or procedures intended to facilitate the budgeting process. Overall the behavioural tradition among the Swedish researchers is quite strong. (Hägg et al., 1988, p. 543).

In Finland, budgeting has traditionally been more a topic of professional journals than scientific research. Since the 1950s, there has been a steady stream of writing in professional journals, the themes of which seem to have changed each decade (see Ihantola & Merikanto, 2005). Hägg et al. (1988) mention a Finnish research group at the beginning of the 1980s whose three members, Alaluusua, Kyläkoski and Akkanen, did their studies in the field of budgeting. Notwithstanding the modest amount of academic research on budgeting in Finland, Hägg et al. comment on the more current research in the following way:

Research in Finland has reflected a broad based and academic orientation. While the early researchers were concerned with financial models and rising operations research techniques, recent researchers have expanded this focus to include behavioural

questions and more traditional budgetary topics. This includes both areas such as biasing of estimates in the budget process and links between budgetary planning and strategic planning. (Hägg et al., 1988, p. 540).

In his doctoral thesis, “Budgeting Biasing in Organizations” (*Budjettiharhan luominen organisaatiossa*), Kari Lukka was the first scholar in Finland to utilise a behavioural perspective in budgeting research (Lukka, 1988). In 1987, Lukka spent time as a doctoral student at the London School of Economics under the supervision of Professor Anthony Hopwood. It was Lukka and his supervisor, Professor Pekka Pihlanto at the Turku School of Economics, who brought the behavioural and organisational aspects and the “AOS approach” to the Finnish accounting discussion and thinking. The behavioural approach is represented later in most budgeting research from the 1990s (see, for instance, Ihantola, 1997; Lumijärvi, 1990).

When summing up Norwegian budgeting research at the end of the 1980s, Hägg et al. (1988, p. 541) come to the conclusion that “(In Norway) the most noteworthy contributions lie in the research done from organisational and sociological perspectives”. These perspectives are still well represented in Norwegian management accounting research.

The following comment by Hägg et al. about budgeting research by the end of the 1980s can be applied to all management accounting research in the Nordic countries:

Nordic research (on budgeting) was almost exclusively connected to Anglo-Saxon research. ... The Nordic work is “softer” in nature, it focuses on conceptualising and framework building, and the case study approach has frequently been used. Nordic research is often done in small research communities, the main part of the work consists of dissertation work by doctoral students, and the results are published only in the national language. (Hägg et al., 1988, p. 544).

The role of budgeting, and therefore the dominant ideas about budgeting, has changed over the years (see Arwidi & Samuelson, 1993; Ihantola & Merikanto, 2005). The role of cost control in the 1950s changed to the role of central planning in the 1960s and to the support of management system and responsibility accounting in the 1970s. Since the 1980s, budgeting has played an important role in the efficiency orientation of the businesses and as a part of integrated information systems and strategic management.

In the Nordic countries, a version of management by objectives (MBO) has enjoyed special popularity. Over the last 20 years, it has been known under the names of management by results and management by output (*resultat budgetering, tulosjohtaminen ja -budjetointi*). It is striking how, e.g. in Finland since the beginning of the 1990s, public administration control systems have been built firmly on a management-by-results basis. For approximately the last 15 years, budgeting has been joined by several new “packaged” instruments, such as the BSC and other frameworks for measuring performance.

One of the most well-known Swedish writers on budgeting is Jan Wallander. His message regarding budgeting shows through in the title of one of his articles, “Budgeting—an unnecessary evil” (Wallander, 1999). One of his earlier articles, “Scrap Budgets, Forecasts and Long-term Planning”, was published in Finland (in Finnish) already in 1981 (see Wallander, 1981). Evidently, his exhortation was not acted upon, but the article does show how ideas have travelled between the Nordic countries, this time between Sweden and Finland.

Budgeting has achieved a permanent position in the field of accounting and business practices. According to Ekholm & Wallin’s (2000) study, however, there was vigorous criticism of budgeting in large Finnish companies at the end of the 1990s, but most companies still used budgeting either alone or else alongside alternative models (BSC, rolling estimates and so forth).

To sum up, budgeting as a practice to the Nordic countries travelled mostly via practitioners and imitated practices from the USA during the 1950s. The evolution of research appears to follow the same pattern as elsewhere. The variables used in budgetary control studies are similar to those found in other countries, but the methodologies are different. In the Nordic countries, case studies are most frequently used, whereas in the USA, surveys and experiments have been used to a much greater extent (see Hägg et al., 1988, p. 543).

Hägg et al. (1988) mention budgetary control with objectives for the use of resources (the Madsen School) as a Nordic contribution to the budgeting field. A second thrust is the work on semiconfusing information systems (Hedberg & Jönsson, 1978). Hägg et al. (1988) also state that Nordic research has benefited from interactions among researchers in the Nordic countries as well as from the joint work of Madsen and researchers in Gothenburg (Asztely, Polesie and others). Through this cooperation, the theoretical method introduced by Madsen in Denmark has been supplemented by empirical studies (see, e.g. Polesie, 1976).

## 7. Management Accounting in the Nordic Countries Today—International Trends with Some Specific Nordic Features

“It is a small world of management accounting practices”, wrote Granlund & Lukka (1998), arguing that there is a global tendency for management accounting system designs and general ideas to converge. The homogenisation of management accounting practices is a result of a number of different diffusion processes and economic and institutional pressures and drivers towards convergent management accounting practices. The bigger Nordic companies have subsidiaries in other Nordic countries or elsewhere abroad. These are all reasons to argue that Nordic companies are part of the global business world and the current trend of homogenisation of management accounting practices. Utilising modern electronic data processing technology and data-warehouse type of integrated information systems (such as SAP R/3) leads to the standardization of data collection formats and reporting patterns in the production of accounting information.

Management accounting ideas travel today from one country to another, from one firm to another and from theory to practice and vice versa via many mediators or idea-bearers. Both practitioners and academics act internationally. Attendance at international conferences and workshops and publishing in international journals is a matter of course for Nordic accounting researchers today. The number of accounting academics is also much greater today than it was 15 years ago. As a consequence of international activities in the realm of both theory and practice, management accounting in the Nordic countries since the 1980s has been marked by the quick arrival of ideas and innovations from the wider world, in practice mostly from the USA. Apart from accounting practitioners and academics, consulting firms and consultants, of course, also play an important role as the hunters and mediators of new ideas. The biggest and most sought-after conferences for business practitioners are organised by consulting firms and usually centre around gurus from the USA, such as Robert S. Kaplan (in ABC and BSC), Michael Porter (in strategy) and so on.

As a consequence of strong international influence coming from all directions and using all possible channels, publications, education, consulting, etc., new Nordic management accounting contributions such as variability accounting during the 1950s no longer emerge. Perhaps no one believes in the possibility of changing the direction of international development. Instead of innovating themselves, Nordic researchers have often been content to improve their understanding of the diffusion and successful

implementation of accounting innovations, such as ABC or BSC from the wider world (see, e.g. Ax & Bjørnenak, 2005; Bjørnenak, 1997; Malmi, 1996, 1997a, b, 1999; Malmi et al., 2001; Vaivio, 1999). Several Nordic researchers have also done survey-based research in describing and analysing cost and management accounting practices and development trends in their countries (in Sweden, Ask & Ax, 1992, 1997; in Norway, Bjørnenak, 1994; in Denmark, Israelsen et al., 1996; Nielsen et al., 2002/2003; and in Finland, Hyvönen & Vuorinen, 2004; Laitinen, 1995; Lukka & Granlund, 1994, 1996).

In spite of a strong international influence and the convergence of management accounting theories and practices, one can nevertheless find some remarkable Nordic contributions, particularly in the realm of management accounting research. The book “*Accounting in Scandinavia—The Northern Lights*”, edited by Sten Jönsson & Jan Mouritsen (2005b) provides a good picture of the Nordic contributions in different areas of accounting. Even in the field of management control and accounting, several Nordic contributions can be found, but we have chosen to mention only those that we view as the most remarkable traditions or milestones that concern both research methodology and topic and research contexts of Nordic management accounting research since the 1980s.

Nordic management accounting research, which is mostly based on hermeneutics, utilises action research and other case study methods, very often in public sector organisations. These phenomena more or less intertwine and have in common one key person, Professor Sten Jönsson.

In the “*Northern Lights*” book, Granlund & Modell (2005) have an article concerning Nordic contributions to the management accounting change literature. They state that Nordic research on management accounting change has proliferated since the 1990s, but that these recent advances were notably preceded by a number of empirical studies—early advances—undertaken by a group of Swedish scholars. Granlund and Modell list those studies (Hedberg, 1981; Hedberg & Jönsson, 1978, 1989; Jönsson, 1992, 1996b; Jönsson & Grönlund, 1988; Jönsson & Lundin, 1977) and argue that:

... these studies have made an important and relatively unique contribution to the emerging research on management accounting change at the time, especially by emphasizing the relationship between management accounting and organizational learning and legitimising the use of in-depth, qualitative field studies as a means of examining change. (Granlund & Modell, 2005, p. 161).

To study change means that the researcher has a longer time-span and must be involved in the case organisation over an extended period of time. The management accounting change research in each Nordic country since the 1990s has focused on different phenomena and used different theories and methodologies (see country by country description by Granlund & Modell (2005), and the table listing all the Nordic management accounting change studies at the end of Chapter 7, pp. 178–186). Very often, the roots of Nordic management accounting change studies, however, are in the early Swedish advances described above.

The early Swedish advances made by Sten Jönsson and other colleagues were empirical studies and relied heavily on action research with field researchers getting involved in the studied organisations over an extended period of time and assuming the role of participant observers as well as modest interveners (*ibid.*, p. 163). Granlund and Modell still conclude that:

Nordic research has made an important contribution to the growing management change accounting literature. Especially the early advances examining the relationship between evolving management accounting practices and organizational learning were clearly innovative and established a tradition of qualitative field research involving a considerable element of interaction with the organizations under study. (Granlund & Modell, 2005, p. 177).

Jönsson (1996a) writes about accounting and business traditions in Sweden and says that since the 1960s, there has been a marked dominance of behaviourally oriented research in business economics as well as in accounting. According to Jönsson (1996a, p. 443), James March and Herbert Simon are the most respected researchers among Swedish colleagues and their influence is widespread. The shift in orientation from a classical, scientific management conception of business economics to a behavioural theory of the firm view took place in the late 1960s in Sweden.

As to the academic management accounting research in particular, Jönsson (1996a, p. 445) writes that “in the last few decades, academic management accounting research has taken on an increasingly behavioural flavour”. He mentions Swedish studies from different decades in which the behavioural aspect has been apparent (e.g. Grönlund & Jönsson, 1990; Hedberg & Jönsson, 1978; Jönsson, 1996b; Östman, 1973, 1977; Polesi, 1976). The management accounting research has progressed from system design aspects to the use of accounting information and support for organisational learning. The context-dependent research in Swedish management

accounting has dealt with public sector management accounting. In addition to behavioural aspects in a political setting in conjunction with the redesign of accounting systems, longitudinal field studies have been conducted, often as action research projects (see Jönsson, 1996a, p. 446 with reference to Brunsson, 1989; Jönsson, 1982; Olsson, 1983). Jönsson argues that a pragmatic view is applied in Swedish management accounting research and writes that “there is also a distinct appreciation of the pragmatic view of accounting systems among scholars in Sweden” and that “the ultimate test of accounting concepts or information systems is whether they work in the real life setting” (Jönsson, 1996a, p. 446).

In 1997, the *Scandinavian Journal of Management* published a special issue on accounting (*SJM*, 1–3/1997), which was based on papers presented at a workshop held in 1994. The issue’s editors, Grønhaug, Mellemvik and Olson, wrote a short introduction on the subject “Accounting in a Scandinavian Research Context”. They contrasted technically oriented accounting research with research on accounting as a social and institutional practice, as well as research, placing it in a broader organisational and social context. They declared that the articles published in the special issue “quite often explicitly describe accounting as interrelated with other organisational and social processes”, and furthermore that the issue’s articles:

... not only discuss the interaction of accounting and its context; they also reflect accounting in a Scandinavian research context. Context not only influences accounting and vice versa, but it also affects the accounting researchers and their ways of reasoning and making sense of the research. (Grønhaug et al., 1997, p. 3).

To conclude, so far we can state that Swedish scholars, led by Professor Sten Jönsson, have shown the way in Nordic management accounting research since the 1970s. This has meant the advent of the inclusion of behavioural aspects, longitudinal case studies and action research, often in the public sector context. In the “*Northern Lights*” book, Mellemvik, Olson and Gårseth-Nesbakk have an article on the dominant traits in public sector accounting research from 1980 to 2003 in the Nordic countries. One of their conclusions is that there is a Swedish/Norwegian “family” in the field of public sector accounting research, and that it is actually a question of Sten Jönsson’s “family”, including Frode Mellemvik, Norvald Monsen and Olov Olson. The main characteristics of the “family’s” accounting research are that it is empirical, case-oriented, longitudinal and focuses on local

government and the use of accounting (see Mellemvik et al., 2005).

Nordic action research in the public sector context is known for projects in big municipalities (City of Uppsala and City of Bergen). Olov Olson has been one of the idea-bearers from Sweden to Norway. During the 1980s he took a position at the Norwegian School of Economics and started the action research project—the “Bergen Project”—in Norway with four Norwegian students, all of whom wrote their doctoral theses during the project (Frode Mellemvik, Norvald Monsen, Rignor H. Olsen and Sverre Høgheim). Many other Nordic and international professors and visiting professors (Sten Jönsson, Thomas Polesie, Nils Brunsson, Barbara Czarniawska, David Cooper, Jan Mouritsen and James March) inspired the Bergen action research project. As a consequence of this successful project, public sector accounting research is the hallmark of Norwegian accounting research today. In Sweden, there are, in addition to Sten Jönsson and Olov Olson, many other public sector researchers, of whom Sven Modell is known especially for the use of institutional theory in his research (see, e.g. Modell, 2001).

Since the end of the 1980s, accounting researchers in Norway, and especially in the Bodo Graduate School of Business, have often chosen the public sector and its organisations (and in particular hospitals) as the objects of their research. This focus on the public sector, together with the application of institutional theory, is among the most striking characteristics of Norwegian accounting research. Often the research has been addressed with financial accounting, but work has also been done on management accounting, especially in the area of performance measurement. In the context of public administration, the boundary between financial accounting and management accounting is even more unclear than that in the company context. Budgeting and the cameral bookkeeping that monitors budget execution, or some other budgetary accounting system, produce information for the needs of both management and external stakeholders.

Several Danish accounting researchers have also chosen to do work on public sector organisations, but from slightly different perspectives and research methodologies (Melander, Skaerbaek and Christiansen; see, e.g. Christiansen & Skaerbaek, 1997). In Finland, accounting research on business organisations and public administration organisations has, to a large extent, been separated into different disciplines. Interest in public sector organisations has just begun to emerge in Finnish business schools (see, e.g. Järvinen, 2005; Kurunmäki, 2000).

The most striking feature of Nordic management accounting research is the adoption of action research or other case study methods. In an article on action research in Denmark, Professor Erik Johnsen argues:

... that from 1982–83 it had been a generation since the first action research in relation to a company’s financial operations management gained academic rights in this country. *Vagn Madsen’s* dissertation, *Contribution to the Elucidation of the Rationalisation Problems in Industrial Enterprises*, Copenhagen 1951. The new theoretical area of *variable accounting* developed via interaction with managers from specific companies in which the author had worked primarily to solve specific problems involving efficiency. (Johnsen, 1983, p. 23).

This research tradition has also spread and taken root in Norway. Finnish management accounting research has often been what Granlund & Modell (2005, pp. 167–170) define as action-oriented research. In the Jönsson’s “family” action research, practical relevance and intervention are important, whereas action-oriented research avoids intervention. Interventionist research seems to be a coming trend in the field of management research (see Jönsson and Lukka’s article in this handbook). In Finland, Kasanen et al. (1991) introduced an interventionist approach, calling the method a constructive approach (see also Kasanen et al., 1993). The purpose of the constructive approach is to produce innovative accounting constructions and contribute to both the theory and practice of accounting. The authors define the constructive research approach as follows:

The constructive approach is a research procedure for producing constructions. Constructions refer, in general terms, to entities, which produce solutions to explicit problems. In management accounting this research approach is intended to produce managerial constructions, i.e. constructions, which solve problems that emerge in running business organisations. (Kasanen et al., 1993, p. 244).

In the “*Northern Lights*” book, Kari Lukka has an article on different approaches to case research in management accounting. He categorises the approaches according to the nature of empirical intervention and theory linkage. The table mapping the case research in two dimensions is a methodological contribution showing the whole spectrum of management accounting case research (see Lukka, 2005).

In summary, Nordic management accounting today is an inseparable part of international trends and developments. There is, however, a Nordic heritage that influences management accounting research especially in these countries. A strong commitment to

hermeneutics, interpretation and understanding is typical of the Nordic Jönsson's "family". It means longitudinal case study research with a different emphasis on intervention, but from a theoretical basis. In the Nordic welfare states, it is only natural that research has been done in the public sector organisation context, possibly also due in part to access issues for longitudinal case study research assuming an extended involvement in the organisation studied.

## 8. Discussion

The development of cost and management accounting in the Nordic countries has been studied in this chapter from the perspective of "Travels of Ideas". Starting with the establishment of business school education in the Nordic countries during the first decades of the last century and approaching the present, we have chosen what we view as the most important issues in the realm of cost and management accounting at different times for our historical analysis. The issues addressed include the establishment of business schools and the start of higher education in cost accounting, the spread of unified costing principles and the standard chart of accounts, marginal costing as a challenge to full costing, budgeting as representative of the focus on managerial tasks in management accounting and, finally, the current international developments of management accounting practices and Nordic research endeavours.

The history of cost and management accounting as a business school subject in the Nordic countries only covers 100 years. Chronologically, this history can be divided into three periods: the period of the German tradition from the 1910s to World War II, the period of the emergence of national heritage from the middle of the 1940s to the late 1970s and the period of international development, which started in the 1980s. All three periods have lasted approximately 30 years.

The institution of German-style business schools (*Handelshochschule*) spreads throughout the Nordic countries within the space of a quarter of a century from 1909 to 1936. Once established, the business schools looked to Germany as the *fons et origo sapientiae* and imitated the German model. Sweden showed the way, and the rest followed. The first professors in the field of cost accounting were either German (Ernst Walb, Walter Mahlberg and Albert ter Vehn) or otherwise influenced by German accounting doctrine (Oscar Sillén, I.V. Kaitila, Palle Hansen and Eilif W. Paulson), especially the works of Professor Schmalenbach.

The first business schools were established on financial support from the business community, whose needs they were intended to meet. In many ways, the

first professors in the field of accounting tried to fulfil these expectations. They translated—both in terms of the language and the ideas—German accounting ideas into their national languages. In the beginning, research was, of course, mostly conceptual in nature, and the writing of textbooks, which were more than practical guides to bookkeeping, was an important part of their contribution to the field.

From the prewar period until the 1950s, the then new cost and management accounting ideas (e.g. costing principles, standard chart of accounts and contribution margin thinking) were energetically debated in professional journals (e.g. *Affärsökonomi*, *Handelsvidenskabeligt Tidsskrift* and *Liiketaito*), the early professors often playing a key role in solving controversial issues (e.g. Albert ter Vehn's role in the full costing issue in *Affärsökonomi* in the mid-1930s). Their theoretical ideas spread to practice via cooperation with national industrial associations, service as committee members, etc.

Research and the potential for research in cost and management accounting before the 1940s were in the hands of a very few people. Cost and management accounting academia in each Nordic country consisted of one or two professors, who played an important role as idea-bearers and translators. Kettunen (1986) talks about "the mythical characters of the past" when discussing the multidimensional activities and extensive influence of earlier Finnish business economics and accounting professors. There is a good reason to extend Kettunen's phrase to cover the accounting professors in all the Nordic countries from the first half of the last century, including Albert ter Vehn, Oscar Sillén, I.V. Kaitila, Martti Saario, Palle Hansen, Eric Schneider, Robert Kristensson and Dag Coward, to name the most famous ones.

In cost accounting, standardization theory was applied in the form of costing principles and standard charts of accounts in the first half of the twentieth century. Basically, it was a question of imitating the German terminology, costing principles and standard charts of accounts, but with their own translations. Sweden, as the leading Nordic industrial country, had the most international companies and connections. Ideas travelled, sometimes conflicting with one another, both from Europe and America, even into the field of cost accounting.

After World War II, eyes turned towards the USA. In particular, the scientific management movement, i.e. Taylorism, came early at the beginning of the twentieth century and gained a foothold in the Nordic countries. In the field of management accounting, the Anglo-American influence came in the form of a debate on marginal costing versus full costing and



was one of the major accounting issues in the 1940s and 1950s in the Nordic countries. Marginal costing and contribution margin thinking in managerial decision-making, which had a strong and sustained impact in the Nordic countries, also received some Nordic translations as well, such as Saario's theory on priority order of costs, which was compatible with contribution margin thinking even though it may not have been based on it.

During the 1940s and the 1950s, the first doctoral dissertations were presented in cost and management accounting in the business schools in the Nordic countries, but the first doctors of accounting became very innovative accounting professors. They trusted in their abilities to develop their own ideas and to influence accounting practices. In Denmark, it was especially Vagn Madsen who developed the variability accounting idea in his doctoral dissertation of 1951, and Zakken Worre, who studied the revenue and cost/expenditure relationships in accounting based on microeconomic theory in his dissertation of 1958. In Finland, Martti Saario developed the expenditure–revenue theory of financial accounting in his doctoral dissertation of 1945, but also the priority order of costs theory in 1949 in management accounting. Some professors were otherwise very influential, including Professor Palle Hansen, who did consulting work and had his own journal not only in Denmark, but also in other Nordic countries.

Most of the research done during the 1950s in management accounting in the Nordic countries, including the few existing doctoral dissertations, was published in the researchers' own national languages, and therefore the "Travels of Ideas" was limited to the Nordic countries. At a very early stage, Nordic researchers carried out case and action research studies involving an extended period of time in the case organisations. Often the empirical part was included in the study only indirectly, as hypothetical numerical examples.

The postwar change from German traditions towards Anglo-American trends has been often agreed in Nordic business school history, but the intensity of Nordic management accounting thinking and innovations compared with the resources available has not been recognised often enough. We call the period in management accounting that started after World War II the "emergence of national heritage", due to the Nordic business schools' and universities' own alumni as accounting professors and the development of their own ideas, which also travelled to the other Nordic countries, though seldom beyond, due to the use of a Nordic language.

Since the 1980s, management accounting ideas from all over the world have travelled to the Nordic countries very quickly and via many channels. If they are American and "packaged" in three capital letters (such as ABC or BSC), they come quickly and it seems easy to imitate them. There are many idea-bearers (business people, consultants, academics, seminars, publications, etc.), the quickest ones obviously winning the most ground first.

Management accounting among the other branches of business economics has developed as a subject field in which scientific research is done using different theories (economic, organisational, sociological, psychological, etc.). And even the research methodologies and methods used are several, including: qualitative and quantitative research, descriptive and normative, theoretical and empirical, as well as the use of surveys, observations, interviews, etc., in data collection. Nordic research findings are currently published almost exclusively in English in international journals. At the same time that business disciplines are gaining scientific status, the research may be becoming too theoretical for business people.

Action research is a Nordic tradition and trademark, especially in the Jönsson's "family". In Finland, the articles by [Kasanen et al. \(1991, 1993\)](#) have promoted the interventionist constructive approach, but due to its normative slant and difficulties, often in terms of the theoretical basis and contribution, it was not fully accepted right away. Another version of action research in Finland is the development inquiry approach (see [Tamminen, 1992](#)). Interventionist research (see the chapter written by Jönsson and Lukka in this handbook) is welcome if it adds practical relevance to the research and provides a contribution to the theory at the same time.

## 9. Conclusions

Three periods can be distinguished in management accounting development. The first, beginning with the foundation of business schools between the two World Wars, was the period of the development of principles for full absorption costing and standard chart of accounts. At this stage, the measures taken to develop cost accounting were rooted in the German tradition, although the underlying philosophical basis for development was the ideology of scientific management and the need for rationalisation and efficiency. This was the form progress took between the World Wars, the development work being largely in the hands of engineers. Representatives of the new discipline of business economics also tried to make their contribution, albeit often with mixed feelings. The nature of research work was, on the one hand,

theoretical and concept analytical, and, on the other hand, empirical, or to use a current term, constructive research. In their studies, researchers such as Albert ter Vehn described the problems facing individual firms and their cost accounting practices, offering solutions such as standard charts, which were, however, intended to be standard for one particular industry only.

During the second period, which began in the 1950s and continued until the end of the 1970s, cost accounting grew into management accounting, a tool to support management decision-making. The theoretical foundation rested on managerial tasks and economics. Management control tools, such as budgeting, became popular both as a topic of writing and in practice. Management accounting in the Nordic countries was influenced by the US literature and experiences. Management accounting professors at the Nordic business schools had their own interest areas where they acted as idea-bearers and mediators, but even some Nordic innovations, such as variability accounting, were developed. Marginal (variable) costing and contribution margin analyses perhaps received more emphasis both from academics and practitioners in the Nordic countries than elsewhere. Ideas even travelled between the Nordic countries, as academics gave presentations and their articles were published in journals in their neighbouring countries. Research still involved concept analysis, offering normative guidance and calculation models. Much importance was attached to operational research and mathematical models elsewhere, but in the Nordic countries, they did not enjoy much popularity.

The third period, which began in the 1980s and as far as research is concerned, must be characterised as one seeking to interpret the various tasks and roles of management accounting and accountants in their social and organisational contexts, emphasising the behavioural implications of accounting. Management accounting has been interpreted in its context using, e.g. organisation and behavioural theories. Concept analysis and the normative tradition of earlier twentieth century research were superseded at the end of the century by hermeneutic, interpretive research that seeks to enhance understanding. Very little management accounting research based on the positivist research tradition has been done in the Nordic countries. Action research, field studies and case studies have been characteristic of management accounting research within the hermeneutic orientation in the Nordic countries. This holds true especially for the last 20 years.

Among the Nordic contributions to management accounting theory, the Dane, Vagn Madsen's

variability accounting stands in a class of its own. It has had considerable influence in Denmark, but obviously also in Sweden and in the other Nordic countries. Madsen's works were well known in all the Nordic countries among researchers in the 1960s and 1970s. At the beginning of the 1980s, internal accounting systems based on variability accounting ideas were constructed in Finland, particularly in central government administration. The system, however, was too demanding (with its recording of working time, etc.) in relation to the technology available at the time; consequently, the idea of internal accounting and budgeting was abandoned. Thus, variability accounting was gradually being forgotten, even in the Nordic countries, until ABC accounting put it back in the spotlight.

In the realm of practice, management accounting in the Nordic countries today is marked by the arrival of innovations from the rest of the world, though mainly from the USA. Both academics and business people today are more international. Management accounting ideas travel inside bigger companies with subsidiaries in other Nordic countries or elsewhere abroad. Today, large conferences for business people are organised in the Nordic countries around the big names, mostly from the USA. Translations and applied implementations of the topical dominant ideas and the standardizing effects of the ERP type of information systems on management accounting systems provide scholars in the Nordic countries with just as many and similar research subjects as they do elsewhere.

Business economics and accounting as subjects of higher education have a practical heritage, which has been their strength but at the same time also a burden, which is difficult—and unnecessary and unwise—to shake off. Even today, universities often stamp business economics as business practices—and not as a science like other social sciences. One possible way to solve the “too practical for the university—too theoretical to be useful in practice” problem could be to strengthen the role of interventionist research. Practical relevance in the form of Nordic action research (constructive, development enquiry or other interventionist approaches) seems to be an emerging trend in the field of management research.

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# A History of Japanese Management Accounting

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**Abstract:** Since the 1980s, the term “Japanese management accounting” has attracted serious attention, not in the least because of Japanese companies’ international competitiveness. However, the term is often used without defining its exact referent. What is Japanese management accounting? Where does it come from? Are there any defining characteristics that make it “Japanese,” which enhance Japanese companies’ international competitiveness? Is Japanese management accounting particularly socially and culturally determined, and therefore, rarely applicable in foreign companies? After examining the evolution of Japanese management accounting, from the mid–nineteenth century to the year 2000, this chapter addresses the aforementioned questions from historical perspectives.

## 1. Introduction

This chapter examines Japanese management accounting from three different historical perspectives. Firstly, in this section, we briefly look at the history of interests in Japanese management accounting in English-language literature, both academic and professional. It is intended to guide readers to appropriate references, and also to clarify the purpose of this chapter. It is not intended to provide a comprehensive picture of diverse Japanese management accounting, but rather to clarify potential ways to further examine what we now understand in English-language as “Japanese management accounting.” Secondly, in Sections 2 and 3, we illustrate some important developments in accounting in Japan that were observed approximately between 1850 and 1950. We try to identify some Japan-specific features of management accounting in Japan, drawing upon well-known, if not representative, companies that have already been researched by Japanese academics but not fully introduced overseas. Thirdly, we will look at the evolution of management accounting at Toyota, which grew significantly during the second half of the twentieth century as a leading international company, owing at least in part to some famous Japanese management accounting practices. One such practice is Target Costing that Toyota is considered to be the first to have comprehensively developed. From the case of Toyota, we present our

view that the success of some leading Japanese companies is contributed by the major Japanese-specific features of management accounting practices that have also been pointed out in Sections 2 and 3.

For the last two decades or so, the terms “Japanese management” and “Japanese management accounting” have become very popular both in business magazines and academic literature. This popularisation did not come as a surprise, not in the least because Japan had already achieved the so-called “miracle growth” by the end of the 1970s, and was still growing towards “Japan as No. 1” in the 1980s (Kharbanda, 1992; Vogel, 1979). During this period of high growth, much attention was directed to every aspect of Japanese management practice including accounting and costing. We conducted a systematic English-language literature review based on the EBSCO database, which covers both the major academic articles and business magazines.<sup>1</sup> The EBSCO review reveals the peak of such attention in the middle 1990s, followed by a gradual decline during the “Lost decade (until the early 2000s),” in which many Japanese companies lost their past reputations.

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<sup>1</sup><http://www.ebsco.com/home>; Last access 01, Dec. 2005; We reviewed 64 articles that contained all the key words of “Japan(ese),” “management” and “accounting” in the abstract.



Nonetheless, a few leading Japanese companies' management accounting still attracts serious attention from international researchers and practitioners who seek trans-national implementation of Japanese management accounting as a tool for the global competition and strategy (e.g., Kranias, 2000; Nishimura, 1995).

The above is an overall, rather oversimplified, sketch of the evolution of interests in Japanese management accounting seen in the English-language literature. We assume that our principal readership is either non-Japanese researchers or Japanese researchers who try to contribute to the English-language literature. Initially, the notion of Japanese management accounting in this chapter is admittedly biased in the way that it was developed by overseas (particularly by the western) researchers whose interests, initially and in many cases, stemmed from the "lessons to be learnt from the Japanese growth" (e.g., Kharbanda, 1992; McMann & Nanni, 1995; Sakurai & Scarbrough, 1997; cf. Kato, 1993b)—often a simplistic but understandable point of view. In addition, another problem of this notion of "Japanese management accounting" is that only a small number of companies have been studied by overseas researchers, most typically the samples being well-known high-performing companies among about 2000 listed companies in Japan. Hopper et al. (1999) exceptionally direct attention to small- and medium-sized enterprises (SMEs), and report similar findings with large companies. However, their research is also subject to the limited scope of the SME samples, and their pioneering research alone cannot completely ensure that both large companies and SMEs share similar management accounting practices in Japan. We therefore need to keep in mind that by "Japanese management accounting," we refer only to the narrow accounting techniques and practices observed in leading companies.

The fundamental task of this chapter is to re-examine what has been understood by English-reading researchers so far, by outlining the major development of Japanese management accounting based on Japanese-language literature. It is not intended to cover the details of the history, but to develop basic knowledge or hypothetical views in the way that the notion of Japanese management accounting can further be studied in collaboration between international and Japanese researchers.

Against such a background and aim, it is useful to note a variety of the Japanese-language management accounting literature. If Japanese management accounting is to be defined without, or with at least less, bias of the overseas, researchers must refer to a various Japanese-language articles. There are about

1,500 accounting researchers, usually called *Kyōjyū* (translated into English as Professors), in about 750 universities, whose works are usually published in each university-based journal, generically called *Kiyō*, as well as popular business magazines and only a few notable peer-reviewed journals. Although *Kiyō* journals do not adopt a peer-review system, this in turn seems to allow more freedom in the choices of topics and methods adopted. If *Kiyō* articles are comprehensively reviewed across universities and time, this may allow us to access unexplored varieties of Japanese management accounting practices.<sup>2</sup> An increasing number of titles and abstracts are now available in English at the national database online by the National Institute of Informatics, Catalogue Information Service,<sup>3</sup> which may open up wider collaboration between Japanese and non-Japanese researchers for the new steams of Japanese management accounting research.<sup>4</sup>

Returning to our main concern, Japanese management accounting in English, we may hope that the contents of the accounting are clearer, as Japanese management accounting has been examined from a particular interest of the overseas (For a good collection of articles on Japanese management accounting before 1990, see Monden & Sakurai (1989); McMann & Nanni (1995) offer fairly comprehensive

<sup>2</sup>Such research outcome is of course subject to the quality of *Kiyō* articles. However, our point here is to direct attention to the positive function of non-peer-reviewed journals. One of the authors of this chapter used to conduct a comprehensive review based on the National Diet Library database, once every year, just in order to sense the research trend and unexplored important topics that were developed in Japan, which has proven very useful at least to him. A thorough literature review can further be developed as an important research, which even deserves a doctoral thesis, for example, in order to free researchers from the overseas bias in the long run.

<sup>3</sup>[http://www.nii.ac.jp/CAT-ILL/contents-e/e\\_home.html](http://www.nii.ac.jp/CAT-ILL/contents-e/e_home.html); Last access, 01, Dec., 2005.

<sup>4</sup>See Yoshikawa et al. (1994) as an attempt to introduce a variety of management accounting literature of Japan in English. The review of the monograph appeared in *Accounting Review* (Daniel & Boatsman, 1995), in which the reviewers clearly hold the well-built overseas bias in the Japanese management accounting literature. However, this bias is not without a good reason: potential usefulness and applicability of Japanese accounting to foreign companies. If the suggested comprehensive review of Japanese literature were to be pursued, researchers are advised to develop and clarify their own reasons for the new research, which is at present by no means clear.

review of Japanese management accounting literature in English.) However, despite the fact that the term has come to be quickly accepted by both the business and academic community, the nature of Japanese management accounting is puzzling. Japanese management accounting has almost always been associated with a few popular management methods and accounting methods such as the Just-in-time (JIT) System, Target Costing and *Kaizen* Costing; however, they by no means automatically explain why these are specifically Japanese.

Along this line, we soon face a paradox: the more we study the details of Japanese management accounting, the more we find close connections with the West. Indeed, according to the Japanese-language literature, the import of accounting techniques from the West has been a well-established area of management research in Japan (Tsuji, 1971; see Sections 2 and 3). If we examine calculative equations, resultant numbers and tables in isolation of Japanese social and cultural aspects, their origins are often found in the West, and nothing appears specifically “Japanese.”

For instance, the following is a typical equation, which appeared in many articles, that tries to introduce the novelty of Target Costing (e.g., Sakurai, 1989; Tanaka, 1995; Yoshikawa et al., 1993).

$$\begin{aligned} &\text{Target sales price} - \text{target profit} \\ &= \text{target cost (allowable cost)} \end{aligned}$$

This equation is then typically followed by explanations such as “Target Costing is defined as a costing technique that sets cost targets for new products on the basis of market price, as shown in the above formula,” or perhaps “Once it has established the target selling price and target profit margin, the company can calculate the allowable cost by simply subtracting the target profit margin from the target selling price” (e.g., Cooper & Slagmulder, 1999; Ito, 1995; cf. Kato, 1993a, b). Given that the equation is actually used in the observed company, this explanation cannot be false, as the mathematical equation assures such definitional correctness. Accordingly, some readers seemed to have taken the equation for granted without much questioning, while others were most likely left without a sense of satisfaction, since there is nothing particularly “Japanese” inherent in this formula or explanation. The notions of the target price and the target profit would exist commonly across the world. If we focus our attention to the calculative equation only, Target Costing therefore appears as a little more than good common sense. And, similar points apply to many other famous Japanese management accounting techniques.

What is Japanese management accounting, then? The EBSCO literature review reveals an increasing trend to emphasise “non-calculative” aspects of Japanese management accounting, which is also consistent with what we find in the Japanese literature through the *Kiyō* review. For instance, several leading researchers insist that Target Costing is neither accounting nor costing, rather it is frequent and mutual communicative act and strategy that enables comprehensive profit planning and management (e.g., Kato, 1993b; Monden & Hamada, 1991; Sakurai, 1989; Tanaka, 1993; Tani et al., 1994). The literature further attempts to analyse the factors and overall mechanism in which what we refer to as Japanese management accounting plays a central role in various management practices. A few common points of reference are the notions of the “social” and the “cultural” by which authors try to define the Japanese specificity. At the risk of some oversimplification, the literature, particularly the English-language literature, tends to conclude that the Japanese social and cultural conditions make Japanese management accounting effectively mobilise a wide range of management functions altogether (e.g., McMann & Nanni, 1995; Yoshikawa, 1994, 2001).

Whilst this is probably not a false conclusion, the analyses of these social and cultural factors remain, so far, superficial. As it stands in the current form, the use of such terms brings an end to research and practice. Namely, the notions of the social and cultural are often defined as external and unmanageable of individual companies, and therefore the majority literature predicts exceedingly difficult tasks for overseas companies if they try to implement Japanese management accounting (cf. Johns et al., 1998; Nishimura, 1995), which is by no means helpful for researchers and practitioners and is perhaps misleading. What is required however is more detailed analysis of what the social and cultural factors are, and how these factors interact with the western calculative discipline. There is a need for detailed examination that illustrates the process of “naturalisation” in which the western calculative techniques were pragmatically transformed in the context of Japanese history, culture and society (e.g., Hopwood, 1987; Miller & O’Leary, 1987, 1994). Sections 2 and 3 attempt to illuminate the ways in which accounting principles were introduced from the West.

## 2. From Mid-Nineteenth Century to World War II

In this section, we aim to sketch the very early history in which the Japanese came to encounter the modern discipline of bookkeeping and accounting, after a long isolation of the nation called the “*Sakoku* (the

closure of Japan, or National Isolation),” 1639–1853.<sup>5</sup> As explained in the previous section, a history of Japanese management accounting must be examined within the realm of various social and cultural factors as well as corporate strategies, performance measurement, motivation systems and supplier relationships. Unlike the history of financial accounting, where the trend has almost always been towards national and international standardisation by a relatively limited number of actors (e.g., Suzuki, 2005a, 2005b), management accounting practices have been divergent across time and space, which consists of one of the reasons for the lack of comprehensive research both in English and in Japanese.<sup>6</sup>

In order to mitigate this challenge, relevant Japanese-language works are cited below, which will hopefully be utilised as a starting point for more detailed research in collaboration with Japanese researchers. In addition to this fundamental task, our aim in this chapter is to develop our view or a hypothesis, which is to be contested by the others’ views, to understand Japan’s management accounting history from a “collectivist” point of view which emphasises the public interests in the accounting development that was conceived to be beneficial for the Japanese society as a whole under which each company’s growth was anticipated.

### 2.1. Japanese Accounting from the Mid-Nineteenth Century: Introduction by Fukuzawa

Since the publication of *Seiyo Jijo (Conditions in the West)* in 1866/1870, Yukichi Fukuzawa (the Founder of Keio University, of which the Business School is currently considered to be among the top few in Japan) has been one of the leading figures in introducing the modern Western cultures to Japan. His *Gakumon no Susume (An Encouragement of Learning)* in 1872/1876 is still widely read today, and one of the disciplines recommended was modern bookkeeping. Fukuzawa translated *Common School Bookkeeping* (H. B. Bryant & H. D. Stratton, 1871) into Japanese, *Choai-no-Ho*, in 1873 which helped

gradually disseminate modern bookkeeping among the public.

Fukuzawa’s purpose of this translation was not simply to teach bookkeeping from a technical point of view, but also to promote the spirit of modern entrepreneurship as described by Max Weber and Werner Sombart. Being an advocate of an improved mentality of the working class, Fukuzawa insisted that every citizen should gain a minimum level of knowledge and education in order to free themselves from the feudal shackles of the *Edo* period, to ensure freedom and equality for all, and to establish the foundations of a new social and legal order (Kurosawa, 1990, pp.70–78).<sup>7</sup> Establishment of new educational institutions such as *Shoho-koshujo* (a college run by the Tokyo, Kobe and Osaka Metropolis which promoted commercial studies including extensive training in double-entry bookkeeping) was another step towards the institutionalisation of a new order in Japanese business and civilised society. In Fukuzawa’s eyes, double-entry bookkeeping was a “technology for building the modern state,” and this technology started being systematically disseminated through emerging educational institutions and growing enterprises.

Alongside Fukuzawa’s *Choai-no-Ho*, another major accounting development was *A Detailed Treatise on Bank Accounting* by the Scotsman Alexander Allan Shand, which was published in Japanese in 1874 by the Ministry of Finance. His book served as a basis for the guidelines on accounting practice used by numerous national banks, including the Dai-ichi National Bank, which was established in the same year. Bank accounting was, in this way, originally a product of British. However, the spirit of the import was much more national- and public-oriented rather than private- business-administration-oriented. The accounting practices were soon amended to match local needs and norms.<sup>8</sup> Supporting Shand were Akimasa Yoshikawa and Eiichi Shibusawa, who were well-known bankers supporting the growth of the Japanese economy from the bank-based financial

<sup>5</sup>The Japanese government prohibited any exchange of goods except for those with the approved Chinese and Dutch merchants at a small island *Dejima* in Nagasaki.

<sup>6</sup>Another potential reason may be that, at one point, management accounting was seen as a tool of labour exploitation in the framework of Marxist social and political philosophy which dominated Japanese academia from the early twentieth century to the 1960s (Shikita, 1969; Matsuo, 1981). The role of management accounting may have been negatively indoctrinated, and unbiased research seemed to be rarely conducted. However, all of this requires more detailed historical and empirical research.

<sup>7</sup>Kurosawa was the most important figure in Japanese accounting academic after World War II (see Suzuki, 2005a, 2005b).

<sup>8</sup>For instance, declared dividends were originally included in the financial statements before the shareholders’ approval. However, this was amended after three and half years in a way that dividends were declared only after the shareholder’s approval, a fact that is now taken for granted but then a matter of consideration from a business and social ethics point of view.

system, who shared Fukuzawa's socio-philosophical ideas.<sup>9</sup>

Turning to management accounting rather than bookkeeping in general, a very early budget system may be worth briefly noting. By the 1880s, several large private companies, which later came to be known as *Zaibatsu*, originated at least in part due to the large-scale sales of some troubled government enterprises' assets to private sectors (Miyamoto et al., 1995). In this process of privatisation and intensified competition, some development of management accounting was observed. For example, Mitsubishi, undoubtedly one of the largest, oldest and well-known *Zaibatsu* companies, adopted a budget system from 1882. On the emergence of an influential competitor, Nippon Yusen (established in 1885), for instance, Mitsubishi seemed to have learnt to change its budget system radically to make the company more competitive. Nippon Yusen adopted a bottom-up or cumulative budgeting process, and this system seemed advantageous in capturing realistic information in the environment where business lines and organisations were increasingly diversified. Based on the business units such as "branches," "coal pits," "mines" and "shipyards" (in which we may find some categorical mistakes from a viewpoint of contemporary management accounting theory), Mitsubishi came to report its day-to-day results to the head office on a monthly basis (for details, see Tanaka, 1987, 1989; Yamashita, 1995).

## 2.2. Scientific Management and Early Management Accounting

Theoretical studies of scientific management methods in Japan began as early as 1911, when Taylor's *The Principles of Scientific Management* was published in the form of an abridged Japanese translation. Scientific management was introduced widely as the "key to eliminating useless effort," and a number of institutions and associations were established in order to promote its notion, implementation and practice. These included the Kurashiki Institute for Labour Studies (established in 1920), the *Kyochokai*, Industrial Efficiency Institute (established in 1922), the Efficiency Institute of Japan and an influential journal *Noritsu Kenkyu* (*Efficiency Research*) established in 1923. They were followed by the formation of the Japanese chapter of the Taylor Society in 1925 and

the National Efficiency Promotion Institute (National Efficiency Federation) in 1928.

Mitsubishi Electric, Toyobo and Fukusuke are among several well-known companies acclaimed for their early and extensive adoption of the scientific management. The adaptations of the scientific method were, however, made to cater for the local Japanese context. For example, in the case of Mitsubishi Electric, differential piece rate system, which was originally developed at Westinghouse, was adapted to incorporate Japanese-style human resource management in such a form that wages met standardised living costs, considered one of the key characteristics of wage management in Japan. In implementing this system, a special committee was formed to represent various interested parties including general employees (Takahashi, 1994).<sup>10</sup> The fundamental aim of such practice was not just to satisfy the economic requirements of management and labour, but also to make the company into a big "family"—a famous management philosophy known as the *Keiei Kazoku* Principle (Management Familism or the Principle of Company as a Family; for details, see Hazama, 1963).

It is important to note that the introduction of Taylorism in Japan took place at around the same time that Japanese-specific management practices, such as the *Keiei Kazoku* Principle, the lifetime employment, promotion schemes based on the seniority, were being developed. Those elements that characterise Japanese management practices emerged from the economic conditions that prevailed from the end of the *Meiji* period (1868–1912) and through the *Taisho* period (1912–1926), such as deep recession, frequent industrial action and the pursuit of rationalisation at a national level. From the 1920s to the early 1930s, cost accounting in Japan seemed to develop rapidly, or at least utilised, as a means of coping with rising costs and deteriorated capital turnover as a result of the abolition of night-shift work and the enforcement of long working hours (Chokki, 1992).

The development of budgetary control and standard costing has conventionally been examined in direct relation with the import of scientific management (Epstein, 1978; Solomons, 1952).<sup>11</sup> According to

<sup>9</sup>These national banks, as already researched in detail in the field of economics (e.g., Aoki, 1990), later formed the core of the Japanese financial system that contributed rapid growth of the Japanese economy.

<sup>10</sup>This closely resembled the post-WWII quality-control (QC) circles in that it was designed as a mechanism for discussion, deliberation and determination of improvements by the worker participation.

<sup>11</sup>Budget and Standard Costing had already been introduced in Japan, at least in an academic sense from the 1920s through commentaries represented by Hasegawa (1930, 1931), and these came to be gradually operationalised in practice.

Chokki (1976, 1992), the defining characteristic of Taylorism is the attainment of tasks through wage incentives that may well fit the notion and practice in the US individualism. In contrast to American Taylorism, however, Japanese management was based on collectivism. In Japan, management adopted Taylorism as an applied solution for the large-scale economic depression. Its application was marked by a departure from the idea that it was essential to raise individual wages commensurated with improvements in efficiency. Rather than pursuing individual management's and company' benefit, it was a means of rationalising production of Japan as a whole in the face of worsening economic depression that the country was facing at that time (Hazama, 1963).

In this section, we have sketched a few important steps in which the Western principles of accounting were introduced to Japan. Confined to a few short descriptions and analyses, any ambitious summary should be avoided. However, the history of business accounting in this period seems consistent with the commonly understood history that Japan, after the period of *Sakoku* or National Isolation (1633–1853), started importing various Western principles, regardless of the areas of knowledge and technology, and then amend them to fit the Japanese-specific environment that included “collectivism” at the national level. This does not imply that accounting techniques and knowledge were not introduced to improve individual business administration. Our point is to direct more attention to a Japanese specific feature, or at least less-Western feature, that the impacts of new accounting were considered in wider contexts of welfare of employees who were facing severe economic depression, as well as individual businesses' efficient management practice. The growth of individual companies and the use of management accounting were conceived under the wider context of national growth.

### 3. During and After World War II

#### 3.1. The Roles of the Costing Standards under the War Regime

During World War II, the role of accounting came to be highlighted as a means of efficient production under the controlled economy regime (cf. Loft, 1994). Even before the war, the influences of Europe (mainly British, French and German) and America were observed in the *Rules on Cost Accounting for Army Munitions Factories* (1939), *Rules on Cost Accounting for Navy Munitions Factories* (1940) and *Rules on Cost Accounting in Manufacturing Factories* (1942), issued by the Planning Bureau of the Japanese

Government.<sup>12</sup> Gradually the Government's economic control was tightened to an unprecedented extent, and cost accounting was one of the effective tools that made this possible. Numbers of management accounting norms and practices, therefore, came to be developed in collaboration between the military, government ministries and private businesses. For instance, the *Cost Accounting Standards* were enacted under Government directions, and the *Cost Accounting Standards for Army Munitions Supplies* (1937) and the *Cost Accounting Standards for Navy Munitions Supplies* (1940) were promulgated separately. This time, the main objective of the Standards was to set appropriate purchasing prices for munitions supplies to the Army and Navy. Under such regulations, suppliers were, however, more interested in making profit from higher prices, rather than enhancing production and administrative efficiency (Kimura, 1943; Kurosawa, 1990; Tsumagari, 1981). The prices were calculated on the basis of the total production costs plus the “appropriate profit” that was largely open to interpretation. It was pointed out that such a calculation did not follow the logic of economics (see, e.g., Kimura, 1943), but under the controlled war economy regime, such a logical argument did not gain much support (Kurosawa, 1990, p. 424).

In May 1944, as the War intensified, the *Cost Accounting Guidelines for Manufacturing Companies* were revised in accordance with the decision of the Planning Bureau to reform and simplify the cost accounting system. This time, the focus shifted from traditional cost accounting to production control by “*Gentan'i*,” i.e., a standard usage per unit measured by a physical measure as opposed to a production unit measured by a monetary term (Kurosawa, 1943). The utilization of *Gentan'i* stemmed from at least two background conditions. First, there was a sharp and continuous inflation. By the end of 1943, the government abandoned even the prevention strategy, which made monetary data less useful for the purpose of munitions production. The other reason reflected the fact that there were absolute shortages of raw materials, while there was a relatively abundant financial capital from the government. In such conditions, the *Gentan'i* approach satisfied what the Japanese call *Genbutsu-shugi* (i.e., *Reality Focused System* or

<sup>12</sup>The rules regarding the army's budget controls, standard cost accounting, inter-firm comparisons, financial comparisons and internal audits were also issued in 1941 and 1942, which intended to extend accounting frameworks to the other areas of management in order to improve the efficiency (Aoki, 1976).

*Principles of Real-Matter*, trying to emphasise the importance of looking at the point of production rather than counting on accounting information), in order to “ascertain efficiency by weighting the quantities of each factor of production” (Nagao, 2004).

Unlike the US where monetary terms were utilised in order for the State to rationally allocate resources (Suzuki, 2005a), the Japanese seemed to have developed some distrust in the monetary valuations. This originally happened in the condition of the wartime high inflation and scarce material resources; however, this in turn seemed to have developed trust in the “Real-Matter,” even in the peacetime (see details in Sections 4 (*Gentan’i* in Toyota) and 5).

Another evolution to note from this phase of the history is that the wartime management accounting regulations were succeeded and later realised as *Cost Accounting Standards* in 1962 (Yoshikawa, 2001). Under the leadership of Torao Nakanishi,<sup>13</sup> Business Accounting Council of the Ministry of Finance initiated drafting the *Standards* from 1950. After 5 years of interviews with industry representatives and extensive discussions, the Japanese saw the first comprehensive draft in April 1957, and a further 5 years was required to publish the *Cost Accounting Standards* (1962) as part of financial accounting regulations that enabled accurate valuation of inventories for financial accounting purposes.

However, the *Cost Accounting Standards* clearly originated from the idea of improving management rather than financial reporting. The early versions of the draft *Cost Accounting Standards* reveal clear evidence that there was a thought among leading academics to maintain management accounting standards for the sake of management (Kurosawa, 1980; Suzuki, 2005b; Tsuji, 1977). Moroi claims, as an assistant to Nakanishi at that time, that the *Cost Accounting Standards* were originally (and even in the final version) drafted for management accounting purposes and they had only few connections to financial accounting—a view which differs from the one of Kurosawa to some extent (Moroi, 2002, p. 157). Namely, even after the War, management accounting, which is now usually considered as a matter of individual companies’ discretion, was initially considered to be standardised as a matter of

national policy in order to improve the productivity of Japanese economy as a whole.

### 3.2. TQC and Management Accounting during the Allied Occupation

After the end of World War II, Japan was occupied by the Allied Powers (1945–1952), and virtually every single economic policy was adopted under the US supervision. The US considered that companies’ management practices, in particular those of *Zaibatsu* companies, consisted of the force that led Japan to the militaristic movement (Suzuki, 2005a). The entire enterprise system therefore came under the scrutiny of the Occupation Reforms, and many of them faced the pressure of Americanisation (Sakamoto, 1957, p. 18). The fact that in many cases the US forced the Japanese to take the American management practices was not the case. American officials encouraged the Japanese to learn and adopt the American principles, but more importantly, the Japanese were willing to utilise American practices that they found essential to improve Japanese companies’ international competitiveness.

There were a number of examples. Total quality control (TQC), which was systematically formulated by the American quality control scholar A. V. Feigenbaum, came to be introduced in Japan. In the US, TQC was a self-sustaining quality control system using specialist personnel; as its basis it took statistical methods that incorporated W. A. Shewhart’s (a pioneer of quality control in the early twentieth century) ideas about quality management. Initially, in Japan, TQC was considered in the telecommunications industry, but later was promoted in many different industries through *CCS Management Courses* that were organised by the GHQ (Allied Power General Headquarters), Civil Communications Section (Goto, 1999). TQC was eventually developed as the company-wide quality control (CWQC) involving virtually all employees. This was achieved owing mainly to the effort of various practitioners involved in institutions such as the Union of Japanese Scientists and Engineers and the Japanese Standards Association, who were assisted by Japanese academics and American quality control experts such as W. E. Deming and J. M. Juran.

In order to disseminate these newly learnt methods, various groups and organisations came to be established, including the Union of Japanese Scientists and Engineers, the Japanese Standards Association, the Japan Management Association, the Japan Productivity Center (currently the Japan Productivity Center for Socio-Economic Development), the Kansai Productivity Center, the Japan Chamber of

<sup>13</sup>Torao Nakanishi was a key academic who was one of the founders of Japan’s managerial economics (Nakanishi, 1936). He was involved in the development of cost standards at the Army and Planning Bureau before the War, and after the War, he led various institutions both in academic and practical fields (Nakanishi, 1980).

Commerce and Industry, and the Japan Industrial Management and Accounting Institute. In addition, various educational institutes, such as universities and technical colleges, have made significant contributions either directly or indirectly as members of the aforementioned bodies. Sunaga & Nonaka (1995), for instance, explain the details of such “Japanese-style transformation” of quality control.<sup>14</sup>

Among the above various activities towards developing the Japanese control systems, the Japan Productivity Center organised an important study tour to the US, which included observation of the US supermarket system that many delegates admired as a superior method for the future of operations management. It was Taiichi Ono at Toyota, amongst the participants, who extended this method and established the foundation of what we now know as the just-in-time (JIT) system (see Section 4). The basic principle of this system was to make the workers aware of the following, by now, common sense knowledge: “we have to check the present process from the viewpoint of the subsequent process, and at the end of the ultimate process, there are our customers’ needs” (Ohno, 1988). On the face of these letters, this principle may not appear inspiring, but once this is widely shared by employees, both the quality and speed came to be firmly “built in” in the organization as a whole. And this term “built in” is the key term, at least for Toyota, which implies the fact that management tried to implement this principle as a matter of common sense rather than a specialized area of management. The key to success was to make the employees aware of this principle of JIT all the time to an extreme degree.

Extensive learning from the US continued even after the occupation. For example, the Union of Japanese Scientists and Engineers (JUSE) organised a series of lectures in which featured speakers such as W. E. Deming played a significant role in identifying the function of accounting in quality management (Udagawa et al., 1995). Other than these institutionally organised events, individual contributions were also important, as they seemed to have had much more freedom in amending originally American ideas. Within the JUSE, Kaoru Ishikawa of Tokyo University formed a QC research group, and the team aided many leading companies in implementing the QC, for which the famous Deming Award (named after the aforementioned scholar W. E. Deming)

turned out to be a symbol of excellence in quality management.

As briefly mentioned already, one of the important features of the Japanese development is that the QC system is characterised as a daily routine rather than a specialised or professionalised practice (Ishikawa, 1984; Udagawa et al., 1995). Japanese management endeavours to make every single member of a company be aware of important aspects of business such as “costs,” “delivery times” and “reliability” as well as “quality” in a decentralised framework. In such a framework, even “quality cost accounting,” which Anglo-American quality management normally assumes to exist, was not introduced. Similarly, performance evaluation and personnel evaluation were not directly linked to quality management. One of the factors by which quality management was successfully implemented in Japan was the fact that the Japanese deliberately eliminated management accounting. In a condition where workers are aware of their task to improve “costs,” “delivery times” and “reliability” as a matter of their norm and routine, accounting information, which is supposed to visualise the reality for management, seemed to have blinded management from the “Real-Matter.” Instead, accounting could have made some unnecessary noise such as demand for rewards based on performance evaluation (Okano, 1995, pp. 98–104; cf. Miller & O’Leary, 1987, 1994). In other words, in Japan, accounting information was considered to be too slow, and the faster way is to look at the “Real-Matter” at the point of production. In this sense, the relative absence of management accounting, paradoxically, features Japanese management and management accounting practices.

What was it that made necessary and possible for the Japanese to pursue effective collectivist quality control without much management accounting? One of the factors is that Japanese companies had to enter new markets that had already been dominated by Western companies at that time. The pursuit of lower costs and guaranteed quality was therefore an absolute requisite for the survival and growth of Japanese companies and indeed for the nation as a whole. The degree of seriousness and risk consciousness seemed to be of no comparison to those of the western companies. Rather than relying on accounting information, all workers were trained to share the same epistemic consonant and try to improve management practices as a matter of routine towards the shared goals. According to the traditional literature, some concluded that the development of Japanese specific management was largely due to the nation’s social and cultural conditions (see Section 1), but this point

<sup>14</sup>However, see Fujimoto & Tidd (1993) for a careful and helpful warning that the importance of QC circles seems to be often overemphasised.

should also be understood with the fact that the Japanese management endeavoured to develop the so-called “OJT (on the job training),” for example, as a mechanism which enabled continuous improvement in a relative absence of accounting.<sup>15</sup>

There was also a good ground on which such practice could be pursued effectively. As the *Keiretsu* companies evolved from the original *Zaibatsu*, there was an environment among large corporations to share the group quality control philosophy. Among large companies, there has been an increasing trend to extend quality control to upper production processes: i.e., from the ordinary “second-look VE (value engineering)” at the production stage to “first-look VE,” which extends to the design stage, and even “zero-look VE,” which goes all the way back to the product planning stage (Shimizu, 1995). The idea was that both the suppliers and the company should grow together rather than the company growing at the cost of the suppliers. There seemed again to be a “collective” philosophy in this sphere, even if it was not at a national level as observed before and during the War.

At this stage, unlike the previous paragraph that highlighted the relative absence of accounting, the role of management accounting became clearer as a common language between the associated companies developed, which we will examine in detail in Section 4.

Before that, for the sake of comparison with the Anglo-American development, we will examine a few more notions such as controller, budget and standard costing in Japan.

### 3.3. Controller, Budget Systems and Standard Costing at Well-Known Companies

The Controller System was introduced to Japan before World War II, but the momentum of its diffusion came only after the announcement of *On Internal Controls in Companies* by the Industrial Rationalization Council in 1951 (Kato, 1991; Nakanishi, 1955). At NEC, a leading electronics company, which was originally found as an international joint venture with Western Electric, the founding company positioned

the accounting staff as American-style controllers. Similarly, at Matsushita Electric Industrial, which was the first Japanese company to adopt a divisional departmental or organisational system, accounting staff was treated as “staff in charge of management administration, accountable to the company president and head office,” working separately from the departmental director and management system (Sakurai, 1997).

However, it should be noted that the function of controllers in Japanese companies remained mainly for regulated financial accounting issues in general, and the substantive planning and control functions were delegated to business divisions, factories and manufacturing subsidiaries that were relatively autonomous. As well as hiving off the manufacture of its mass-produced goods to subsidiary production companies in each region in the mid-1960s, NEC gradually separated its cost control activities from the core of the accounting division, and entrusted them as “autonomous activities” of each business division. Koike, who worked for NEC as a senior auditor, describes the process of the “autonomous activity” formation as follows: “QC activities,” “ZD activities,” “VE activities,” “productivity improvement activities” and “cost reduction activities” were integrated as activities originally within a department, and they gradually came to shape small group activities on the part of employees themselves (Koike, 1993, p. 162). “The reality was that these departments (and controllers) did not have the strong powers that American companies had, nor did they themselves formulate the targets for profit planning and cost control that form the premise or guidelines for drafting budgets; they were run in the form of a Japanese-style modification body, deciding budgets based on drafts submitted by departments further down the hierarchy, under the system of requesting managerial decisions.” (Sunaga & Nonaka, 1995, p. 164; see also Miyajima, 1996).

Based on 25 case studies of major companies such as Mitsubishi Electric and Tokyo Keiki, Nakanishi (1955) also supports the claim that the Controller System did not work well in the Japanese environment. In many cases, the accounting division or department was too busy for financial accounting issues to play a role in substantial budgeting functions. Nakanishi concluded that one of the necessary conditions for the successful (and minimal) Controller System in Japan would be the environment where the notion of budget and budget control are shared by many divisional managers and workers (p. 5). Such a decentralised management system seems to constitute a Japanese feature that can be contrasted with the

<sup>15</sup>In the broadest sense of the word, the OJT may include the famous “morning exercise” (which was regarded in the 1980s as a symbol of Japanese labours’ royalty to the company) and after-five drinking in which informal but often important information is frankly exchanged and the sense of “family” and “corporative” is enhanced. Although these stereo-typical features of Japanese management and business customs started diminishing by now, the level of collectiveness seems to be still no comparison to that of the western companies.



American system in which management activities revolve around the central controller (Okano, 2003, p. 7).

A similar point can be made on the development (or under-development) of standard costing. At Mitsubishi Electric, for example, standard costing was introduced before World War II when the National Electrical Manufacturers Association (NEMA) published the *Unified Cost Accounting* in the 1930s. Even when reasonable standard costs were set at some point, it often proved difficult to maintain such standards due to the volatile fluctuations in prices at that time, forcing the use of the most recent figures as quasi-standards. In addition to this, Tax Law did not accept standard costing as the valuation method of inventories, and actual cost calculation remained the mandatory practice (Nakanishi, 1955, pp. 154–155).

At NEC, further serious attempts were made to utilise standard costing. In 1953, the company developed the “Dual Standard Costing System” which split the purpose of standard costing into two: one for the inventory evaluation (financial accounting) and the other for cost management (management accounting). For the latter, NEC placed an emphasis on responsibility accounting, management by exception and *Koto-mae* (i.e., before-things-happen or causal) management. Firstly, responsibility accounting sought answers to questions of who is responsible for which cost and variance. The second concept, “management by exception” was, as commonly understood, the key concept of scientific management based on standard costing, and it involved identifying the causes that deviated from the standard. Thirdly, the emphasis on *Koto-mae* management was concerned with analysing causal relationships, which was considered to be essential to design a more efficient and reliable production system in the next round. Concerned with the fact that once costs occur they are irrecoverable, *Koto-mae* management turned out to be a more important notion than just mere standards, which will further be developed as a notion of *Kaizen* (constant improvement) costing.<sup>16</sup>

In this Standard Costing System, the lack of an incentive mechanism for individual management may be regarded as Japanese. Nakayama considered that: “In my opinion, I do not believe that there is any need to introduce an incentive scheme regarding

standard cost variance. At NEC, where I introduced standard costing, the accuracy of standards was not good enough to allow the performance of supervisors to be evaluated based on the cost variance rate. With some standards being stricter than others, there was unfairness. It was therefore considered inappropriate to evaluate supervisors based on such a benchmark; and of course the same was true for the ordinary employees” (Nakayama, 1970). Yet, the degree of tightness and difficulty of standards alone does not fully explain the reason for the absence of the incentive scheme (Tsuji, 1977). Given the traditional seniority and lifetime employment systems of Japanese companies, the incentive scheme did not make much sense. Moreover, such an introduction of an individually based incentive scheme went against the effort of making the sense of collective responsibility to improve production process in a company or a group as a whole.

Seen in this way, the controller system and standard costing were not developed in Japan in the same way as in the Anglo-American companies, where extensive critique against standard costing took place only after the 1980s. In Japan, accounting was often seen as a potential cause that could blind management from the point of production. The personnel-based control, as opposed to the product-based control, was also often understood as countereffective to the promotion of collective responsibility for efficiency improvement. These seem to have formed the foundation of Japanese specific management accounting (Okano, 1995, 2003).<sup>17</sup>

#### 4. Modern Japanese Management Accounting: Toyota’s Case

One of the leading Japanese companies which grew rapidly after World War II is Toyota. In this section, we will look at a history of Toyota’s management accounting, which is useful in at least following two senses. Firstly, management accounting research usually requires detailed description of conditions in which management accounting was developed and operated, which has not been done in the above sections. If we were to choose one company for a case description, Toyota would be a good option, as many overseas practitioners and researchers have seen it as almost a representative company of Japan. Such a

<sup>16</sup>Dual standard costing at NEC was significantly influential in both academic communities and practitioners at the time. Ryusuke Nakayama, who developed the dual standard costing as a head of accounting at NEC, later became a professor at Nihon University where he played a leading role in the various subsequent debates on the subject.

<sup>17</sup>Okano (2003) proposed to consider the following four as the key factors that characterise Japanese management accounting: (1) Cross-functional management and policy management, (2) *Genba* and *Genbutsu* principles, (3) Emphasis on voluntarism, (4) Built-in quality and costs, and causal management.

view, i.e., Toyota as a “representative” Japanese company, is not an undisputed one, but Toyota is certainly “famous” for its technical and financial high performance in recent years. The company is also often seen as a pioneer of what we usually refer to as Target Costing which again is generally recognised as an example of the typical Japanese management accounting.<sup>18</sup> Secondly, as we will see below, Toyota’s history reveals a few important similarities with what we have already examined in the history of Japanese management accounting; namely, for instance, the important roles of the *Gentan’i* and collectivism.

In 1950, along with other companies which started implementing management accounting practices, Toyota established the concept of “cost maintenance” to hold down the vehicle costs within the scope of periodical financial accounting. Implementation of the cost maintenance concept required identification and the setting of various standards, especially the standard cost figures which, in Toyota’s terms, were (and still are) represented as the “benchmark cost.” In the early 1960s, Toyota’s management divided the cost management process into three phases: *Target Costing*, *cost maintenance*, and *Kaizen costing*; and took a different approach in each of these three phases (Toyota Motor Corporation, 1987, p. 371). In 1961, the automaker began developing the *Kaizen costing* process by developing programmes to substantially reduce the defect costs such as spoilage cost, reworking cost and claim cost, and by adopting the Value Engineering and Value Analysis (hereafter VE/VA)<sup>19</sup> which brought suppliers into the collaborative manufacturing process. At almost the same time, suggestion schemes, developed at companies such as NCR and Ford,<sup>20</sup> were utilized to develop the TQC concept, and Toyota began a campaign to win the Deming Award which further accelerated the cost management development. Originally the VE activities were performed only by the engineers assigned to the design, purchasing, accounting and finance, and production engineering divisions, but they gradually

came to involve engineers and technicians working at plants and also those in the engineering division’s experimental departments and materials departments. This widening participation contributed to build up a relationship between *Kaizen* costing and Target Costing. In this way, previously three-way-divided cost management practice gradually came to be integrated into an overall quality control practice.

Focusing on the adoption of the VA/VE scheme as an important step for Target Costing, Tanaka (1994) defines the development of the original “Corolla” as the origin of Target Costing at Toyota. On the other hand, if the basic framework for Target Costing, i.e., the calculative flow of (a) setting target selling prices, (b) setting target costs and (c) assignment of cost reduction targets, is taken as a key, Toyota was already using the Target Costing process in the development of the “Pubrica” which the company developed under the “public car” concept promoted by the Ministry of International Trade and Industry (Toyota Motor Corporation, 1977, p. 349), in a similar way to Hitler’s producing the “Beetle” in Germany. Toyota set \$1,000 (then, ¥360,000) as the target sales price for this vehicle from the planning stage (Pubrica was advertised as the “\$1,000 car.”), and applied cost analysis procedures from the prototype development stage. Furthermore, in development of this vehicle, the purchasing division requested suppliers to achieve “30% cost reduction in three years,” creating the prototype of Target Costing that incorporates VA/VE techniques.

Toyota uses a system of assigning a Chief Engineer for each vehicle model, and this is decisively an important feature of Toyota’s product development work. Based on the Corolla model, which was introduced in 1966, target costing was first incorporated into the development schedule under the Chief Engineer who came to be supported by a cost team that provided necessary cost data to the Chief Engineer.

Toyota continued to comprehensively review the cost management procedure for each operational step from product planning to sales. This effort led to a significant shift in the management’s belief from “Quality can be improved by more serious inspection procedures,” to “In-advance planning of the manufacturing process determines quality,” prompting the management to further develop a “cross-functionally” arranged cost management and quality assurance system (Toyota Motor Corporation, 1987, p. 382). One of the key concepts in this process was “cross-functional management.” Cross-functional management contrasts with functional management in the Anglo-American companies where each function is managed independently with separate

<sup>18</sup>Toyota’s target costing development process was examined in detail in Monden (1993), which is based on the company history publications.

<sup>19</sup>Value analysis (VA) and value engineering (VE) are generally treated as synonyms, but Toyota differentiates the two terms by calling the comparative analysis of functions and values prior to start up of production as VE and the same after the start up of production as VA.

<sup>20</sup>According to Robinson & Stern (1997), the oldest “suggestion scheme” recorded can be found in Scotland in 1880, at the shipbuilding firm William Denny and Brothers.

authority, responsibility and reward. Rather than developing such formal structure, at Toyota, cross-functional coordination and informal groups came to be developed, aiming at improving critical factors in management such as “quality,” “cost,” “reliability,” “delivery dates” and “overseas” which are considered to be better or only managed by cross-functional collaboration (Ishikawa, 1984; TQM Committee 1998; Udagawa et al., 1995).<sup>21</sup> Cross-functional management enabled Toyota to overcome sectionalism between departments, and made all employees to take responsibility for “quality,” “cost,” “reliability” and “delivery dates.”

These actions were transcribed into the company’s official document, *Cost Management Rules* (1961), that covered every step from product planning through to sales as a Target Costing programme. However, these rules were not codified in order to officially authorise numbers as a basis of performance evaluation and reward system. Target Costing is not, or at least its emphasis is not on, a representational calculation that informs controllers of the conditions at the points of production, thereby enabling management to centrally control factories at a distance. Rather, it is to a large extent a centrally designed linguistic device that is shared by all the employees in different sections of local sites, so that cross-functional communications, decisions and collaborations are autonomously made for the sake of company-wide goals of “quality,” “reliability,” “delivery dates,” etc. bearing in mind cost constraints.

If the determining characteristic of Target Costing is attributed to narrowly defined VA/VE activities, we may find the origin of Target Costing in the US (Tanaka, 1994), or perhaps in many companies across the world. However, the main characteristics of Toyota’s and many Japanese companies’ Target Costing should be sought in the higher degree of vertical and cross-functional management, which has become possible owing to Target Costing as a common language between wider participants. Indeed, the English translation “Target Costing” from the original Japanese “*Genka-Kikaku*” may be misleading. It literally means “Cost-Planning” and that is how Target Costing is regarded in Japan, rather than a costing method. *Genka-Kikaku* has much to do with planning, coordination and improving in advance to actual production and its calculation (Kato, 1993b). Rather than focusing upon Target Costing’s

definitional equations and finalised calculations on paper, the analysis of its psychological and behavioural impacts on employees seems to provide more opportunities to examine Target Costing as a mechanism which has been highly successful at Toyota and it is possibly applicable overseas (Okano, 1993, 1995).

Reflecting such a role of Target Costing at Toyota, the overall responsibility of Target Costing does not belong to a controller but to a Chief Engineer for each vehicle model. Under normal circumstances, engineers’ professional satisfaction comes from achieving high quality and reliable automobiles from an engineering point of view. However, at Toyota, as Chief Engineers speak accounting language, they pursue their desires within the allowable costs. Within this constraint, if they further pursue high quality and reliability, they have to develop horizontal collaborations and gradually a vertical network of *Keiretsu* groups of suppliers (i.e., *Kyoho-kai*, *Seiho-kai* and *Eiho-kai*; established in 1963). It was necessary for Chief Engineers to collaborate with, rather than unilaterally push, *Keiretsu* suppliers to reduce the costs and at the same time improve the quality and reliability.<sup>22</sup>

Such collaborative relationships with *Keiretsu* companies can be symbolically represented in the form of the contracts between Toyota and its suppliers. Unlike that of western companies, Toyota and its suppliers exchange what they call the *Kihon-Keiyaku*, i.e., the basic contract, a relatively small number of sheets of paper in which only fundamental agreement of parts-delivery and a longer-term technical collaboration are agreed upon only in general terms. In the basic contract, the prices and quantities of the supply parts are not specified. Instead, while day-to-day supply parts are ordered based on the famous *Kanban* system (*Kanban* means “signs” representing a timely order-slip method; see Ohno, 1988), Target Cost information is shared as a common language between the two parties in order to constantly reduce the costs and improve the quality.

Another example is a “guest engineer system,” which commonly takes place as part of the product design process. This scheme does not aim at reducing the design costs through negotiating prices. Instead it aims at increasing the effectiveness of VA/VE, achieving cost improvements, building a long-term “trust,” and establishing win-win relationship between the manufacturer and the suppliers by employing the engineers who share the same information (Sako, 1992). The point is to share a common “awareness” of the

<sup>21</sup>The classification of the critical factors has some categorical mistakes but we followed the actual example from Toyota.

<sup>22</sup>The close collaboration between *Keiretsu* companies, based on the extended VA/VE scheme, played an important role in the 1969 model change of the Corolla.

link between costs and specific individual improvement activities.

Furthermore, what lies behind such Target Costing is the *3-Gen* principles: *Genba* (or *Genchi*, meaning actual site or point of production), *Genbutsu* (actual tangible items or things) and *Genjitsu* (actual reality). These terms reflect a craftsman's spirit and rhetoric, rather than intellectually or academically classified referents, and therefore there may be little point in pursuing what exactly *Genjitsu* means for instance. These languages are used to warn management of a risk of being isolated from the actual conditions of suppliers, plants and sales fields. In addition to Toyota, in many other Japanese companies, these languages can frequently be observed on factory floors, in company slogans, business magazines and financial papers. Particularly in production industries, it is considered as an important virtue for the top management to walk through factories and plants as frequently as possible. Hioki (1998) states that Japanese plants were the first to take the view that on-the-ground intelligence is superior to that of technicians or central management. While English-language literature tends to emphasise accounting as visualising device for management, in Japan the existence of accounting is often considered to be the cause of blinding management from the *3-Gens*.<sup>23</sup> As such, in Japan, there seems to be relatively high resistance to accounting being implemented as a tool of representation and performance evaluation. In this sense, paradoxically, the removal of management accounting seems to characterise management and management accounting in Japan.<sup>24</sup>

<sup>23</sup>Similarly, the other Japanese management practices such as in-house training programs, for example, OJT (on-the-job training), CWQC (company wide quality control) without quality management accounting and JIT are also closely related to the *3-Gen* principles (Odaka, 1993; Hisamoto, 1998). Okano (1995) attempted to clarify the characteristics of "Japanese-style management accounting," target costing and JIT at Toyota through the correlation between financial and non-financial (physical) measures, using the concept of "invisibility of accounting." See also (Ohno, 1988; Okano, 1996, 2003).

<sup>24</sup>The authors believe from their field research experience both in Japan and abroad, the relative absence of management accounting characterises Japanese-specific features. This is a point that requires further empirical research. While it is relatively easy to show falsifying counter examples, the authors considered that it is important to present our understanding, at least as a hypothesis, as the popular use of the term "Japanese management accounting" may have caused a potentially false image that Japanese companies were successful due to extensive uses of management accounting techniques.

Once Target Costing started revealing positive results based on the *3-Gen* principles, the company tried to extend this scheme to all possible opportunities, which is embodied by another craftsman's language, "*Tsukuri-komi*," i.e., the "spiritual and actual devotion in the art of production," by which the duty, willingness and pride of skilled labour are symbolically represented. The following is a brief description of how quickly and widely Target Costing became disseminated in many spheres of Toyota's business administration, representing the *Tsukuri-komi* devotion that is considered to be central to the company's strengths.

The first model to which Toyota's Target Costing was applied in vehicle design stage was the Corona 1500DX (RT40), launched in 1964, but the scope of this application was still narrow—the cost and other related activities were only studied on this model (Toyota Motor Corporation, 1977, p. 349). In order to implement Target Costing at an early stage, to be applicable to other models, Toyota formed the Cost Planning Section (i.e., Target Costing Section) within the Technology Management Division in 1975, and upgraded the organisational status for Target Costing in each department of the Office for Production Engineering Planning, the Accounting and Finance Division, and the Purchasing Management Division (Toyota Motor Corporation, 1987, p. 576).<sup>25</sup>

In August 1979, Toyota started a special project to implement Target Costing on the parts for the front engine front drive (FF) vehicles. This was the first attempt by Toyota to conduct Target Costing as a "special project," in addition to the Target Costing activities as part of a routine operation. Similarly, from the beginning of the 1980s, Toyota began applying Target Costing scheme to the Production Engineering Division to prevent unnecessary investments in new equipment and to eliminate excess equipment. It was a significant step from the routine "Target Costing," which was primarily an activity of the design division, to "capital investment planning," which is a production engineering division's activity

<sup>25</sup>In comparison to Toyota, Daihatsu's case may appear more "Japanese." Daihatsu formed a cost management department outside the accounting department in early stage to promote development of target costing. Although each Chief Engineer has substantial target costing responsibility, Toyota still retains the cost planning office within its accounting division (Kato, 1993a; Monden & Hamada, 1991). Also, Nissan refers to an equivalent process as new vehicle development cost management, and the company is reported to have applied this process from the developmental design stage for the "Sunny" in 1966 (Kimura, 1992).

that determines long-term rates of production parts (as opposed to *Gentan'i*, standard usages per unit by physical measures).<sup>26</sup>

By 1981, reflecting all the improved Target Costing management, Toyota set the cost targets for all individual parts and design engineers of all the key models such as the Starlet. In 1982, following the Committee for Target Costing on the Starlet, Toyota implemented detailed Target Costing and parts review meetings involving body makers and suppliers from the earliest development stage (Toyota Motor Corporation, 1987, pp. 651–652). The application and expansion of Target Costing management is also seen in research and development. In 1992, Toyota established the new Technical Center organisation, which was the first comprehensive reorganisation of the research and development organisation, in which the notion of Target Costing was again an important factor to determine the new organisational and management structure.

The impact of such extreme pursuit of Target Costing on overall cost savings and profit management has certainly been one of the key features of Toyota's international competitiveness. For instance, in 2000, Toyota launched a cost-reduction initiative called CCC21 (Construction of Cost Competitiveness for the 21st Century). Its goal was to carry out a radical review of the Target Costing and to reduce costs by 30%. By abandoning all current assumptions, which hitherto revolved around VA/VE, it intended to "strip costs completely naked." Previously divided purchasing divisions (i.e., the Procurement Division, Parts Procurement Division and Materials and Equipment Procurement Division) were reorganised into a single division in order to make more efficient procurements of 173 individual parts that constituted 90% of the total purchasing costs. Together with all the other Target Costing efforts, this initiative attained an average cost reduction of 30% (50% in the case of some parts) over a 3-year period. The total savings were estimated at ¥1.34 trillion (approximately \$1 = ¥110), against the procurement cost for the accounting year to March 2000, ¥4.75 trillion.

## 5. Concluding Remarks: Past, Present and towards Future Research

Japan's development of management accounting since the *Meiji* Restoration in the middle of

nineteenth century has been outlined. The country was significantly influenced by the western accounting methods on two major occasions: the first wave from Europe before World War II, and the second from the US during its occupation after the War. The "influence" here does not mean the unilateral "introduction" or "translation" of ideas and techniques. What made this history interesting is the process of "naturalisation" in which the Japanese local conditions and the new knowledge combine to create a new form of management that is now known as Japanese management accounting. We have tried to illuminate the common underlying thoughts and attitudes in the Japanese local conditions.

Summarising the forgoing review of the history, one of less-controversial features of Japanese management accounting would be the concern for the wider members of organisations. The development of accounting was pursued not for the sake of individual managements or companies, but for wider groups of companies, industries and even Japanese society as a whole. For this end, we observed a number of collective and public learning with active contribution from academics, industrial associations and the government. Such a feature has been often mystified in English-language literature as if the collective action has been a result of the intrinsic Japanese culture. Instead, we attempted to clarify more specific historical conditions in which such collective actions were necessitated and made possible; for example, the re-opening of the nation after *Sakoku* over 200 years, the controlled war economy, the severe recession and familism, and the second wave entry to the international market after the War. It was not the case that the Japanese did not pursue individual benefits; however, the emphasis was on collective actions which were the necessary condition for the individual success. Through such history, one possible view is that the contemporary Japanese managements adhered fundamentally the idea of collectivism which is still observable in many companies today, although this may be rapidly changing under the process and pressure of globalisation, which is left for the future research.

Another important feature of Japanese management accounting is a reflection of *3-Gen* principles which often try to minimise the use of accounting in the way that accounting's representational capacity and the connection with an incentive system are assumed. There seems to be relatively consistent scepticism about accounting's monetary valuation and the role of controllers. Instead, as we have seen in an early example in the Wartime regulation and Toyota, the notion of *Gentan'i* has been utilised on many

<sup>26</sup>At this point, Toyota re-conceptualised the cost management grouping from the "Target Costing," "*kaizen* costing" and "cost maintenance" to "Target Costing," "cost maintenance and *kaizen* costing" and "capital investment planning" (Toyota Motor Corporation, 1987, p. 651).

occasions. Even in peacetimes, for example at NEC and Matsushita, management found that even if they use budget control the incentive system was seen unnecessary or even as an obstacle, and if we follow management by exception, actions tended to be too late.<sup>27</sup> Rather than trusting in accounting's visualising effects which may enable central control at a distance, they believe in experiencing *3-Gens* and communication with employees on actual sites of planning, designing and production.

This, together with the collectivist management philosophy, seems to encourage employees' wider participation in the continuous improvement process such as *Kaizen* costing. The employees' voluntarism is often pointed out as a key for such continuous improvement process; however, this voluntarism again should not be beautified as if it is the original good nature of Japanese labour.<sup>28</sup> In our view, Japanese management makes considerable efforts to involve all the employees in many spheres of business based on in-house trainings often called the "OJT" (On-the-Job-Training). While the main aim in American companies was to elicit ideas from employees that would lead to instant cost reductions, with evaluations of those responsible for the implementation of the system being made according to accounting figures in the books, Japanese companies principally try to gain wider participation of employees itself, with evaluations of those in charge of the scheme being based on the degree of their participation (Robinson & Stern, 1997). The Japanese voluntarism here, at least until the early 1990s, seems to be closely connected to the effort of creating a destiny-sharing "cooperative" and softly enforcing the collective responsibility within it, which enables the company's success, on the basis of which individual employees' benefits are promised.<sup>29</sup>

<sup>27</sup>Of course, many companies still use budget control and standard costing, but in the authors' view, these do not consist of defining characteristic of Japanese management accounting.

<sup>28</sup>It is often pointed out that the workers' voluntarism plays an important role in Japan; however, questions remain as to "to what extent" and "in what way" workers organized themselves "voluntarily." International comparison of the degree of employee voluntarism is a challenging task; however, there seems to be a general consensus view that the degree of employee voluntarism is stronger in Japan (e.g., Hyodo, 1997). The fact that most QC circle activities initially took place outside working hours also support this understanding.

<sup>29</sup>Toyota's "Jishuken (voluntary study group)" and "Supplier Support Center" are good examples. At the Supplier Support Center in Kentucky (USA), care is taken to ensure that there is no formal report system that informs Toyota

Finally, the accumulation of such efforts and the minimum use of accounting results in what the Japanese call the "*Koto-mae* (before-things-happen or causal) management" or the "built in quality and reliability" within allowable costs. The Japanese developed a strong awareness that "quality and costs are almost determined prior to the design stage." There is relatively little point, in a highly competitive and short-life-cycled production environment, to pursue management by exception based on standard costing, as wasted costs are no longer recoverable. Rather than comparing standards and actual results based on accounting information (and refining the standards and seeing the actual results again), the Japanese constantly try to improve causal relationships that determine the quality and costs. This causal management does not confine itself to the point of production with a company, but it extends back to such processes as design and product development even beyond the boundary of the individual company. At this stage, the active role of accounting becomes clearer as a shared target and language among wider participants.

Seen in this way, a characteristic of Japanese management accounting is to use accounting as an epistemic device, which strategically and rhetorically binds wider participants together in the way that they work towards the group company's goal. It is a tool of communication and changing the employees' and even suppliers' behaviour as their own choice (Hiromoto, 1988). No doubt, the Japanese companies encountered various management accounting techniques from the West, however, they did not merely copy their uses. Rather, they extracted only useful principles, modified the details and uses of them in rather rhetorical ways. Accounting came to be used in advance of actual production as a target and this enhanced the communication between wider participants.

The aim of this chapter was to outline a history of Japanese management accounting. Covering over 150 years, our history had to be rather simplified on the basis of a small number of management accounting techniques of leading companies. The choice of a few sample companies was one of the most problematic tasks for the authors. Even analyses of practices of 10 companies was improbable, as explanations of

with the report of, for instance, which suppliers are conducting what sort of activities. It is considered most important to maintain the system as voluntary; however, the principal aim is to sustain the group royal and communicative under a usually generous but ultimately forcible parent company, Toyota.

management accounting practices require detailed illustrations of company strategies, industrial types, sizes, etc., as well as macroeconomic, cultural and social conditions. We have therefore chosen a few internationally famous companies. This has caused a biased view of Japanese management accounting which is certainly English-language oriented. In this sense, the above history is not “the” history of Japanese management accounting but “a” history which is to be continuously refined by the future research.

Not only for the researchers, but also for practitioners, we hope that this history is helpful. The chosen companies are undoubtedly leading Japanese companies in which western companies and researchers have already been interested due to their business growth and success. As western researchers traditionally hoped, we also believe that there are a few lessons to be learnt. In the past, when it came to the implementation process, Japanese management accounting was usually regarded as difficult and even impossible due to the close association with the cultural and social features. Against such a background, we attempted to explain, based on a historical review, some more details of what has been oversimplified as the cultural and the social, so that the difficulties of Japanese management accounting implementation can be mitigated. Having located these companies' positions in wider historical, cultural and social contexts, we hope further detailed research will be conducted. Indeed, the authors observe and read in various Japanese literature every day, a number of cases in recent years that overseas companies successfully adopted JIT or Target Costing based on more advanced studies that clarify the detailed conditions of the adoption, many of which consist of the efforts of making the sense of collective responsibility and collective rewards, all of which are so far left un-researched in English-language literature.

The appreciation of Japanese management accounting does not come without reservation. From the 1990s, a trend has been accelerated to diversify the sources of supplies and customers at a global level that may have made the traditional Target Costing method difficult. If Japanese companies try to apply what they have developed in Japan at a global level, they may experience adverse effects from applying such management and accounting. Simply, there is only little evidence, research or even actual experience that is substantial enough to suggest Japanese management accounting works well in the global environment. As far as leading Japanese companies are concerned, their management accounting seems to have entered in a new phase from the 1990s.

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