



# ADVANCES IN MANAGEMENT ACCOUNTING

Volume 9

Marc J. Epstein &  
John Y. Lee

ADVANCES IN MANAGEMENT  
ACCOUNTING

# ADVANCES IN MANAGEMENT ACCOUNTING

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ADVANCES IN MANAGEMENT ACCOUNTING VOLUME 9

# ADVANCES IN MANAGEMENT ACCOUNTING

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## STATEMENT OF PURPOSE AND REVIEW PROCEDURES

*Advances in Management Accounting (AIMA)* is a professional journal whose purpose is to meet the information needs of both practitioners and academicians. We plan to publish thoughtful, well-developed articles on a variety of current topics in management accounting, broadly defined.

*Advances in Management Accounting* is to be an annual publication of quality applied research in management accounting. The series will examine areas of management accounting, including performance evaluation systems, accounting for product costs, behavioral impacts on management accounting, and innovations in management accounting. Management accounting includes all systems designed to provide information for management decision making. Research methods will include survey research, field tests, corporate case studies, and modeling. Some speculative articles and survey pieces will be included where appropriate.

*AIMA* welcomes all comments and encourages articles from both practitioners and academicians.

### *Review Procedures*

*AIMA* intends to provide authors with timely reviews clearly indicating the acceptance status of their manuscripts. The results of initial reviews normally will be reported to authors within eight weeks from the date the manuscript is received. Once a manuscript is tentatively accepted, the prospects for publication are excellent. The author(s) will be accepted to work with the corresponding Editor, who will act as a liaison between the author(s) and the reviewers to resolve areas of concern. To ensure publication, it is the author's responsibility to make necessary revisions in a timely and satisfactory manner.

### *Editorial Policy and Manuscript Form Guidelines*

1. Manuscripts should be type written and double-spaced on 8 1/2" by 11" white paper. Only one side of the paper should be used. Margins should be set to facilitate editing and duplication except as noted:
  - a. Tables, figures, and exhibits should appear on a separate page. Each should be numbered and have a title.

- b. Footnote should be presented by citing the author's name and the year of publication in the body of the text; for example, Ferreira (1998); Cooper and Kaplan (1998).
2. Manuscripts should include a cover page that indicates the author's name and affiliation.
3. Manuscripts should include on a separate lead page an abstract not exceeding 200 words. The author's name and affiliation should not appear on the abstract.
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6. In order to be assured of anonymous review, authors should not identify themselves directly or indirectly. Reference to unpublished working papers and dissertations should be avoided. If necessary, authors may indicate that the reference is being withheld for the reason cited above.
7. The author will be provided one complete volume of AIMA issue in which his or her manuscript appears and the senior author will receive 25 offprints of the article.
8. Manuscripts currently under review by other publications should not be submitted. Complete reports of research presented at a national or regional conference of a professional association and 'State of the Art' papers are acceptable.
9. Four copies of each manuscript should be submitted to John Y. Lee at the address below under Guidleline 13.
10. A submission fee of \$25.00, made payable to Advances in Management Accounting, should be included with all submissions.

11. For additional information regarding the type of manuscripts that are desired, see 'AIMA Statement of Purpose'.
12. Final acceptance of all manuscripts requires typed and computer disk copies in the publisher's manuscript format.
13. Inquires concerning *Advances in Management Accounting* may be directed to either one of the two editors:

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# INTRODUCTION

Marc J. Epstein and John Y. Lee

This volume of *Advances in Management Accounting* begins with an article by C. J. McNair, Lidija Polutnik and Riccardo Silvi that, according to one reviewer, represents ‘ground breaking’ work which extends strategic cost management directly into the end-customer interface. This article extends the understanding of the value creation model (VCM) and its viability as a metric for evaluating the effectiveness of a firm’s strategy and execution of that strategy.

This volume continues with an article by Marc Epstein, Piyush Kumar, and Robert Westbrook. This article addresses the fact that neither academics nor managers have yet delineated the leading and lagging indicators of business performance, their interrelationships, and how they should be measured although activity based costing and the balanced scorecard have recently focused greater attention on the drivers of costs, success, and profits. To address this need, they propose a model of the causal relationships between the variables describing business performance, along with suitable metrics for operationalizing the model.

The article by Mohamed Bayou and Alan Reinstein involves a look at sharp differences between Eastern and Western philosophies that have affected management accounting thought and practice. Japan, for example, a process-oriented society, uses techniques such as target costing and Kaizen costing that require process-oriented thinking focusing on continuous improvement. The West, in general a result-oriented society, uses result indices as prime factors for performance evaluation. To test the claim on the difference between the West’s and East’s modes of thinking and the related costing structures, they investigate the differences in the automobile industry’s practices, namely the emphases on results and cost associability at General Motors, Ford Motor Company and Honda Motor Company.

The article by Thomas Madison and Donald Clancy examines the association between downsizing and performance when consideration is given to competition and equity market pressure. Zahirul Hoque reports on the results of an empirical assessment of the importance of matching productivity measures with



business mission and perceived environmental uncertainty. The results support earlier findings linking contextual factors to performance evaluation systems.

This volume continues with an article by Jeffrey Quirin, David Donnelly, and David O'Bryan. It investigates the relationship between two organizational constructs, budgetary participation and budget-based compensation, and two individual characteristics, organizational commitment and performance. The relationship between performance measurement and the use of balanced scorecard in the healthcare sector is discussed in the article by Lilian Chan and Kathy Ho. This paper uses a survey data involving hospitals.

The next two articles deal with activity cost variance analysis and efficient CEO compensation. The article by Charles Tang and Harry Davis develops an integrative approach to analyze variances in activity costing. It offers a direct and intuitive analysis. The article by Elizabeth Cole and Joanne Healy uses a data envelopment analysis approach in the study of efficient CEO compensation.

We believe the nine articles represent relevant, theoretically sound, and practical studies the discipline can greatly benefit from. These manifest our commitment to providing a high level of contributions to management accounting research and practice.

Marc J. Epstein  
John Y. Lee  
Editors

# *OUTSIDE-IN* COST AND THE CREATION OF CUSTOMER VALUE

C.J. McNair, Lidija Polutnik and Riccardo Silvi

## ABSTRACT

The challenge is for cost management professionals to devote sufficient resources to this area to turn the potential benefits into realities and for general managers to push cost analysts to understand and explain cost position in strategic terms.

Shank and Govindarajan, 1993: 44

*Advances in the literature on strategic cost management and related management practices point to the importance of having a thorough understanding of the relationship between a customer's willingness to pay for a bundle of attributes and the cost incurred to meet these requirements. In response to these trends, McNair, Polutnik and Silvi (1999) introduced the value creation model (VCM). VCM defines a firm's cost structure in terms of value-added, business value-added and non-value-added activities, as well as various forms of waste. The resulting cost structure is then compared to the product's customer-defined value attributes. The degree of alignment between cost and value is measured within VCM via a metric, or value multiplier, that compares incurred costs against a revenue proxy*

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*for each value attribute. The improved alignment of activities, costs and value attributes is posited to provide a firm with the basis for improving its competitive position.*

*This paper extends the understanding of the VCM approach and its viability as a metric for evaluating the effectiveness of a firm's strategy and execution of that strategy. Specifically, this paper uses findings from eight field sites in eight unique industries to explore the validity of the assumptions, methods, and metrics that comprise VCM. Analysis of the data suggests that value-driven cost control provides a potential for improved profitability. The improvement can be achieved through improved process alignment or reconfiguration or through more effective cost management in the early stage of product life cycle. The value multipliers derived from the field data are posited to serve as a focusing device, one that helps a company improve its financial performance and overall responsiveness to the market. The resulting metric appears to provide a powerful tool for assessing both management's and the firm's effectiveness in the market, as well as isolating areas of significant strategic risk or opportunity.*

## INTRODUCTION

The marriage of cost and strategic analysis is in its infancy. Since the early work of Shank and Govindarajan (1993a, b) in Strategic Cost Management and the related efforts taking place under the Target Cost Umbrella (Ansari & Bell, 1997; Society of Management Accountants of Canada (SMAC), 1996), this field has gained momentum. No longer solely the interest of strategists, the development of viable, logical linkages between strategy, customer requirements, and firm performance is now recognized as an imperative for a profession seeking to regain its relevance (Johnson, 1992; Johnson & Kaplan, 1987).

The key issue raised by proponents of a strategic perspective in cost management is the need to incorporate the drivers of company performance in the design and analysis of its cost system. There is increasing evidence, though, that not all such drivers are equal in terms of their impact on firm effectiveness. Specifically, target cost management evidence points toward the need to incorporate a customer perspective – an *outside-in* view of the firm – as the critical dimension. Target cost management (TCM) establishes the linkage between cost and customer requirements during product design (Ansari & Bell, 1997; SMAC, 1996). It fails, however, to extend this logic into existing products and services or to incorporate the 'total firm' perspective necessary to support the development of a customer-driven strategy (Wayland & Cole, 1997; Green & Srinivasan, 1990).

In order to fully understand the linkage between cost and strategy, and to use this knowledge to improve firm performance, it is critical to define and measure the firm's current and potential ability to meet customer requirements in a cost-effective manner (McNair, 1994; McNair et al., 1999). Creating the bridge between the firm and its customer is the first step in transforming cost from a financial function to a strategic tool. Cost in this setting becomes more than an economic measure of resources consumed by an activity – objective 'fact' – it becomes an investment stream that yields long-term dividends to the firm and its stakeholders.

The objective of this research was to explore and define the relationship between market requirements, measured through a set of specific product value attributes (Wayland & Cole, 1997; Green & Srinivasan, 1990; Lancaster, 1971), and the investments of the firm in delivering on these attributes. The research was shaped by the underlying belief that it was possible to quantify the relationship between market/customer requirements and the internal economics of the firm in relative, directional terms. Therefore, the goals of this exploratory study were to: (1) determine if this relationship could be measured; (2) identify the degree of alignment of the firm's cost structure with the customer-defined value attributes; and, (3) explore the relationship between the degree of alignment and organizational effectiveness (as measured by profitability and customer satisfaction).

The study was by nature exploratory and sought to define key variables, explore relationships, test the ability to objectively measure the key variables, and determine whether or not the resulting information would impact management's perspective and strategic focus (Dubin, 1978). Building on both qualitative and quantitative case-based methodologies (Lincoln & Guba, 1985; Yin, 1984), the study tries to lay the groundwork for the extension of strategic and target cost management by defining cost management as part of a firm's ongoing strategy deployed through its investments in specific resources and capabilities.

Filling a gap in the development of the strategic cost management paradigm, this work seeks to link the internal economics of the firm to the market in relative – not concrete or objective – terms. The following pages present the background literature, which serves as the basis for the development of the theory and the propositions tested during the field research. The methodology is then detailed, followed by the field evidence from eight sites, including firms in the U.S., Italy and Canada, that are engaged in both service and manufacturing activities. The field evidence is analyzed, leading to observations and recommendations for future research. Taken in total, this exploratory study provides new insights into the complex relationship between cost and firm performance.

## BACKGROUND

Over the past fifteen years, management accounting practices have faced – and met – significant challenges to their relevance (Johnson, 1992; Berliner & Brimson, 1988; Johnson & Kaplan, 1987). The onslaught of papers that followed in the wake of these early challenges legitimized the efforts to assess and revitalize cost management practices – to “worry about accounting” (Hopwood, 1994). As the field turned to introspection, it was determined that little change had taken place in cost management practices since the 1920s.

McNair and Vangermeersch (1998a, 1998b), utilizing historical analysis of the capacity literature, traced the curtailment in the development of cost management practices to the National Industrial Recovery Act (NIRA, Johnson, 1935; Lyon et al., 1935). The NIRA appears to have transformed ‘cost’ from an objective measure of the resources consumed by a firm in its attempts to meet customer requirements to a political tool for rationalizing and institutionalizing the inclusion of waste in the calculation of a product’s *full cost* (McNair & Vangermeersch, 1998a, b). A far cry from the efforts of Gantt (1915), Church (1915, 1931) and others to develop an objective measure of the ‘true cost’ of a product or service, the resulting full absorption costing model became a basis for price setting and cost rationalization at a societal level.<sup>1</sup>

For more than 50 years, cost management practices in the United States retained this single-minded focus on establishing a basis for the ‘price’ (e.g., inventory value) of a good or service. Full absorption costing, which emphasized the allocation of all indirect productive costs to good units produced, became the dominant cost management paradigm. While full cost models remained static, the competitive climate continued to change. By the late 1970s, the onslaught of foreign competition had begun to undermine the economic structure defined and implemented during Roosevelt’s New Deal. Faced with a market and a set of customers who were no longer willing to accept the products a firm wished to sell at the price needed to ‘cover its costs’, managers began to need and demand new forms of cost and accounting information. It was this demand that led to the rebirth of management accounting practices (Johnson, 1992; Vangermeersch, 1996–7).

During the early stages of the rebirth of management accounting, emphasis was placed on improving the accuracy of product costing practices (Turney, 1991; Kaplan & Cooper, 1998). Unbundling overhead and reassigning it to the activities and outcomes that were determined to cause these costs, these early activity-based cost models made the questioning, and change, of management accounting practices legitimate. The floodgates of debate and change in management accounting were opened. What followed was an almost frenzied search for relevant practices,

which led to the exploration and adoption of models and insights from strategy, operations management and engineering. It is a quest that continues today, as practitioners and academics alike seek to create a database of economic and non-economic information that can meet management's ever-growing need for information to use in decision support.

The changes that are taking place in management accounting practice can be classified along two primary dimensions: (1) internal versus external focus, and (2) cost versus value emphasis (see Fig. 1). Activity-based costing (ABC), one of the earliest of the 'new' techniques,<sup>2</sup> is both internal in its focus and cost-based in perspective. It seeks to better understand the internal causes of cost, emphasizing the development of data that is not defined or measured in terms of its impact on unit costs at the product level.

While ABC is commonly agreed to be an improvement over traditional standard costing, it is not without its detractors (Noreen, 1997; Johnson, 1992). Often excessively detailed in nature, ABC has proven to have the potential to be cumbersome to design and implement in practice (Noreen & Soderstorm, 1994). In addition, simplifying assumptions made within the ABC model create concerns for many. Specifically, ABC's treatment of all non-unit costs as 'variable' in nature,<sup>3</sup> as well as its tendency to remain tied to the general ledger as a full absorption product cost approach, have combined to create a level of skepticism about its accuracy and informativeness.

Several changes to the early ABC model and literature have been made to address some of these weaknesses. In addition to arguing that the technique is being improperly judged, ABC proponents have undertaken efforts to reduce its complexity and detail orientation through the development of Activity-based management (Cokins, 1999; Player & Keys, 1995). The general ledger dependency of ABC has been loosened through the use of Activity-based budgeting (Brimson & Antos, 1999) and Capacity cost management (McNair & Vangermeersch, 1998b; Klammer & McGowan, 1997; The Society of Management Accountants of Canada, 1996). As a result of the latter work, idle capacity costs and other forms of waste are no longer a mandatory part of a product's inventoried cost. There has been a renewed recognition, first stated by Gantt (1919), that only those resources actually consumed by an activity or good unit of output should be assigned to it.

As cost management practices began to expand in scope and content, the organizations they served continued to experiment with new management techniques. What emerged was a recognition that the market – the firm's customers – were the unmeasured and poorly understood driver of a company's success. Banker et al. (1998) determined, in fact, that a positive association existed between customer satisfaction measures and future accounting performance for

	<b>Cost-Driven</b>	<b>Value-Driven</b>
<b>Internal Focus</b>	Activity Based Costing Activity Based Management Capacity Cost Management	Strategic Cost Management Product Attribute Costing
<b>External Focus</b>	Target Cost Management Life Cycle Costing	?

*Fig. 1.* Categorization of Emergent Cost Management Practices

their sample of hotels. Similarly, Ittner and Larcker (1998a; 1998b) found that customer satisfaction measures were viable leading indicators of future performance on both key financial and non-financial measures (e.g., revenue growth, market value and accounting performance of business units; see also Anderson, et al., 1994; Epstein, et al., 1999).<sup>4</sup>

The following comments capture the results and implications of these recent research efforts:<sup>5</sup>

We find that the relations between customer satisfaction measures and future accounting performance generally are positive and statistically significant ... Customer satisfaction measures appear to be economically relevant to the stock market ... (they) provide information to the stock market on expected future cash flows.

As these studies suggest, the value of a product or service, as defined by the customer and market, rapidly became the central theme in the burgeoning cost and management literature. Early process value analysis work (Ostrenga & Probst, 1992) gave way to business process reengineering (Hammer & Champy, 1995; Davenport, 1994), and finally, the emerging literature on customer-driven strategies (Wayland & Cole, 1997; Green & Srinivasan, 1990).

Cost management practitioners, responding to these trends, have rapidly incorporated the language of the customer in their work (Kaplan & Cooper, 1998; McNair et al., 1999; McNair, 1994; Morrow, 1992; Turney, 1992). For instance, recent initiatives at Sears have resulted in an 'Employee-Customer-Profit Chain' model that is believed to have led to a turnaround in the performance of this well established retail giant (Rucci et al., 1998). In fact, this firm has gone so far as to posit, and validate, that each percent improvement in customer satisfaction results in a \$50 million annual increase in revenues.

Results from four years of application throughout the retailing firm, while inconclusive in scientific terms, suggest that a firm that learns to effectively leverage its resources in ways that improve customer satisfaction can expect to improve its own performance as well as its overall competitive position.

The implications of these customer satisfaction-driven studies and activities filtered their way into the activity-based cost literature. The most common treatment for these effects was to further classify the activities of them into two categories: value-added and non-value-added. Value-added costs were defined as those that could be directly tied to serving the customer, while non-value-add activities could not be so linked. The premise underlying this classification was simple – a firm that had a higher amount of ‘value-add’ in its cost structure would outperform a firm that did not have as high a level. Interestingly, while there continued to be ample evidence that customer satisfaction was a critical dimension of competitive success, the field evidence in cost management using the ‘value-add/non-value-add’ classification did not always support these contentions.

The inherent flaw in these efforts was the fact that the ‘value’ that was established for an activity or *outcome was defined by management and the firm – not the customer*. In addition, field evidence suggested that few individuals were willing to agree that their work was unnecessary to the firm, especially given the climate of reengineering and downsizing that was prevalent during the late 1980s and 1990s (McNair et al., 1999). These weaknesses combined to give the activity-based concepts of ‘value-added’ limited usefulness in strategic and tactical decision making.

Strategic cost management (SCM) (Shank & Govindarajan, 1993a, b) addressed many of these shortcomings. SCM has the stated objective of using cost information, often gathered from several heterogeneous external sources, to define and create a competitive advantage (Shank & Govindarajan, 1993a, b; Porter, 1985). In the SCM environment, managers look for ways to leverage the industry value chain in unique ways that reduce the cost and complexity of completing transactions. The key contribution of SCM is that it takes an external view of cost and raises the understanding of how company activities can be better leveraged and aligned with the market to improve performance. The strategic positions identified and taken through SCM and related approaches are dynamic, as are the value relationships in the industry’s value chain (Shank et al., 1998; Slywotzky & Morrison, 1997). However, the performance improvements are often short-lived, due to competitive forces. In addition, the examination of the firm’s internal cost structures often remains superficial because the model is defined around the firm and its placement within the industry value chain. A high-level tool, SCM fails to provide guidance on



the ability of specific activities, products or services to meet defined customer value attributes.

Target cost management (TCM; Ansari & Bell, 1997; Cooper, 1995; Yoshikawa et al., 1993; Sakurai, 1989) and product attribute costing (Bromwich & Bhimani, 1994) take a different approach to incorporating customer information in the cost management system. Recognizing that customers purchase a product or service because its bundled attributes, or features, best match their requirements, these cost management models emphasize the concept of value as defined by the customer. This is not a new insight in business economics nor marketing, but it does represent a shift in the perspective of cost management away from internally-defined value at the product and company level to one that is based on external information.

TCM is one of the best publicized of these market-driven techniques. It is focused on building customer-defined value into the product during the development cycle. It seeks to ensure that a product is not launched until it has optimized its value content, as measured by specific customer-defined value attributes, as well as its profit goals as determined by the firm's managers. Value analysis and value engineering are used to discipline the development effort in TCM (Ansari & Bell, 1997; Bromwich & Bhimani, 1994; Yoshikawa, 1994). There is increasing field evidence that firms which use TCM do develop products that contain minimal design flaws, perform well against customer expectations, and achieve their profit goals from the onset of production and throughout the product's life. It would appear that building the customer perspective into the product increases the odds that the product will prove competitively successful.

Reviewing these developments, then, there is increasing evidence that those firms that focus their activities and expenditures on meeting specific customer requirements, or value attributes, may outperform those less closely aligned with the market. The challenge to cost management practices embedded in these trends is two-fold: (1) to find ways to objectively measure and trace costs to customer-defined requirements; and, (2) to establish the relationship between firms with various levels of value-driven cost and their resulting market and financial performance.

The *profit potential* concept (McNair, 1994; McNair & Vangermeersch, 1998) represents a first level attempt at addressing these two challenges. It measures the magnitude of the existing relationship between cost and value by matching current revenues with their associated amount of value-added (e.g., necessary) cost. The resulting metric, or relationship between revenue and value-added cost, was defined as the firm's *value multiplier*. Citing evidence from the field, these authors argue that only one fourth (25%) of a firm's expenditures create value for the customer.

As suggested by Fig. 2, these relationships can be captured in a simple graphic. The outer border of the figure is the market price. Reflecting long-standing knowledge in economics, this price barrier is set by the competitive market. A company does not control its market price – price is determined by the market’s assessment of the match between the product’s attributes and each individual’s utility function relative to competition in the market.

As can be seen by the figure, the center of a firm’s economic and management structure is its value-added core. Within this core are the specific activities and outcomes valued by the customer – they generate price in the market. The relationship between the relative size of the core and the product’s resulting price is the value multiplier, which is clearly always greater than one in a profitable firm. Three other rings complete the economic structure defined by McNair and Vangermeersh (1998; 1994) – non-value-add, waste and a firm’s profit potential. Waste was the specific focus of much of this work and was defined as any excess cost, rework or related problems that were unnecessary and unlikely to ever generate a dollar of revenue for the firm. Non-value-add became a residual category for all of the activities that were performed to keep the firm functioning but that were not directly valued by customers.

A firm that has a high level of waste and non-value-add would appear to need to create far more value per dollar invested in the value-added core than one that has lower cost hurdles to overcome. Since profit is never guaranteed, waste and non-value-add costs can expand to the point that profit disappears. Additionally, the underlying dynamics of these relationships suggests that the only way a company can increase its price – or share in the larger sense – is to increase its degree of alignment between its activities and customer requirements. Enhancing the value-added core is the key to improving profitability.

On the other hand, this basic relationship also suggests that dollars, or effort, removed from the value-added core will create a disproportionately larger decrease in the price the product or service commands in the market. McNair and Vangermeersch (1998) argue, in fact, that the price envelope (or share in the larger sense) will collapse faster than the reduction in costs. In other words, across-the-board cost reductions may actually harm the firm’s current and future profit potential, not enhance it.

Several key assumptions of the resulting profit model are: (1) revenue is a direct result of activities contained in the core; (2) only the core activities were valued by the customers; (3) increases in revenue (and share) could only come by additional investments in the core activities; and, (4) reduction of spending on core activities would collapse the price envelope inward at a multiplicative rate.

A second aspect of the *profit potential* model is reflected in Fig. 3. As can be seen, the authors argue that a firm’s current spending can be assessed against the customer’s definition of what an activity or outcome is, and is worth. Looking at the diagram,

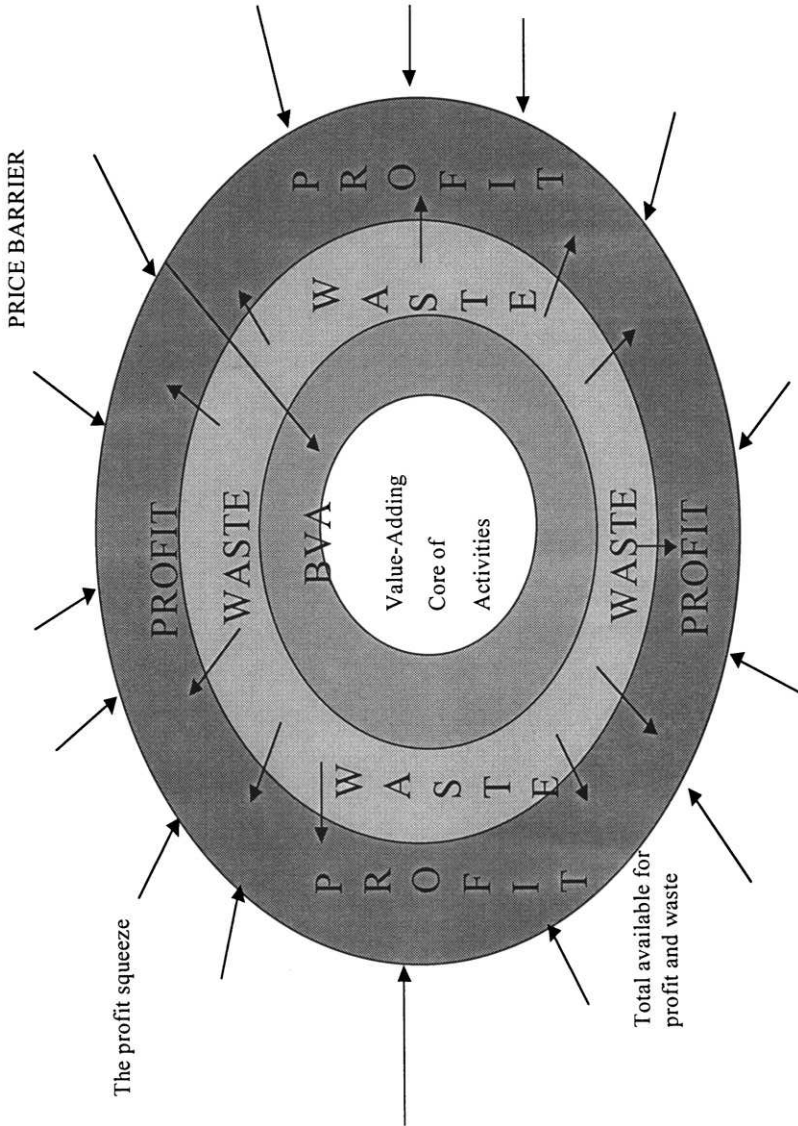


Fig. 2 The Value Creation Model

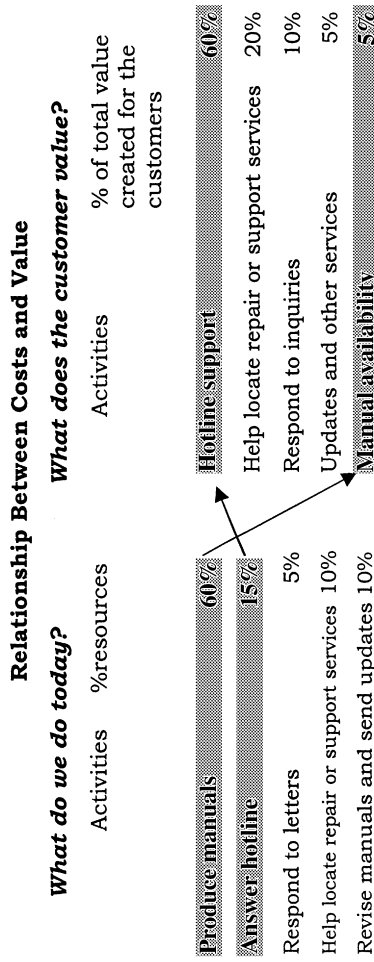
which is based on field data collected at a major computer manufacturer, the dollars expended on customer service are categorized into a series of activities that the firm's managers felt were undertaken to provide customers with post-purchase service. As the list was developed, it became clear that to this firm, the development of comprehensive user manuals was the dominant activity in the customer service category.

Looking at customer service from the outside-in, though, led to a very different weighting of the core services bundled under post-purchase support. Customers, when asked, expressed dissatisfaction with the current level of 'help line' support. These same customers did not see manuals as important – they wanted 24-hour a day, rapid access to a person who could help them solve their problems. As the figure suggests, the firm was spending the majority of its funds on manuals, and much less on the help line. This was the opposite spending pattern the customer would have preferred. As this simple illustration suggests, it wasn't simply the fact that specific activities might, or might not, be valued by the customer. It was equally important that the firm emphasize those activities that were most valued by the customer. The critical linkage in the customer satisfaction-activity relationship was that ensuring the appropriate level, or balance, of effort and cost as *defined by the customer*.

*The profit potential* model appeared, then, to capture the relationship between customer value attributes and firm spending, touted as the key to an effective strategy in the marketing literature (Wayland & Cole, 1997; Green & Srinivasan, 1990). Unfortunately, it did not go far enough toward precisely defining the relationship of cost and the entire array of a product or service's specific value attributes. While both external and value-driven in nature, there was little guidance provided to companies on where to focus their efforts to improve performance. In addition, it provided little detail in defining and categorizing the multiple activities of the firm in ways that reflected their importance in maintaining the organization's ability to produce and survive in the market.

As in many of the other studies in Strategic cost management, the work by McNair and Vangermeersch (1998) fell short in terms of providing a predictive, objective, and well-defined set of metrics to guide management decision making. Clearly, there is increasing evidence that leveraging a firm's resources in ways that optimize the value created for customers can create a more profitable competitive position for a firm. Even so, there is currently little or no information on exactly how large these value multipliers should be or whether all value attributes have equal impact on short- and long-term performance.

A second concern in this earlier work is its failure to examine costs in a problematic manner. It is not sufficient for a firm or its manager's to state that an activity is, or is not, value-adding. This key feature has to be defined and constrained by the customer's and market's expectations – their definition of



Source: McNair, 1994.

Fig. 3. The Effort-Value Linkage

value. To achieve this goal, a model or research study would need to start with a clear definition of what product or service attributes are valued by the customer. This information would serve to inform the categorization of costs and activities within the firm. Any other approach would be open both to self-report bias and rationalization at the firm level.

These shortcomings in terms of defining the value-added core, establishing specific value attributes for a product or service, and defining costs based on customer-defined levels of value served as the basis for the research that is presented here. Specifically, this research set out to bridge the gap between the customer value attribute literature and cost management practices. Several key issues and propositions were targeted for exploration and improved understanding:

**Issue 1.** Can the customer's preference for specific product value attributes be established and measured in an objective manner?

Proposition 1a. Customers can define the attributes they value in a product.

Proposition 1b. Customers can assign weights to these attributes that reflect their relative importance in the purchase decision.

**Issue 2.** Can the firm's cost structure be mapped to these value attributes in a meaningful and objective manner?

Proposition 2a. The activities that directly support the firm's ability to deliver on customer value attributes can be identified.

Proposition 2b. The cost of these value-added activities can be established with reasonable accuracy.

**Issue 3.** Can the relationship between cost, specific value attributes and firm performance be identified and measured?

Proposition 3a. A firm with a high degree of alignment of its costs and customer-defined value attributes will experience high levels of customer satisfaction.

Proposition 3b. A firm with a high degree of alignment of its costs and customer-defined value attributes will experience high levels of profitability.

As these issues and propositions suggest, this research was exploratory in nature. While evidence of the importance of matching firm efforts with those activities and outcomes (product and service attributes) valued by the market exists, there is little or no understanding of how to capture the impact of the degree of this alignment on a firm's short- and long-term firm performance. The research model and methods were designed to test these relationships.

## RESEARCH MODEL AND METHODOLOGY

As consumers seek to maximize their own utility, they choose among available products and services with specific bundles of characteristics or attributes. It could be argued, then, that a profit-seeking firm should strive to offer a set of product characteristics that are either similar to those of competitors, but at a lower price, or better than those of competitors at a similar or higher price. A superior competitive position is created when the firm continues to offer a unique bundle of attributes not easily replicated, but highly valued, in the market.

Representing Porter's (1985) cost versus *differentiation* basis for competitive positioning, these arguments lie at the heart of microeconomic theory and the developments in competitive strategy today. Unfortunately, traditional costing systems do not provide any information on the costs incurred to gain a competitive advantage. Without this knowledge, a firm has no guarantee that it will optimize its profitability and performance with a given strategic position – its future success is left in the hands of intuition and market forces.

As suggested by Fig. 4, an underlying economic framework can be developed to capture the potential relationship between customer/market requirements, defined as an array of value attributes with unique weightings by customer, and the firm's economic and activity structure. The left side of the figure depicts the resource array, or complete set of resources a firm has available to provide products and support internal operations. These resources are channeled into a number of processes, or activity streams, that result in any number of outcomes. These outcomes are depicted as value-added, business value-added (required for the business), and waste.

These outcomes are matched against the value distribution through the value creation multiplier. Revenues are the result of a successful match. These revenues, less the sum of the resources consumed by the firm for the period (e.g., its costs) result in firm profits. Several key assumptions of the research are reflected within this model:

- (1) Revenues are a proxy for the amount of value each attribute represents in the market.
- (2) Different attributes will have different amounts of value embedded in them.
- (3) The market can be captured as an array of value preferences that cluster into identifiable, unique clusters or segments.
- (4) Internal costs can be mapped to the value attributes.
- (5) Residual costs can be classified into business value-add and waste.
- (6) Externalities play a small role in these relationships.

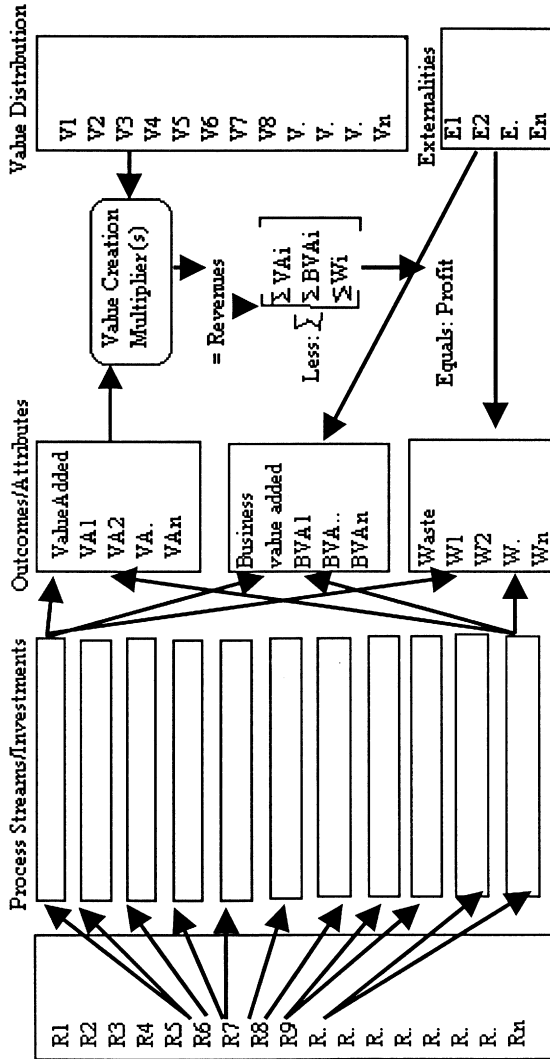


Fig. 4. The Value Creation Model



These assumptions, along with the research questions and propositions, served as the basis for the field-work, which is described below.

## RESEARCH METHODOLOGY

Theory building efforts (Dubin, 1978), such as those underlying the value creation model, begin with the collection and analysis of field data that either corroborates, or disproves, suggested relationships. Differing markedly from theory testing, theory building seeks to develop a model of the real world by comparing diverse situations and events. By definition bound to the field, theory building is at once a creative, yet disciplined, initiative guided by the insights and shortcomings of the researcher(s). It is by definition anchored in the interpretive paradigm.

Having placed this research within its epistemological framework, the empirical methodology becomes evident. Theory building efforts are intricately tied to case, or field, research (Lincoln & Guba, 1985). While many different approaches can be used to gather case data, the methodology developed by Yin (1984) provides the greatest control over the research endeavor. The heart of Yin's approach is documentation, before, during and after the site visit. Built from a well-defined set of protocols, questions, and issues, case-based research using Yin's model can provide reliable, verifiable findings.

The paper presented here was conducted in several stages, as summarized in Fig. 5. First, prior field research conducted by the author(s) was reanalyzed in light of one of the primary research questions: Could a clear relationship be identified between cost and a product's value attributes? The preliminary review and analysis of related literature suggested that customer-defined value attributes could be elicited and that, at least at some level, internal activities could be mapped to these value attributes. What remained to be seen was whether this information could be elicited jointly during a field study, and once obtained, if management would validate the findings and/or find them informative.

As the figure suggests, there were multiple methods, industries, and approaches used to complete this study. In total, the field work alone utilized over 200 total field days by three researchers over two and half years of time, along with support from the firms that participated in the study. The nature of the research questions and the fact that many of the tested relationships required data collection at a very intense level (e.g., rebalancing and recategorizing entire general ledgers; meeting with 150 key managers in one firm alone). The researchers deemed it was crucial that the data collected and conclusions drawn would be based on extensive knowledge, not casual knowledge, of the target sites.

<b>Phase</b>	<b>Objective</b>	<b>Method</b>	<b>Number of Sites</b>
Analysis and exploration of concepts.	To define and develop measurable constructs.	Interviews, review of literature, and expert opinion.	<ul style="list-style-type: none"> <li>• Computer</li> <li>• Metal Working</li> </ul>
Cross-sectional field study. Most work done in Italy.	Test the key constructs and obtain data for analysis of key relationships.	<p>Traditional field studies; up to 10 days on site using protocol instruments.</p> <p>Interviews and/or surveys used for customers and firm responses.</p>	<ul style="list-style-type: none"> <li>• Agricultural machinery</li> <li>• Ice cream mfg.</li> <li>• Small consulting firm</li> <li>• Wood working machines.</li> <li>• Electronic systems</li> </ul>
Extended study and analysis. Work done in U.S., Italy and Canada.	To do detailed analysis of the firm and issues, obtain reactions of management, analyze segments, and identify areas where model failed to capture the key issues.  Between 25 to 100 site days per company.	<p>In-depth analysis of market research for customer metrics.</p> <p>Intensive ABM and capacity modeling to define cost relationships.</p> <p>Extensive meetings and interviews with management.</p>	<ul style="list-style-type: none"> <li>• Public relations</li> <li>• Telecommunications</li> <li>• Residential housing materials</li> <li>• Agricultural machinery (phase 2 and 3 completed in this site).</li> </ul>

Fig. 5. Summary of Research Methods

Beyond these initial questions on the feasibility and validity of the methods, there were issues surrounding customer segmentation and the development of differential value/cost assessments that needed to be explored in this study. Specifically, Wayland and Cole (1998) and others have suggested that customer segments would emerge when consumers' preferences for bundles of products/services are heterogeneous. These segments would then reflect different willingness to pay, for a set of bundled product attributes. Defining segments and assessing the firm's efforts against potential diverse attribute weightings was one of the key issues addressed in the third phase of the study.

Having developed primary and supporting research questions and approaches, a methodology and specific set of protocols was designed.<sup>6</sup> Specifically, the methodology implemented included the following steps:

- Customer value attribute proxies would be estimated by management and verified through a sampling of customers from the firm's current customer base. Customers would further be asked to force rank these attributes, assigning 100 potential 'dollars' to each of the attributes, reflecting the amount of total value the attribute represented.
- *Revenue equivalents* would be derived by multiplying the total revenue represented by a customer segment or product offering times the percentage value assigned by customers to each value attribute.
- Activity analysis would be conducted specifically for the project, ensuring that the definition of value-added would reflect customer perceptions rather than internal definitions.
- The unit of analysis would be a strategic business unit (SBU).
- Individuals from across the various functions would be interviewed. The criteria for choice would be that the individual represented a unique job description. If two or more individuals did the same, or similar work, only one individual would be interviewed.
- Internal assessments of value-add, business value-add and waste would be used. While this built an inherent bias into the data, it was necessary to assume a reasonable level of accuracy for the purposes of this project.<sup>7</sup>

Once the interviews were completed, the data was analyzed and summarized in the following way:

- (1) A customer value profile was created for each defined segment. This profile included the value attributes and their relative value on a forced 100 point ranking system. For the study analysis, the average customer value profile for a segment was used.
- (2) Revenue proxies were created for each segment by multiplying the forced ranking times the current total revenues provided by that segment.

- (3) Activities that participants defined as value-adding were matched with the value attribute they supported. This was done in collaboration with knowledgeable individuals at the research site.
- (4) The total costs for the value-added activities was derived by summing across the research subjects.
- (5) Multipliers were developed by taking the total revenues represented by an attribute and dividing these by the total activity costs traced to each attribute.
- (6) Analysis of the multiplier relationships, as well as an overview of the underlying cost structure of the firm (value-add, business value-add and waste), was completed.

The resulting value analysis served as the basis for many of the findings that follow. After the analysis was completed, a meeting was held with site managers to discuss the implications of the results and determine the degree of informativeness, if any, the results contained. These sessions were not used to change the study data for the specific site, but rather to gather feedback and insight into the impact of this new form of information on management perspective and attitudes. In addition, if methodology issues surfaced, there were incorporated in the Phase III analysis.

Taken in total, the methodology described here attempted to simulate a pilot implementation of a new management tool within a company. Done on an experimental basis, this study was undertaken to determine the feasibility of the VCM approach, develop reliable proxies and measures for key concepts and test the usefulness of the concept for affected managers.

## **SUMMARY OF EVIDENCE FROM THE FIELD<sup>8</sup>**

The evidence from the field consists of both quantitative data on value attribute rankings, cost structures and revenue multipliers, as well as qualitative data from the full range of interviews conducted in the course of the project. In all, approximately 300 managers across the eight sites contributed insights, observations, data and analytic support for the study.

As suggested by Table 1, the actual range of companies, industries, size and location was significant. This level of variety matches the theory building intent of this research. Specifically, if any pattern or result were to be found to carry across the population of sites, it would suggest that the underlying VCM had at least some level of reliability.

The companies were located in the United States (Impact Communication and Windows, Inc.), Canada (Telecom), and Italy (the remaining 5 sites). The

*Table 1.* Field Data Summary

Company	Revenues (\$Mil)	Year	Number of Employees	Profitability (ROS)	Industry	Stage in Business Life Cycle	Number of Individuals Interviewed
Carpigiani	\$58.0	97	350	N/A	Ice cream equipment	Mature	23
Confartigianato	\$4.0	98	109	2.8%	Small business administration and general consulting	Mature	8
SCM	\$380.0	97	1,983	6.0%	Wood working machines	Expansion	28
Clover	\$56.0	98	304	8.0%	Electronic systems design & manufacturing	Expansion	10
Windows, Inc.	\$546.0	98	4,000	12.0%	Residential building materials	Mature	150
Celli	\$16.0	97	80	6.5%	Agricultural equipment	Decline	12
Impact	\$25.0	98	145	5.0%	Public relations	Mature	22
Communications Telecom	\$600.0	98	3,000	7.0%	Telecommunications	Expansion	45

stage in the business cycle faced differed markedly. In some sites, such as Windows, Inc., the analysis was applied differentially to a new product launch and the firm's existing product lines. Three of the companies were in the service sector, while five manufactured a range of products. In general, then, there appeared no a priori reason to believe that a bias favoring the VCM analysis had been built into the data.

During the preliminary interviews, a number of observations and comments about the proposed research were obtained. Some of these included:

I really don't see what this is going to tell us. We already talk to our customers throughout the product life cycle. It's an interesting concept, but I doubt we'll learn anything (Marketing Manager, Windows, Inc.).

It would really help us . . . I mean not just finance . . . the company . . . if we could finally talk the same language (Finance Manager, Windows, Inc.).

We don't want to be a 'smile and dial' firm, so we work to make ourselves unique – we are a boutique firm. We specialize in research. (Name of founder) is the expert on cause-related marketing. That's what we do best . . . even though not all of our customers care about it (President, Impact Communications).

As these opening comments suggest, there was not an obvious acceptance of the model by the companies, although all were willing to let the data be collected.<sup>9</sup> The support received was due to the fact that each of the firms studied had one issue in common – they had determined that improved customer satisfaction was a critical determinant of their future success. So, while these firms did not necessarily feel that the proposed methodology was the solution to their problems, they all agreed that they needed to better understand how well they were meeting customer needs.

### *1. Results of the Customer Value Analysis*

As described in the methodology, the first data that needed to be collected was the customer value attributes for each firm.<sup>10</sup> To facilitate this data collection, one specific product line was targeted for the analysis in the larger, diverse firms.<sup>11</sup> A range of methods was then used to query the first two propositions: could the customers define value attributes for the product, and if so, would they be able to assign unique weights to these features. The diversity in methods reflected the exploratory nature of the study. It was unknown at the onset whether customer values would coincide with a manager's perception, and whether existing firm marketing research could be used to proxy the key relationships.<sup>12</sup> The results are presented in Table 2.

**Table 2.** Value Attributes by Firm

<b>Company: Carpigiani</b>		<b>Company: Confartigianato</b>	
Attributes	Market weights	Attributes	Market weights
Technical reliability	18%	On time delivery	17%
Technical performance	9%	Reliability	17%
Innovation	9%	Promptness	15%
Price	15%	Price	14%
Customer assistance	15%	Comprehensibility	9%
Before sale assistance	9%	Politeness	9%
Terms of payment	16%	Easy access	8%
Prompt delivery	9%	Completeness	11%
<b>Company: SCM</b>		<b>Company: Clover</b>	
Technical performance	29%	Quality	27%
Price	12%	Know-how updated	23%
Technical reliability	20%	Prompt delivery	18%
Customization	8%	Price	32%
Delivery time	5%		
Company's reliability	11%		
Customer service	15%		
<b>Company : Impact Communications, Inc</b>		<b>Company: Celli</b>	
Placement/Quantity	30%	Technical reliability	21%
Creative/Proactive	15%	Price	19%
Strategy/Brand	28%	Service reliability	19%
Knowledge of business	12%	Life Cycle	15%
Reputation	7%	Customer assistance	14%
Result Merchandising	8%	Technical performance	12%
<b>Company : Telecom</b>		<b>Company: Windows, Inc.</b>	
Service	29%	Price	59%
Price	46%	Size Grid	9%
Variety	7%	Color/Options	6%
Convenience	9%	Appearance	6%
		Brand	6%
		Durability/Warranty	14%

*Results at Impact Communications.* As the data suggests, in several of the firms unique weights by segment were derived. One of the most striking of these occurred in Impact Communications. Impact was a unique site, being entrepreneurial in nature, service-based, and relatively small in total size. Its entire approach to public relations reflected the expertise of the founder – she is known as the expert in cause-related marketing. The founder placed a lot of emphasis

on doing extensive research on an industry and trends before drawing conclusions, making recommendations, or developing publicity strategies. She also wanted to separate herself from the traditional ‘smile and dial’ culture of most publicity firms. The entrepreneur had a very specific, and strong, view on what comprised value creation within her firm.

What was interesting in exploring the data and talking with the managers at this site, was not that the philosophy of the founder was noticeable in the words, actions, and investments of the firm. The intriguing fact was that not all of the current customers had the same preferences or values as the founder for the work the firm. Specifically, three customer segments emerged from the data collected during interviews with the internal manager and customers: Research clients, Publicity clients, and Full service clients. The former came to the firm specifically for its research expertise to find answers to difficult public relations issues or to craft a new market strategy. Publicity clients, on the other hand, wanted traditional ‘smile and dial’ services, gauging the efforts of the firm by the number of inches of print ad accumulated over the contract period. The final group, full service clients, was small firms that relied on Impact for the full range of their marketing activities.

Table 3 details the results of looking at the mean attributes in Table 2 on a segment basis for Impact Communications.<sup>13</sup>

These segments did appear to exhibit significant differences in their preference patterns, providing insight on another key issue explored by this research – the consistency of customer’s definitions and assessed value. As suggested by Wayland and Cole, unique segments that were defined, not by size or geography, but rather value attribute preference patterns, emerged in the analysis of Impact Communication. This learning occurred fairly early in the one year total site exposure, supporting the inclusion of segment questions in interviews and during the cost analysis.<sup>14</sup>

It was interesting how these differences were dealt with within Impact Communications – in effect, they weren’t. Each client’s ‘job’ was handled in exactly the same way, with the same distribution of activities and effort across research, placements, and related public relations tasks, regardless of the service being purchased by the client. Research, for instance, was always done, absorbing between 20 and 30% of the total time spent on a client’s behalf. Relatedly, placements were always done on an opportunistic basis, rather than as a dedicated, intense activity. Both of these patterns reflected the founder’s preferences – not necessarily the customers’. As a result, insufficient effort was directed on achieving placements for publicity clients, while the placements were a negative activity for research clients who normally had an internal public relations staff and strategy. Comments by the President shed light on these problems:



**Table 3.** Segment Comparison for Impact Communications

<b>Company: Impact Communications</b>				
Attributes	Average Market Weights	Research Clients	Publicity Clients	Full Service Clients
Placements/Quantity	30%	0%	70%	25%
Creative/Proactive	15%	30%	5%	20%
Strategy/Brand	28%	30%	0%	25%
Knowledge of Business	12%	10%	10%	20%
Reputation	7%	30%	5%	5%
Results Merchandising	8%	0%	10%	5%
Total	100%	100%	100%	100%

Our founder and owner believes that research is what sets us apart from the rest of the competition. We do it for everyone...period. Now I'm not saying everyone cares about it – values our efforts. But we have to maintain our standards. We don't want to be a typical PR firm – we're unique.

Unfortunately, the application of a 'one size fits all' approach to the three unique customer segments had led to a number of troubling trends at Impact, specifically:

- Very low retention rates, beyond the initial engagement, of 90 to 95% of the publicity clients.
- Ongoing tension and problems from research clients whenever Impact placed an item in the press (placements are a dynamic, opportunistic event).
- Low satisfaction levels for publicity clients, moderate satisfaction among full service clients (who tended to be loyal to the firm) and high overall satisfaction ratings from research clients.

The obvious solution would be to discontinue servicing publicity clients, but these clients were the 'bread and butter' of the firm; 50 to 65% of the total client base was made up of publicity clients at any point in time.

Impact Communications, then, provided a microcosm of the entire study and its premises. One spending and activity pattern was utilized across three unique segments with apparently unique preferences, with a predictable impact on the satisfaction and long-term profitability of the client.<sup>15</sup> Taken in isolation, it provided validation of the six research propositions: the attributes could be identified and measured, costs could be compiled against attributes, and the degree of match between internal spending and the importance of the value attribute to a customer would affect the firm's performance and its customer satisfaction ratings. In addition, Impact's results appeared to validate, at a firm level, the findings of prior research on the relationship between customer satisfaction

and firm profitability. Impact's profitability was low and declining, with pure publicity clients seldom staying with the firm beyond the initial engagement (negating any potential payback on the investment of resources in research).

The first aspect of the field work on each site, then, explored the ability to define attributes, identify their relative importance, and determined the feasibility of identifying unique value-based segments. Specifically, propositions one and two were supported – unique attributes by company and product were identified and customers were able to assign unique weights to these attributes. Having completed the value-based aspects of the study, the analysis turned toward the collection of cost data within each site

## *2. Results of the Cost Analysis*

The second major research question entailed the ability to collect cost information that aligned with the value attributes. Table 4 details the initial distribution of costs collected during the study for the eight sites. The overall results supported earlier work by McNair (1995) and McNair and Vangermeersch (1998) which suggested that waste would comprise at least 20% of a firm's cost structure. Obviously, the numbers provided were biased downward in each case – it was naturally difficult for any one manager or firm to admit to high levels of waste.

As the above results suggest, propositions 2a and 2b were supported – activities were identifiable and could be mapped against each of the value attributes. In addition, the total cost structure of the firm could be analyzed against the three value-defined cost categories: value-add, non-value-add, and waste.

*Results at Telecom, Inc.* Once again, insights from the field served to enhance the understanding of how the research impacted both the perceptions of the managers and their willingness to respond. Telecom was a firm that was still recovering from the deregulation of the long distance market in Canada, and was faced with the deregulation of local service in the near future. In addition, reengineering was being completed, as the firm struggled to hold off unwanted takeover by the major telecommunications company in Canada. The managers in this firm appeared to be both aware, and concerned, about the impressions they would make replying to our paper. No one wanted to draw attention to themselves, or to suggest that their work was not necessary to the firm's future. The culture of the firm also prized honesty – managers were encouraged to resist pressures to change their methods or respond to requests for work or information if they felt it was flawed or biased in some way.

Specifically, during data collection at Telecom, significant resistance to the three categories (value-add, non-value-add, and waste) was encountered. As

**Table 4.** Cost Distribution for all Sites

Company	Value-Add %	Non-Value-Add %	Waste %
Carpigiani	44%	32%	24%
Confartigianato	42%	39%	19%
SCM 48%	40%	12%	
Clover	44%	46%	10%
Windows, Inc.	36%	39%	25%
Celli 47%	31%	22%	
Impact Communications	54%	29%	17%
Telecom	8%	73%	20%

described by one departmental manager:<sup>16</sup>

I can understand what you're asking, but it just doesn't seem right. I mean, I know a customer isn't going to pay me to do my stuff around here, but if I didn't do it, the company would run into problems – big time – in the long-term. It may not be value-add to today's customers, but I won't classify my work as non-value-adding or waste.

As this resistance was explored, it became clear that the language used in the accounting literature had a behavioral impact that was less than desirable. *It appeared to reduce the individual's feelings of self-worth.* If the reflections and discussion at Telecom were any indication of a general trend, it would appear that the research completed to date using the three-way categorization of cost may have inadvertently inserted a *language-based bias* into their data and findings.

While not intended in the original research design, this finding proved to be a major breakthrough for the researchers. Underscoring the need to use field methods that allowed for extensive interaction, debate, and exploration, these results suggest that a blind adherence to a prescribed set of protocols, as promoted by Yin, can potentially impact the validity of the research and reduce the knowledge gained from the research effort. These are issues that have not been well addressed in the accounting literature. They beg the question as to whether sociological or ethnographical research methods are more appropriate in the management accounting domain.

As the problem regarding the impact of the language of 'value' was discussed at Telecom, an alternative language emerged:

- Value-add: those activities and costs a customer would agree to pay for.
- Business value-add – Current: internal support activities and costs that do not directly impact customer satisfaction, but that could lead to dissatisfaction if performed poorly (e.g., improper invoicing).

- Business value-add – Future: internal activities designed to create new products, new services, or to support the future growth and competitive position of the firm. Today’s customers might conceivably have a disincentive to pay for these activities as they obsolete current purchases.
- Business value-add – Administrative: activities and work required to support the firm and its management, such as e-mail, meetings and related work (described as ‘feeding the bureaucracy’ by Telecom managers).
- Non-value add: activities and costs that should be minimized or eliminated through improvement efforts as no stakeholder benefits.

These categories represented significant learning for the researchers on the behavioral impact of accounting language. Once the terms were changed, the degree of participation and discussion improved in Telecom and latter sites. The effect was so marked that the prior terminology was eliminated from the research study for all subsequent sites.<sup>17</sup>

A second language and behavioral issue emerged during the Telecom analysis.<sup>18</sup> In looking at the value attributes during a one-on-one interview, the same manager noted:

These aren’t alike at all. Comparing them is like apples and oranges . . . Some are table stakes – we’ve got to do them to be in the telecommunications business. Others are extras – ways we improve our performance.

Two new terms were borne out of this debate – ‘table stakes’ and ‘revenue enhancers’. The former represented the basic product/service features necessary to be considered for purchase by a customer – e.g., a customer expects to hear a dial tone as soon as a handset is picked up. A failure to have this capability would effectively screen a company out of the potential pool of suppliers. The table stakes concept had a further positive impact – it provided a basis for interpreting ‘price’ as one common item found in a set of value attributes. Based on the results at Telecom, it was determined that ‘price’ might serve as a proxy for the importance a customer placed on the basic product or service. It could be argued that a firm that competes solely on the basis of price (e.g., a cost-based strategy) would emphasize and invest predominantly in these core attributes.

In a related way, the ‘revenue enhancers’ identified by Telecom managers appeared to provide the basis for differentiation strategies in the market. Customers would, the managers argued, increase their preference for a company’s products if they had the appropriate set of non-essential attributes given each customer’s unique set of preferences.

The insights from this part of the study, then, created changes in the methods, interpretation of the model, and understanding of the firm’s cost structure. The former extension, namely the addition of business value-add concepts, was

tested and found to increase acceptance and quality of the model in the target sites. The latter extension allowed the researchers to interpret a previously difficult attribute – price. Price was deemed, through ongoing discussions with the target site managers, to be a reasonable way to capture the basic features of the product – its table stakes value.

*Results at Windows, Inc.* The results of this expanded analysis are presented for Windows, Inc., the last site in the study (see Table 5). Windows was the most intensive, lengthy, elaborate study completed for this project. Site visits took place on an almost weekly basis, involving two of the three researchers for almost one year of total time. Having defined the study at the SBU level, the researchers faced an almost insurmountable task – while Windows had over 4,000 employees, it maintained only one SBU. In addition, the company was privately held, making it very difficult to obtain financial information on some key dimensions. Data could not be ‘used’ as presented by the firm – each element of data had to be reconstructed. In many ways, then, Windows represented a pilot implementation of the constructs, rather than simply another field test.<sup>19</sup>

Extensive research had recently been completed by Windows on its existing products and customer preferences. The firm was undertaking one of its first attempts to use target cost management in the launch of a new product line, and had compiled the market data to support these efforts. The research provided evidence that clear segments existed for the firm’s products (new residential building – custom or small builder, new residential building – large builder, and replacement/remodeling customers). While each of these segments placed a heavy emphasis on ‘price’, there was a significant difference in their overall preferences. Table 5 uses the results from the key segment for the firm – small custom builders.

At Windows, price was defined during interviews as the basic window that would keep weather out and provide natural light. The related attributes were viewed as a means by which the firm could differentiate itself in the market in terms of quality and image. The former were described as “things you have to do to even be considered by the customer,” the latter as ways the firm could enhance the price it received for its product over and above a generic, low cost window. The firm followed a differentiation strategy, reaping significant premiums in the market based on brand image supported by product and service quality.

Defined in terms of the basic window versus the ‘extras’ that made the firm’s windows command a premium price in the market, the respondents easily mapped their costs to attributes by category.

Issues that emerged from the intense Windows site analysis included the following: the need to develop effective methods for data collection (e.g., an Excel spreadsheet model that made analysis of the data simple to complete), the need to ensure that every manager affected by the system both understood

**Table 5.** Windows, Inc. Cost Distribution

<b>Company: Windows, Inc.</b>						
Attribute	Value Weight	V/A Cost	BVA-C	BVA-F	BVA-A	NVA
Price	59	29.24	9.49	9.51	7.77	18.72
Size Grid	6	0.62	0.25	0.24	0.55	0.48
Color Options	9	2.03	0.83	0.71	1.80	1.90
Appearance	6	1.40	0.57	0.69	1.25	1.52
Brand	6	1.87	0.76	0.64	1.66	1.99
Durability/Warranty	14	0.96	0.40	0.50	0.83	0.82
	100	36.12	12.30	12.29	13.86	25.43

Note: All figures are in percent.

and had been given adequate incentive to respond to the study’s information requests, and the political nature of the study itself. Even with the change in the language and methods to accommodate earlier problems, the politics of change remained. In other words, the development of new accounting methods appears to be tied to the need to effectively manage the change process – these methods do not provide objective data sources but rather a new language and set of issues that need to be negotiated by the firm. The facts that new methods uncover new issues, redefine priorities, and change the individual’s view and role in the organization, cannot be ignored.

Having documented the ability to identify and segment the firm’s cost structure across all eight sites, as well as having obtained improved understanding of the impact of the study’s language and categories on behavior and perceptions, attention turned to the development of firm-specific value multipliers.

### 3. Revenue Multipliers

The goal of the VCM analysis was to ultimately derive a set of value multipliers for each of the identified attributes. A value multiplier was defined as a metric that would compare the amount of cost that was traced to a specific value attribute to its related revenues (e.g., the revenue equivalent). The multiplier was designed to measure the degree of alignment between current expenditures and efforts and those desired by the market. It was believed that higher alignment would be reflected in better financial performance and higher customer satisfaction levels.

For the purposes of this aspect of the analysis, the segment mean is used to illustrate the findings.<sup>20</sup> The results are presented in Table 6, which compares

**Table 6.** Value Multipliers

(Stated in \$Mil)				
Attributes	Market Weights	Revenue Equivalent	\$Value-Add Cost	Value Multiplier
<b>Company: Carpigiani</b>				
Technical reliability	18%	\$2.42	\$0.43	5.7
Technical performance	9%	\$1.23	\$0.01	98.3
Innovation	9%	\$1.16	\$0.03	39.4
Price	15%	\$2.03	\$0.71	2.9
Customer assistance	15%	\$1.98	\$0.53	3.8
Before-sales assistance	9%	\$1.19	\$0.07	16.1
Terms of payment	16%	\$2.07	\$0.12	17.9
Prompt delivery	9%	\$1.12	\$0.21	5.4
	100%	\$13.20	\$2.11	6.3
<b>Company: Confartigianato</b>				
On-time delivery	17%	\$.45	\$0.13	3.6
Reliability	17%	\$.45	\$0.05	8.8
Promptness	15%	\$.40	\$0.09	4.3
Price	14%	\$.37	\$0.07	5.4
Comprehensibility	9%	\$.24	\$0.15	1.6
Politeness	9%	\$.24	\$0.06	4.0
Easy access	8%	\$.21	\$0.10	2.2
Completeness	11%	\$.29	\$0.43	0.7
	100%	\$2.65	\$1.08	2.5
<b>Company: SCM</b>				
Technical performance	29%	\$9.90	\$.56	17.7
Price	12%	\$4.09	\$.20	20.1
Technical reliability	20%	\$6.82	\$1.39	4.9
Customization	8%	\$2.73	\$0.49	5.6
Delivery time	5%	\$1.71	\$0.45	3.8
Company's reliability	11%	\$3.75	\$0.96	3.9
Customer service	15%	\$5.12	\$0.77	6.7
	100%	\$34.12	\$4.81	7.1
<b>Company: Clover</b>				
Quality	27%	\$15.12	\$1.98	7.6
Know-how updated	23%	\$12.88	\$0.05	257.6
Prompt delivery	18%	\$10.08	\$3.63	4.7
Price	32	\$17.92	\$2.91	7.8
		\$56.00	\$8.57	6.5
<b>Company: Windows, Inc.</b>				
Price	59%	\$322.14	\$135.67	2.37
Size grid	9%	\$49.14	\$2.88	17.06
Color/options	6%	\$32.76	\$9.42	3.48
Appearance	6%	\$32.76	\$6.50	5.04
Brand	6%	\$32.76	\$8.68	3.77
Durability	14%	\$76.44	\$4.36	17.53
	100%	\$546.00	\$167.51	3.25

**Table 6.** Continued

Attributes	Market Weights	(Stated in \$Mil)		
		Revenue Equivalent	\$Value-Add Cost	Value Multiplier
<b>Company: Celli</b>				
Technical reliability	29%	\$3.13	\$0.37	8.5
Price	19%	\$2.83	\$0.33	8.6
Service reliability	19%	\$2.83	\$0.22	12.8
Life cycle	15%	\$2.23	\$0.17	13.4
Customer assistance	14%	\$2.08	\$0.06	32.5
Technical performance	12%	\$1.79	\$0.02	89.8
	100%	\$14.89	\$1.17	12.7
<b>Company: Impact Communications</b>				
Placements				
quantity	30%	\$7.50	\$0.27	27.77
Creative/pro-active	15%	\$3.75	\$2.89	1.30
Strategy/brand	28%	\$7.00	\$7.57	0.92
Knowledge of business	12%	\$3.00	\$0.21	14.29
Reputation	7%	\$1.75	\$0.19	9.21
Results merchandising	8%	\$2.00	\$0.35	5.71
	100%	\$25.00	\$11.48	2.18
<b>Company: Telecom</b>				
Service	32%	\$57.58	\$32.63	1.7
Price	48%	\$86.38	\$27.27	3.2
Variety	9%	\$16.19	\$61.61	0.3
Convenience	11%	\$19.79	\$5.57	3.5
	100%	\$179.95	\$127.08	1.4

the value-added dollars for each attribute to weight, in terms of total value created by the attribute, in the customer' eyes.

The multipliers vary markedly across the different firms and attributes within a firm. The results underscore that the relationships can be measured, and that the results would vary by firm. In general, it appears that multipliers are lower for the service firms, suggesting perhaps that the market may recognize that a higher cost and return needs to be associated with fixed assets to provide sufficient incentive for these industries to emerge. If these multipliers were adjusted for such things as the required return on assets, it is likely that the two major sectors (manufacturing and service) would come closer in terms of total multipliers.

Table 7 presents further investigation of the metrics, along with the current financial performance of the firm.

In terms of alignment, a higher multiplier would suggest one of two conclusions. First, a high multiplier could mean that *less alignment* exists – the firm



with a high multiplier is spending less of its dollars on activities and outcomes with direct customer benefit. A second situation would be that the firm with the high multiplier on one or more attributes has a competitive advantage in its industry. Third, and equally plausible, is that high multipliers reflect the stage in the firm's growth cycle – a firm that heavily invests in the future would expect to show higher current period multipliers than one which more closely matches its current spends to current products.

As can be seen, then, one of the questions that naturally arose during the study was how best to interpret a 'high' versus 'low' multiplier. A priori, the belief was that low multipliers would indicate areas where a firm might be investing more in an attribute than it perhaps should if it desires to optimize its financial and market position – it is putting too much value in the product or service. A low multiplier could also serve as an indication of where the firm is facing a table stake (no real premium can be expected), is overspending or meeting severe competition in the market.

A high multiplier is equally difficult to define precisely for all sites and attributes. For instance, a high multiplier, coupled with high customer satisfaction, might indicate a competitive advantage for the firm. On the other hand, if coupled with low satisfaction, it might represent an area where the firm is underspending relative to the market's wishes. In this case, customers should be expected to be less loyal, and a competitor could target this problem in their strategy.

In terms of the general findings that value-add dollars represent roughly 30 to 40% of the total, a benchmark of approximately '3' could be set as a break-even, or multiplier target, to sort these findings into 'high' and 'low' categories. If this were the case, it would be expected that Confartigianato, Telecom and

*Table 7*

Firm	Return on Sales	Average Multiplier
Carpigiani	N/A	6.3
Confartigianato	2.8%	2.5
SCM	6.0%	7.1
Clover	8.0%	6.5
Windows, Inc.	12.0%	3.3
Celli 6.5%	12.7%	
Impact Comm'ns	5.0%	2.2
Telecom	7.0%	1.4
Average Multiplier		2.7

Impact would be facing low profit levels. In three of the four cases, this assumption appears to hold. On the other hand, the data from Windows, Inc., which exhibits a close to the average level of a multiplier and the highest return on sales would appear to somewhat contradict these tendencies.

It is at this point that the impact of separating the value attributes into ‘table stakes’ and ‘revenue enhancers’ becomes important. Windows has chosen a premium place in the market, differentiating itself on a broad number of dimensions. Its high returns reflect the high multipliers on all but the ‘price’ dimension, which due to its weight pulls the final average down. Since the five ‘non-table stakes’ dimensions are so highly valued, the premium earned is substantial. This is a firm that has learned how to make a basic window that doesn’t leak – and then added value to the product that is difficult for competitors to challenge. In reality, the customer is getting more for the ‘table stakes’ price of the window – its basic features – in terms of quality and performance than they are paying for. The positive influence of this ‘value excess’ shows up in the brand and durability multipliers. The premium earned on the revenue enhancing attributes more than outweighs the excess investment in the window itself, as the return on sales suggests.

In other words, the firm level multiplier appears to have less information value than those developed for each of the specific value attributes – multipliers at the attribute level are the dominant concern. For instance, while Clover has an overall multiplier of 6.5 (on the high end), the dominant number of its attributes show fairly low multipliers – only know-how appears to generate a premium in the market for this firm. If this were the case, any study done at the firm level would miss the key relationship between value-added costs and firm performance. In other words, the contradictory findings with respect to the relationship between customer satisfaction and firm performance in prior research may be due to the differences generated at the attribute level.

In the exploratory study, then, the multiplier concept was determined to be valid and measurable, but its final interpretation remains to be tested more fully. With Telecom and Impact Communications, there were clear areas where the high multipliers mapped to low satisfaction *at the segment level*. For the firm as a whole, Windows, Inc. was one of the firms where the multipliers could be given meaning at the global level. This may be due to the high degree of homogeneity in the product lines of the firm. Subsequent research needs to more fully explore the interaction of the multiple dimensions affecting the value multiplier, including individual versus firm level metrics as well as the degree of correlation between the multipliers and customer satisfaction, and the interactions between multipliers, satisfaction, and firm performance.

*Impact on Behavior*

The final issue of concern in the study is whether or not the VCM analysis provides insight to firm managers. In each site, the results were greeted with interest. At Celli and Windows, Inc., the managers noted that new learning took place. These managers used the results to guide changes in their spending and activity structures. As noted by a Windows, Inc. top executive:

We've always seen color and size options as a bad thing here. We work very hard to limit these options, and view them as necessary evils. If these results are borne out by our market research, we had better rethink this. If we launch new products and don't offer variety, we may lose share. Since that's a trend we're trying to avoid, we'd better make sure we give customers what they want.

One final comment from the Windows, Inc. financial manager, who served as the contact point for the study, underscores that the VCM approach may provide a different type of information for the firm.

This is the first time we can all sit down together and discuss what we're doing, using the same language. The data may not always be new, but it really does simplify our conversations and gives us a common framework that marketing, finance and operations can use. That may be the real value for us – we can talk together better.

Taken in total, the results of the exploratory studies suggest that the VCM approach is applicable to many different firms, that it does impact perceptions and behavior and appears to provide the basis for pinpointing areas where the firm needs to change its focus and spending. The data, to date, is not rich enough to pinpoint the 'right' multiplier level or spending for any one attribute, but rather serves as a means to highlight outliers and identify areas of potential competency or competitive risk. In many ways, the VCM approach appears to put economics around SWOT (strengths-weaknesses-opportunities-threats) analysis, a common strategic analysis tool. All strengths and weaknesses are not equal when relative values are included in the equation. In addition, if a high multiplier is associated with low satisfaction, it may indicate an area where competitors could threaten the firm's future. In other words, the multiplier relationships appear to be directionally accurate and informative.

The final propositions of the study, namely the ability to gauge satisfaction and profitability from the relative multiplier positions of the firm, remains to be more fully tested. Data from Impact and Windows, Inc. suggests that where customer requirements are understood and met, satisfaction and loyalty may be higher. Conversely, where these requirements are not met, the firm may be viewed less positively. Given increasing evidence, borne out in Impact, that the customer relationship is an investment that has to be maintained over time to

recover its initial costs, it would appear important to define and track spending and performance against requirements over time – to develop a customer life cycle perspective on the cost-value relationship.

## **COMMENTS AND OBSERVATIONS**

The purpose of this paper was to test whether or not the Value Creation Model (VCM) could be operationalized in a meaningful way within a company. The ultimate value of the model rests in its ability to directionally identify and categorize the effectiveness of a firm's cost structure alignment with the market. On the basis of this belief, the research sought to understand what could be measured, where actual data would be difficult to obtain, and whether or not the results would provide insights and significant variation to warrant further work.

The results suggest that VCM does provide a different view of the organization and that it serves to link internal financial analysis to the strategic position of the firm in its various product markets. It also appears to provide information to managers, who view it as an interesting way to look at the firm. Some have gone so far as to change their spending to reflect the requirements of the customer, others are looking for ways to validate the findings before taking action. In no case, though, were the results met with indifference – VCM appears to make visible a unique dimension of the organization.

As with any exploratory study, there are many weaknesses in the work that has been presented here. The lack of comparability across attributes and firms limits the statistical analysis that can be completed. One of the major improvements that could be made, then, would be to compare firms within one industry for their relative spending and performance on a common set of attributes. A second improvement would come from tracking one firm over time, to understand the dynamics of improved alignment between spending and customer requirements and its possible positive impact on firms' competitive position. In addition, many of the identified relationships need to be individually explored to better understand the limits of the VCM structure. Issues of concern are whether interdependencies exist between the various attributes, how to best capture the relationship between multipliers and customer satisfaction, and finally, how to best determine if any of the business value-add or non-value-add costs are more important than others for the long-term survival of the firm.

While many improvements can be made, this study did accomplish its stated objective – to determine if the core relationships and variables that make up the model are to be viable proxies for the key facets of strategy in a competitive market. VCM suggests a way to approach the firms' investments in delivering

on various attributes as a portfolio of efforts that target specific segments and seek to mitigate business risk by optimizing the segments served by the firm's products. The ultimate value of the approach remains to be seen as the pilot firms begin to use the information in their strategic and tactical decision making.

On the academic level, this paper makes both methodological and theoretical contributions. In the former case, it would appear that a modification of 'accepted' or best practice in field research may need to be adjusted to reflect the fact that many of the relationships being explored by the research studies require validation at the cultural level. It cannot be assumed that the language and approach used in accounting research is neutral – it appears to markedly influence the validity of the response data. If the managers at Telecom are any indication (as well as the downstream impact of new words at Windows, Inc.), it may be necessary to require a 'language bias test' for a field study that explores the impact of words on results. Much like a pre-test in experimental work, this addition to existing methodology could potentially increase the probability that the recorded findings would be repeatable and verifiable.

Also at the methodology level, it is quite possible that it may become necessary to accept a more fluid research design as a viable, in fact optimal, way to learn from field data. In very few cases is the problem under study in field research so well defined and documented that the researcher will not come upon significant, study-impacting results. A researcher should not be left in the undesirable position of choosing to either ignore a finding that is significant or 'adjust' early evidence to make it appear compatible. Field research is a learning experience, one in which the interaction of the researcher with the site allows for knowledge to grow. This fact is the embedded value in field research that is difficult to achieve in most other research forms. It is to be pursued, with sufficient discipline, not buried or falsely reported.

The expansion of the accounting language to include business value-add is another major contribution of this research. If the study results hold, it is quite possible that the majority of reported results to date may be spurious – they may fail to accurately reflect the economics and reality of business structures. Similarly, the use of language that is undesirable may upwardly bias prior studies.

Finally, it appears crucial to separate the factors influencing customer satisfaction and retention into the underlying attributes of the product and service. A global measure of satisfaction is as unlikely to yield consistent empirical results as the firm-level multipliers did in this study. It appears to be necessary to delve deeper into the organization and its 'value proposition' to capture the relationships and issues that define superior versus inferior, performance. Just as a consumer's utility function is comprised of multiple elements, research that attempts to understand the relationship between a firm's efforts and these

elements must be sufficiently complex. In the end, understanding and documenting the economics of the firm as it relates to the preferences of consumer segments may be the key to unlocking the profitability puzzle.

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## NOTES

1. The literature and development of this argument is laid out extensively in several articles and books by McNair and Vangermeersch. The forces leading to the chasm that opened in cost management practices in the 1920 to 1930 period can never be fully explained, or tied to, one cause. Rather, the combination of policies, international events and macro-economic forces at work during this time period created a unique form of capitalism. The new capitalism was based initially on active collusion (the NIRA) and later upon tacit acceptance among business advocates that the role of cost was to provide a basis for a firm to cover its costs of production and earn a 'reasonable profit' in the market. The result was the substitution of full cost for market-defined value and the basis for a firm's price (e.g., utility functions and demand curves), as well as the separation of a firm's internal economics from the realities of the market.

2. There is an ongoing debate as to how 'new' ABC really is. Staubus wrote extensively about this cost model in the early 1970s. There is also evidence that the method and focus can be traced back as far as Whitmore's work in the early 1900s. It is beyond the scope of this study to trace ABC's genealogy.

3. Kaplan and Cooper (1998) argue that this is a misinterpretation of ABC. Specifically, they state that ABC takes a long-term perspective on cost, noting that in the long-term all costs are variable. While this fact cannot be refuted, it is equally true that in practice, costs are viewed and managed as though they are actionable in the short-term. Whatever theory underlies the ABC model, its impact on practice suggests that ABC estimates are seen as, and used, as proxies for variable costs by managers. This has been found to lead to various forms of undesirable behavioral responses, such as a sales manager failing to make calls at the end of a month because the budget for this activity has been exceeded. Whether ABC is the problem or whether there is simply a need for improved education on how to use the ABC estimates remains to be seen.

4. As noted in Ittner and Larcker, 1998(b), there has been some industry-based variation in the reported results on the informativeness of customer satisfaction measures for assessing a firm's potential long-term performance. Foster and Gupta (1997) found positive, negative and neutral relationships based on the questions included in the satisfaction measures. While not a perfect signal of future performance, though, customer retention and satisfaction appear to provide some insight into current and future success of a firm.

5. See Ittner and Larcker, 1998(a), p. 2.

6. Protocols are available upon request.

7. The recognition that the simple categorization of activities and costs into value-add, non-value-add and waste was insufficient to capture the range of effort in the firm led to the development of three 'business value-add' categories (administrative, investments in future capabilities, and current key support activities that indirectly impacted customer satisfaction). This refinement was a result of the in-depth research (Phase III), and was both a major finding of the research and the basis for revision of the model in the Phase III sites.

8. We would like to thank Dr. Monica Bartolini of University of Bologna, Forli Campus, Italy, for her help with data collection and analysis of Italian sites.

9. The support was garnered in some part because each firm was promised an activity-based analysis of their existing cost structure. It is often necessary in field research to provide a quid pro quo to participating firms to secure their participation. This report was a natural outgrowth of the methodology and was not completed for any consideration or fees.

10. In Lancaster's model (1971) and economics literature in general, consumers are assumed to maximize utility function consisting of goods/services or in case of Lancaster's model attributes, subject to the budget/efficiency constraint. Price enters utility maximization as a limitation on maximum achievable utility rather than as an attribute. At this stage of our research our empirical data are more in line with marketing research which allows for price to be defined as an attribute.

11. It is not believed a bias was created by this reduction of data. Instead, it allowed the study to better understand and reflect the customer's view, which is product-based, and the firm's spending, which is also product-dependent. Firms where this narrowing down occurred were SCM and Windows, Inc.

12. We performed a preliminary test on whether internal perspectives on attribute weights were consistent with market-determined values as suggested by Cleland and Bruno. Our data however was insufficient to test this claim.

13. The average market value reflects weighting of the value attribute distribution by the percentage of total clients included in each segment.

14. Impact was the only site where extensive student projects supplemented the researchers time spent on site. This did not change the project methods directly, but added significantly to both the length of the analysis (this was a fairly small site and should have been rapidly completed) and the depth of the questions and interpretation that resulted.

15. The firm investment in research would likely pay off over the long-term for even the publicity clients, but since these were often one-time engagements, there was no ongoing revenue stream to offset the costs of the initial firm investment in knowledge about the firm, issues, industry trends, and macro-economic events. More detail on Impact is available through the Babson case series.

16. Each of the noted quotes is taken from researcher notes. Some are exact quotes, others are logical paraphrases of the conversation and comments provided. In each case, the respondent was asked if the comments reflected their feelings and meanings accurately.

17. While some may argue this compromised the research, the goal was to identify whether the data could be collected, how best to do so, and what behavioral impact might ensue. Failing to incorporate the learning would have led to the need to create

another study to test this result. As it stands, discussions at Windows, Inc. reinforced the message provided by Telecom's managers – the language of the original study inhibited responses and shaded perceptions.

18. Four of the eight sites (Impact, Telecom, Windows, Inc. and Celli) were visited multiple times over an extended period of time. Significant depth to the results was added due to the increased length of exposure that allowed the researchers to better understand the company, its culture and the impact of the study on perceptions.

19. The support of CIM-A, at Babson College, was critical during the completion of both Telecom and Windows, Inc. Without this significant funding, the work could not have been completed. This suggests that research using this methodology may be more difficult to support than other, less intense, methods and approaches.

20. The segment data is available, but given the high sensitivity of the analysis, would need to be cleared with the affected sites before a release to another researcher, which will delay the response time.

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# THE DRIVERS OF CUSTOMER AND CORPORATE PROFITABILITY: MODELING, MEASURING, AND MANAGING THE CAUSAL RELATIONSHIPS

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## ABSTRACT

*Activity based costing and the balanced scorecard have recently focused greater attention on the drivers of costs, success, and profits. Neither academics nor managers, however, have yet to delineate the leading and lagging indicators of business performance, their interrelationships, and how they should be measured. To address this need, we propose a model of the causal relationships between the variables describing business performance, along with suitable metrics for operationalizing the model. The model provides guidance on the investments that managers should make to maximize both stakeholder and shareholder value, the likely payoffs from investments in items such as human resources, suppliers, and customers, and the information with which to make the tradeoffs that managers must make on a daily basis. Finally, we propose a research agenda for exploring causal relationships between business performance drivers that should prove fruitful for researchers in accounting and other business disciplines.*

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## INTRODUCTION

In this paper we develop a framework for understanding the causal relationships among the drivers of customer and corporate profitability. Our approach, which we designate as the Action-Profit-Linkage (APL) model, draws upon literature in accounting, human resources management, marketing, and operations, and provides an integrative framework for evaluating the profit consequences of managerial actions. In addition to helping identify the key drivers of customer and corporate profitability and assess the causal linkages among them, the model is also useful for evaluating the revenue and cost impacts of specific firm actions designed to manage them.

One of our purposes in proposing the APL model is to focus management attention on the causal linkages among the key drivers of customer and corporate profitability. Typically, managers devote their attention to individual target variables or metrics such as sales, profits, market share, customer satisfaction, capacity utilization, employee turnover, etc. in the course of planning and directing the actions of the firm. Seldom is the focus on the relationships between the variables of interest, or on the *larger* system in which the variables are embedded. We believe this prevalent tendency to focus on individual target variables results in a significant impediment to cross-functional integration in organizations. Armed with an understanding of how the performance metrics of their organizations are interrelated, managers will be better equipped to deal with the challenges of leading complex organizations. To help accomplish this, the proposed model offers a framework for identifying and evaluating the linkages between the drivers of corporate profitability.

While we develop the model in its general form, it is readily adapted for evaluating the tradeoffs between alternative investments for organizational improvement in any of the functional areas of the firm. The APL model is consistent with existing models of organizational improvement, including the service profit chain (Heskett, Sasser & Schlesinger, 1997), return on quality (Rust, Zahorik & Keiningham, 1995), and the balanced scorecard (Kaplan & Norton, 1996) models.

The paper begins with a review of the relevant literature upon which we draw in developing the model. After describing the model, we consider the measurement and analysis of the profitability drivers, and provide a brief illustration of the implementation of the model. Finally, we offer a research agenda for testing the model and developing its applications.

## 2. LITERATURE REVIEW

Much of the literature within the functional areas of management, notably human resource management, marketing, and operations management, focuses

principally on variables, metrics, and management tools unique to each functional area. There have been relatively few attempts to integrate the relationships among variables across disciplines, and relate the management actions pertaining to them to overall firm profitability. Consequently, while researchers have made significant progress with regard to systematically understanding the intra-disciplinary effects of variables, relatively little effort has been devoted to understanding their respective impacts on overall firm profitability.

For example, in the marketing literature, a large body of work exists on the modeling, measurement, and management of the variables and metrics unique to marketing, such as market share (Buzzell & Gale, 1987), customer satisfaction (Yi, 1991; Zeithaml, 2000), and brand loyalty (Aaker, 1996). Progress has been made in understanding the individual drivers of each of these three metrics, as well as in relating them to each other. For example, customer satisfaction is driven by customers' perception of product performance relative to their expectations of such. Higher satisfaction has been linked to greater customer loyalty (Zeithaml, 2000), which leads to increased market share and in some cases, superior profitability. Within the firm, however, proposals for improvement in customer perceptions are seldom evaluated according to their profit impact (for an exception, see the work of Rucci, Kirn & Quinn, 1998).

Similarly, the organizational behavior literature has frequently addressed the antecedents of job satisfaction and the managerial interventions that affect it (Cranny, Smith & Stone, 1992). However, much of the work on the consequences of increased job satisfaction is confined to examining the effects on related outcomes such as productivity, absenteeism, and turnover (Handy, 1993). Even discussions of the returns on investment in employee management practices (Tsui et al., 1997) focus only on changes in employee attitudes and behavior, rather than on overall corporate profitability.

In the operations and service management literatures, attention has been devoted to the measurement and management of quality, while the accounting literature has addressed the cost of quality. Much of this work focuses on customers' perceptions of quality and its roots in various organizational deficiencies (Parasuraman, Zeithaml & Berry, 1985), and on the interrelationships among the various categories of costs and other aspects of product and service management (Juran, 1979). The focus of this work is on the drivers and costs of non-conformance (see for example Morse & Roth, 1987; Ittner, 1996), rather than on non-financial measures of performance or opportunity costs.

Some tools have been developed to perform cost-driver analysis in order to prioritize potential quality improvements and provide estimates of profit impacts (Atkinson, Hamburg & Ittner, 1994). In marketing, an integrated approach for measuring the profitability of quality improvement initiatives has been proposed

in view of the prevalence of quality improvement as an end in and of itself (Rust, Zahorik & Keiningham, 1995). The framework conceptualizes quality initiatives as investments that must be held financially accountable, much like other investments.

In addition to efforts within marketing to assess the profitability of quality initiatives, accountants have begun to focus attention on measuring the profitability of customers (Ittner & Larcker, 1998a; Foster & Gupta, 1997). The premise underlying customer profitability analysis is that while it is important to be customer-focused and improve customer satisfaction, such improvements should not be made at the expense of long-term firm profitability. Customer profitability analysis suggests that firms should evaluate the attractiveness of each customer not on the basis of the gross revenues earned, but on the basis of the difference between gross revenue and cost to serve the customer. The development of customer profitability analysis has been facilitated with advances in activity-based costing (Kaplan & Cooper, 1998), allowing firms to better understand the drivers of the costs associated with each customer.

The most encouraging signs of progress in linking variables across disciplines has come from recent work on the service profit chain (Heskett, Sasser & Schlesinger, 1997) and the balanced scorecard (Kaplan & Norton, 1996). These broad interdisciplinary frameworks effectively integrate knowledge heretofore isolated within separate functional areas. These frameworks help focus attention on a set of a few major decision variables and causal relationships that can assist managers in making better decisions.

The service profit chain provides a strategic framework for managing revenues and profits, primarily in people-intensive service settings. It proposes that firm profitability depends on the satisfaction and loyalty of the organization's customers. Attainment of customer satisfaction and loyalty in turn requires better management of the employees of the firm. While the service profit chain has been used in various organizations, its implementation at Sears Roebuck may be the best-documented evidence of its effectiveness (Ittner & Larcker, 1998b, Rucci, Kirn & Quinn, 1998). At Sears, a five-point increase in employee attitude was found to result in a 1.3 point increase in customer satisfaction, which in turn led to a 0.5% increase in revenue growth.

The balanced scorecard (Kaplan & Norton, 1996) provides a still broader-based approach to managing the drivers of success. The scorecard contains a parsimonious yet multi-faceted set of measures that can be used by senior management to determine the current health of their enterprises and to manage that of the future. Specifically, the balanced scorecard views the organization from four perspectives linked directly to corporate strategy: customer, financial, internal business processes, and learning and growth. Taken together, these

four perspectives and their related measures form a strategic management system that helps companies implement strategy.

In summary, the management literatures focus largely on modeling and measuring the interrelationships among the variables unique to each functional area. Interdisciplinary approaches, such as the service profit chain and the return on quality models, while very helpful, do not encompass the full range of the drivers of organizational success. The balanced scorecard is perhaps the most suitable framework inasmuch as it focuses attention on the drivers of success and profits. However, it does not directly provide guidance on developing, measuring and analyzing the causal linkages existing among the various drivers of profitability. Such a framework for understanding the causal linkages among firm actions, functional metrics and ultimately corporate profitability would be helpful to both academics and managers. While the former would benefit from an integrative, multi-disciplinary framework for studying the drivers of firm profitability, the latter would be aided by re-focusing attention from firm metrics and variables per se to the linkages between metrics leading to organizational success.

It may be surmised that in the absence of such a framework, a number of non-financial performance metrics, e.g. customer satisfaction, quality, and market share have become accepted as universal drivers of corporate strategy, even with only limited empirical evidence of their role in leading to profitability. However, the overarching objective for managing an enterprise should not be to increase levels of quality or customer satisfaction or employee retention because they have a role in business success or profitability. Instead, it should be to manage all of the identifiable drivers of profitability with regard to both their effects on revenues and costs, so as to maximize the value of the firm to its stakeholders. The APL model discussed in the next section provides a means of pursuing this goal.

### **3. THE ACTION-PROFIT-LINKAGE MODEL**

The Action-Profit-Linkage (APL) model is a framework for identifying and measuring the key drivers of business success and profit, developing the causal linkages among them, and estimating the impact of managerial actions designed to bring them about. It takes its name from its focus on linking actions taken by the firm to the profitability of the firm within its market environment. The model assumes that firm actions may have identifiable effects on customers, and that these customer reactions in turn have predictable effects on the revenues received by the firm. When the costs of the firm's actions are considered, it becomes possible to link firm actions to their ultimate impact on corporate profitability. The APL model is intended to help researchers better investigate the



relationships between specific firm actions and overall corporate profitability, and to help managers make better decisions about firm actions so that they result in superior profit consequences.

The APL model is shown schematically in Fig. 1. The full details of all possible relationships between individual model variables is not shown in order to simplify the presentation. The major headings at the top of the figure represent the major classes of variables comprising the model, and the boxes indicate more specific groupings of variables. Our notational convention is to indicate the likely drivers of a variable or class of variables by the other variables leading to it with arrows. Each of the immediate drivers in turn is shown to have other drivers, leading backward in a causal chain of events

A generalized version of the model is presented for expository purposes. The model is intended to be customized to a specific firm by substituting the actual performance metrics used by that particular firm for the more general variables discussed here. Many of these firm-specific variables will be the same as those in the model here, but others will reflect the firm's particular industry and business context.

### *Overview*

We begin by recognizing that *economic impact*, that is, overall corporate profitability may be decomposed into two components: direct customer profitability, and profits or costs from operations only indirectly related to customers. Customer profitability, in turn, is driven by the revenue stream generated by a customer after deducting the direct costs of all actions taken by the firm to produce, market, and deliver its product or service offering to customers. All other revenue and cost streams may be combined to form indirect costs or profits.

The determinants of the revenue stream of the firm are: (1) the number of customers making purchases, and (2) the purchasing behavior of customers. The number of customers comprises not only existing customers making repurchases, but also new customers being attracted for the first time. We refer to the direct behavior of customers, as well as their key psychological antecedents, as Customer Actions. In effect, customer actions are the market responses to the actual product or service that is offered for sale. The latter we label the Delivered Product/ Service, and it includes the sum total of the firm's offering: a product or service of defined characteristics, a particular brand or vendor name, an established or negotiated price, and a mix of persuasive communications to customers. Finally, the delivered product/service is created by a variety of Firm Actions, such as obtaining financing, acquiring equipment, developing operations schedules, hiring staff, managing a sales force, purchasing advertising space, billing customers, and operating a customer service call center.

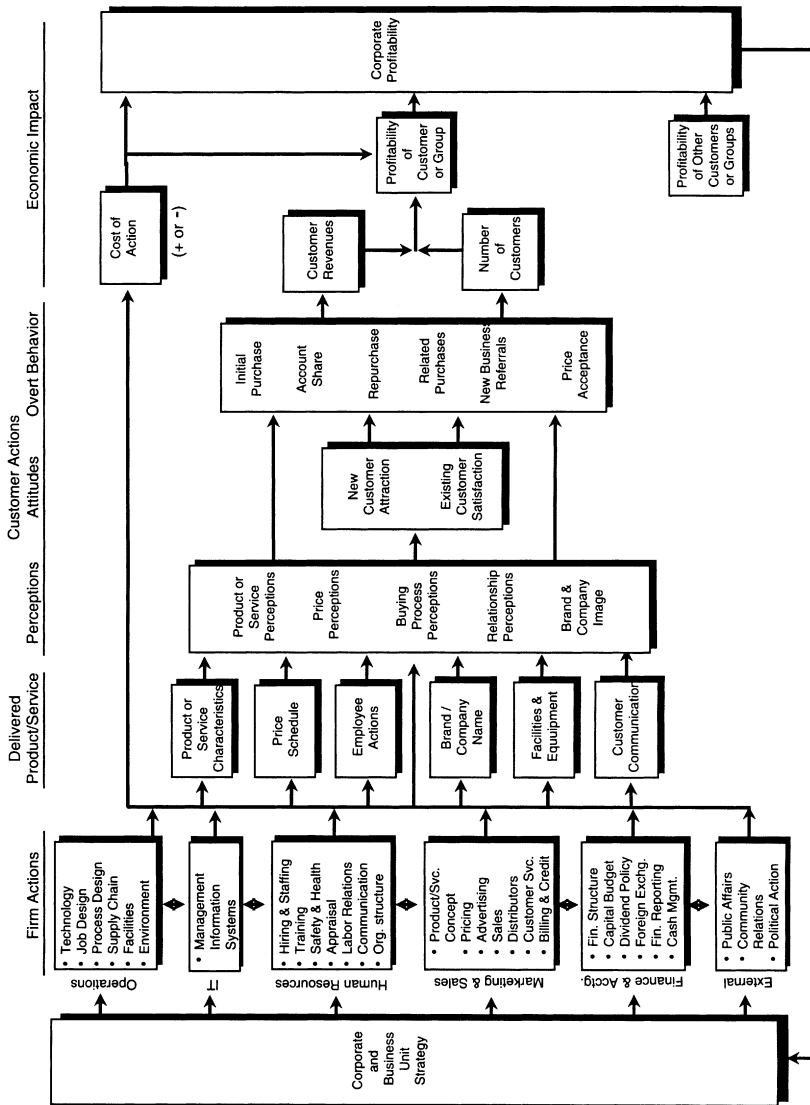


Fig. 1. The Action-Profit Linkage Model

Hence, the APL model posits that specific *firm actions* create the *delivered product or service*, which influences *customer actions* relative to the product/service, which in turn produces revenues and ultimately corporate *profitability* through an identifiable set of causal linkages involving numerous intervening variables. The profitability of any firm action can be evaluated by examining the causal linkages between the action and the resulting change in the customer revenue stream, allowing for the costs of the action. Further, firm actions that do not affect customer actions can be traced directly to corporate profitability via the appropriate costs and non-customer revenues.

The work of Rucci, Kirn and Quinn (1998) at Sears Roebuck illustrates the essential nature of causal linkages between key performance metrics of the firm. Although the driving force for their research was the service profit chain, the model they developed is in fact a special case and more limited form of the APL model. The Sears model established two noteworthy linkages: (1) the actions of employees to the actions of customers, and (2) the actions of customers to firm profitability. These linkages allowed management to understand how direct and specific improvements in employee satisfaction would improve customer satisfaction, and ultimately profitability. The key relationships in the model were summarized as “. . . a 5 point improvement in employee attitudes will drive a 1.3 point improvement in customer satisfaction, which in turn will drive a 0.5% improvement in revenue growth” (Rucci, Kirn & Quinn, 1998: 91). Knowing this, management could evaluate the revenue gains from a variety of alternative actions designed to improve employee attitudes, such as training programs, incentive compensation, job redesign, etc. When the costs of the actions are considered, it becomes possible to compute the ‘return on action’.

#### *Customer Segments*

The APL model is intended to be applied to each of the principal customer groups or segments of the market served by the firm. Such specification is necessary owing to differences in the response tendencies of each customer type, which arise out of differences in customer needs and expectations, buying habits, alternatives considered, etc. In firms with very few customers, such as those involved in business-to-business sales, customer segmentation may not be feasible owing to an insufficiency of numbers. In these instances, the APL model may be applied to each individual customer. We turn now to each of the major elements of the APL model and the relationships among them.

#### *Corporate Strategy and Firm Actions*

Corporate strategies are manifested in the portfolio of activities or actions that firms choose to or choose not to perform (Porter, 1996). In the APL model,

firm actions comprise the decisions or choices made by management that effect a change in the activities of the firm. Six broad domains of firm action may be identified, corresponding to the firm's functional areas: operations, human resources, marketing, finance and accounting, information technology and external relations. Operations actions concern business processes that produce and deliver the firm's products and services, including the use of suppliers and the acquisition of the inanimate inputs for creation of value. Human resource actions consist of the acquisition, development, utilization, and retention of the firm's employees. Marketing actions comprise the choice of the firm's product/market and its methods of sale. Financial and accounting actions pertain to financial structure and management, capital budgeting, and reporting. Information technology actions refer to the capture, processing and dissemination of information within the firm. Finally, external relations are those actions that are directed toward improving relationships with stakeholders other than employees, customers, suppliers, and investors and financiers, namely, the firm's community, regulators, and public policy makers.

Within each of these six domains there is, in turn, a wide range of potential activity. For example, within marketing, the potential areas of action involve the specification of the product or service concept, creation of a product line, pricing strategies and tactics, sales, advertising, customer service, etc. In turn, each of these areas comprises many specific actions. For example, the pricing area in marketing might include actions such as raising price, lowering price, bundling the service with other services, offering introductory discounts, revising frequent-customer discounts, and other changes in the price schedule.

In general, firm actions have either an effect on the delivered product or service and thereby the revenues of the firm, or the costs of the firm, or both. Some actions, such as a re-organization of employees to serve customers more quickly, may positively or negatively impact customer satisfaction and loyalty, and thereby revenues, while at the same time possibly requiring no increase in costs. Others, such as the installation of a more powerful computer system for process control, or a change in capital structure of the firm, might affect only costs and not revenues. Finally some actions, such as increasing spending on advertising, have the potential to impact both revenues and costs (Foster & Gupta, 1994). Actions contributing to costs may involve changes in the firm's variable costs or its fixed costs. As a result, not all actions directly impact customer profitability or contribution earned; those involving fixed costs may only have their effects at an organization-wide level after customer profitability or contribution has been aggregated across all customers.

*Delivered Product or Service*

Firm actions lead to the creation of an actual product or service offering as it is presented to customers. While some actions are more centrally involved than others in creating the product or service, all may be viewed as participating. The delivered product or service describes the objective characteristics of the offering to which customers in turn respond by buying or not buying. Six groups of elements make up the delivered product or service: (1) product or service offering with defined attributes, (2) brand or vendor name, (3) physical facilities and equipment for serving customers, (4) actions of customer-contact employees, (5) communications about the product or service offering, and (6) price. For example, the delivered product of an airline includes the following: schedule of flights between cities served; airline name; airport facilities and aircraft; behavior of reservations agents, check-in and gate agents, flight attendants and baggage handlers; airline website, media advertising, vacation package brochures; and fares. All of these characteristics reflect the combined result of the firm's actions, but principally those in operations and marketing.

The behavior of customer-contact personnel involved in delivering the offering deserves explanation. Although mostly applicable to services, this aspect of the delivered product/service may also be relevant to products that have a significant service element, e.g. new car purchases, where some amount of warranty service is bundled with the vehicle sale. Included under the rubric of employee behavior are also several intervening factors that drive the overt behavior manifested to customers. These intervening variables include employee attitudes toward the firm, their assigned jobs, their pay, supervision, other employees and the customers of the firm. These factors are necessary for both understanding and modeling the linkage between firm actions such as staffing, training and compensation to the overt behavior of employees toward customers.

*Customer Actions*

In the APL model, customer actions are broadly defined to include not only the overt buying behavior of customers, but also customers' covert perceptions and attitudes. The latter may be considered intervening variables for purposes of understanding and modeling the linkages between customer actions and the delivered product/service.

Customer actions must be conceptualized slightly differently depending on whether the current customers of the firm are at issue, or whether the concern is prospective customers who have yet to make a purchase. Both groups of customers are responsible for the generation of revenue, but in different

manners. Existing customers making another purchase comprise the bulk of most firms' sales. Prospective customers represent the pool of future buyers, some of whom will make an initial purchase following receipt of targeted communications, sales calls, etc.

*Overt Customer Behavior.* For current customers, these actions include such visible activities as repurchase or continuation of service; repurchase frequency; account longevity; transaction price paid; share of customer requirements (also known as account share); extent of purchase of related services and products offered by the firm (also termed cross-sell); and new customer referrals. For prospective customers, the forms of overt behavior are similar, although instead of repurchase, the appropriate behavior is the incidence of initial purchase. New customer referrals by prospective customers are generally fewer and less influential than those made by existing customers. Similarly, it is less likely for prospective customers making an initial purchase to fulfill as large a share of their requirements with the firm's offering, or to purchase related services and products from the firm.

*Customer Attitudes.* Customer attitudes are defined as the extent to which customers are favorably or unfavorably disposed with respect to the firm and/or its delivered product/service. They represent an essential intervening form of customer action, necessary for establishing predictive causal linkages between firm actions and the overt behavior of customers. Absent customer attitudes, it is difficult to successfully establish the empirical relationships needed to trace the profit impact of specific firm actions. For existing customers, customer attitudes are described more specifically as customer satisfaction, and for prospective customers they are simply termed customer attraction. These customer responses are in effect the drivers of the various forms of overt customer behavior.

*Customer Perceptions.* The final form of customer 'action' in the APL model is comprised of the various perceptions that customers have of the delivered product or service. These perceptions reflect what customers know and think specifically about the delivered product/service, based on their direct experience and reception of the firm's informative and persuasive communications. In effect, the perceptions that customers have of the product or service offering are the drivers of customer satisfaction and attraction, and indirectly thereby of overt customer behavior (Westbrook, 1981)<sup>1</sup>. They too are necessary for establishing a chain of links from firm actions to visible forms of customer behavior such as customer retention, new customer referrals, etc.

Customer perceptions of the delivered product /service fall into five broad classes: (1) the product /service itself, (2) the price paid or required to acquire the product, (3) the nature of the buying process required to acquire the product /service from the firm, (4) the relationships customers have with the firm and its employees, and (5) the overall image of the firm and/or the brand. In general, each customer will have multiple perceptions of the product/service across one or more of the five classes, based on their experience if they are current customers of the firm, or on advertising, sales calls or referrals if they are prospective customers. Our categorization reflects an elaboration of the useful taxonomy proposed in Kaplan and Norton (1998), and is intended to more sharply focus management attention on all essential aspects of customer perception for purposes of understanding customer actions. Importantly, perceptions need not be veridical with respect to the product /service as it exists objectively or made available to customers. One of the main challenges of firm action, therefore, is to ensure that customer perceptions most accurately represent the actual product /service and its price.

#### *Economic Impact*

The economic impact section of the model reconciles the revenue effects of Overt Customer Behavior with the Costs of Firm Actions to obtain a resulting profit impact. Consider three of the six forms of Overt Customer Behavior described above – the likelihood that existing customers make repeat purchases, the likelihood that prospective customers make first purchases, and the likelihood that either type influences other prospects to become customers. These are the factors that determine the total number of customers the firm will have. The remaining three forms of Overt Customer Behavior – the account share of each customer type devoted to purchases of the firm’s product/service, the extent to which they accept the asking price, and the likelihood that each customer type will make related purchases from the firm – determine the annual revenues generated by each customer. The product of Number of Customers and Average per Customer Revenues is equal to the total revenues generated by all customers.

The Costs of Firm Action will either be direct and attributable to individual customers, e.g. improving the amount and quality of airline meals served, or indirect and not attributable to individual customers, e.g. expanding corporate financial planning staff. Direct costs deducted from customer revenues yield direct per customer profitability (labeled Profitability of Customer or Group in Fig. 1), while indirect costs reduce the sum of all individual customer profitabilities to yield Corporate Profitability.

The APL is intended to be applied to each individual customer served by the firm, if the firm has only a few but large customers, or to each of the customer

segments served by the firm, if it has many customers that have been divided ex ante into distinct customer segments. In some instances, there may also be an addition to (or subtraction from) total corporate profitability from what is labeled here as a ‘network effect’. A network effect occurs when a Firm Action for a particular customer segment also causes a change in the profitability of another segment. For example, consider Microsoft advertising the launch of Windows 2000 Professional Edition to their business segment customers through a national television campaign. Although not the target of the campaign, some of its consumer segment customers notice the ad and are influenced to buy the consumer version of the product. Microsoft’s total profitability is thus influenced by the intended effect of its business-to-business advertising, as well as the unintended effects of the business-targeted advertising on consumers. Network effects are often but not always created by instances of ‘action leakage’ to other segments.

### *Model Linkages*

Linkages in the APL model are shown in Fig. 1 as arrows connecting the major groups of variables in the model (Firm Actions, Delivered Product/Service, Customer Actions, Customer Profitability, Costs and Corporate Profitability). Although the linkages are between variables rather than groups of variables as shown, for clarity and simplicity, they are shown as the latter. The linkages between variables should be inferred from the arrows linking the groups of variables in the figure. For example, the arrow between ‘Product Characteristics’ under the Delivered Product/Service should be taken to mean that linkages are expected between at least some physical product characteristics and some ‘Customer Perceptions’. For example, in the automotive industry, manufacturing quality is measured by a variable known as defects per 100 cars, and it might be expected to drive the customer perception of the vehicle’s reliability. Similarly, the arrow from Customer Actions – Overt Behavior box to the Number of Customers box is meant to indicate the following: the number of customers patronizing the firm is related to at least one of the following: probability of initial purchase, probability of repurchase, and the other variables in the Customer Actions – Overt Behavior box.

Although Fig. 1 shows groups of variables linked together in simple and direct chains, the causal linkages between individual variables in the APL model need not be limited in this manner. For example, ‘Employee Behavior’ is a potentially important subgroup of variables within Delivered Product/Service, and HR actions, also a subgroup within Delivered Product/Service, are no doubt among its key drivers. However, other Product/Service characteristics, as well as other firm actions may be as strongly linked (if not more so) to Customer Actions and



ultimately Customer Profitability. As a result, the model does not require or limit the linkages to the following chain: HR Actions → Employee Behavior → Customer Actions → etc. Instead, the APL model allows *any* of the variables to be linked to any others so that the most powerful linkage can be discovered through empirical research. This constitutes a major difference between the APL approach and the service profit chain.

To illustrate the diversity of the potential causal linkages that may arise in APL models, we consider three specific examples. In the first example, consider an Internet retailer that sells consumer products from its web site. The firm is considering a training program to improve the service given to customers over the telephone. The APL model shown in Fig. 2a outlines the causal linkages between the firm action to invest in the training program and overall corporate profitability. Very specific and measurable attributes, such as response time, the quality of consultation, courtesy, and professionalism characterize the behavior of such employees during a service encounter. The employee's performance on each of these attributes comprises in part the delivered service, whose quality, in turn, influences customers' perceptions and subsequently their overall satisfaction. The level of customer satisfaction results in increased repurchases from the retailer. The firm's action to provide training to its customer contact employees is likely to improve their performance on the specific quality metrics, thereby leading to higher customer revenues and greater corporate profitability.

In the second example, management of an airline is considering a redesign of its check-in counters (Firm Action) in order to reduce passenger check in times (aspects of the Delivered Product/Service). One set of linkages that might be hypothesized is as follows, shown in Fig. 2b: faster check-in counter drives more favorable customer perceptions of check-in (an aspect of Customer Actions), and these in turn drive higher satisfaction with the airline (another aspect of Customer Actions), which increases the likelihood of flying the airline again in the future (also an aspect of Customer Actions). The latter Customer Action might be expected to generate increased customer revenues, and if sufficiently large, would be expected to offset the cost of the counter redesign, thereby increasing overall corporate profitability.

In addition to these linkages, however, there may be other linkages that add to or subtract from them. Returning to the airline case example, because the counter redesign (Firm Action) effectively moves more customers through the check-in line, the workload of check-in counter employees increases as well (another inadvertent Firm Action), reducing their overall satisfaction (Employee Behavior, an aspect of Delivered Product/Service). Two effects might be expected to result: (1) the check-in counter employees are less inclined to be pleasant and helpful to passengers (also Employee Behavior), which reduces the favorability of passenger

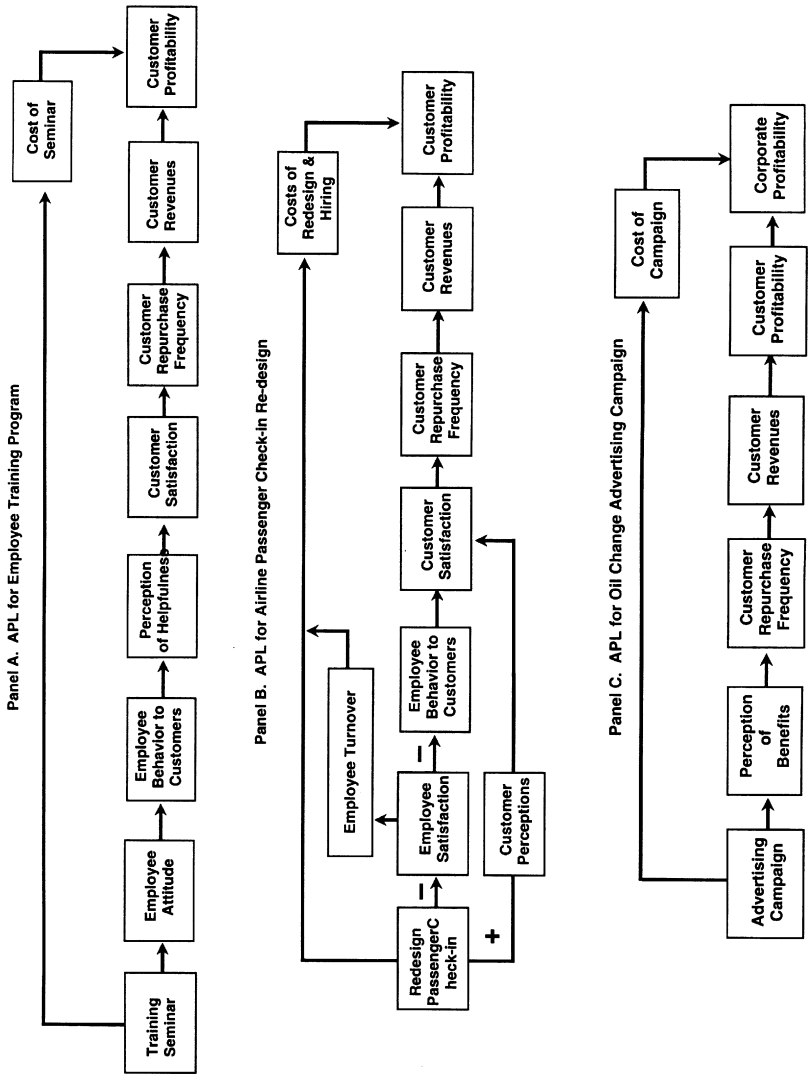


Fig. 2. Illustration of Possible APL Models

perceptions of check-in personnel (Customer Perceptions), and in turn works to reduce overall Customer Satisfaction with the airline; and (2) the lower employee satisfaction increases the likelihood that some employees will quit to find work elsewhere (an aspect of Employee Behavior), which increases the firm's hiring and training costs (Costs). Note that both of the linkages to Customer Satisfaction converge, and the result will be either a net increase or decrease, depending on which has the more powerful effect. There will be a corresponding increase or a decrease in the likelihood that customers will fly the airline again, customer revenues and profitability. Thus, it is important to recognize that firm actions can also produce linkages with directionally opposite effects on the other variables in the chain of effects. The APL model that is developed should include all the preceding linkages so that their effects can be evaluated empirically. The net effect on profitability of the Firm Action to redesign the check-in counters can then be calculated by considering the increases in customer revenues as offset by the increased costs of hiring and training. While the chain of events in the first linkage is consistent with the prescriptions of the service profit chain, those in the second one are not.

For the third example, consider a chain of oil change service shops that is seeking to increase the number of its customers who change their oil every 3000 miles or sooner. As shown in Fig. 2c, the frequency of oil change (Customer Action) may bear no relationship to the Satisfaction of the customers with purchase, or to Employee Behavior (an aspect of the Delivered Product/Service) and satisfaction of the service employees of the firm. The driver of the change in customers' behavior might be the Firm Action of an advertising campaign, either in the mass media or direct mail. The APL model for such a behavioral change may therefore include neither variables for customer satisfaction nor employee satisfaction.

While the examples considered above showed the impact of a given Firm Action upstream on the downstream chain of events including Delivered Product/Service, Customer Actions, Customer Revenues, and Costs, the implementation of APL models requires managers to work in reverse. In other words, the initial step is to identify the drivers of profitability, leading to desirable customer behavior. Next, the perceptions and attitudes that affect such actions would be identified, leading to the appropriate changes in the Delivered Product/Service, and finally the set of Firm Actions that sets the chain in motion. APL causal chains related to a variety of alternative Firm Actions can then be compared to select the ones that have greater impact on corporate profits.

#### *Time Frame*

Ideally, consideration of the impact of firm actions on customer actions, and that of customer actions on customer revenues should recognize the time needed for

the effect to materialize. Many firm actions may be expected to have immediate consequences for customer action and thereby relatively quick effects on revenues. Others in contrast may require extended times to yield an effect, with resulting delays in the generation of revenue.

*Computing Action-Profits*

Integral to the development of APL models is the computation of the return on action. The principles underlying this computation are the same as those used for capital investment. First, the appropriate causal model is used to identify the relevant customer and firm actions. Next, the incremental revenue and cost streams that are likely to result from the firm actions are calculated. These revenue and cost streams are then used to compute the return on the investment required to execute an action. These expected returns can then be used to examine the feasibility of the action as well as to select the appropriate set of actions from a portfolio.

*Formal Model Statement*

The general APL model may be represented mathematically by a set of equations linking a group of variables in the model to one or more other groups. The purpose of this formal statement of the model is to provide an unambiguous definition of the expected causal linkages comprising the model. In any given application to a firm, the model must be customized to the particulars of the situation, which will require developing the specific variables comprising each group and hypothesizing their linkages to variables within other group. However, the value of the general model is to put forth the relationships that are most commonly expected.

$$\text{Corporate Profits} = \sum_i \text{Customer Segments} (\text{Profitability of Customer Segment}) - (\text{Non-Customer Costs}) \tag{1}$$

$$\begin{aligned} \text{Profitability of Customer Segment } i &= \sum_j \text{Customers} (\text{Lifetime Customer Revenues} \\ &\quad - \text{Customer-specific Costs})_j \\ &+ \sum_{\text{Customer Segments} \neq i} (\text{Network Revenue Effects} \\ &\quad - \text{Network Cost Effects}) \end{aligned} \tag{2}$$

$$\text{Lifetime Customer Revenues } j = f_1 (\text{Overt Behavior of Customers}) \quad (3)$$

$$\text{Overt Behavior} = f_2 (\text{Customer Satisfaction, New Customer Attraction}) \quad (4)$$

$$\text{Customer Satisfaction} = f_3 (\text{Customer Perceptions}) \quad (5)$$

$$\text{New Customer Attraction} = f_4 (\text{Customer Perceptions}) \quad (6)$$

$$\text{Customer Perceptions} = f_5 (\text{Delivered Product or Service, Firm Actions}) \quad (7)$$

$$\text{Delivered Product or Service} = f_6 (\text{Firm Actions}) \quad (8)$$

#### **4. DEVELOPING CUSTOMIZED ACTION-PROFIT-LINKAGE MODELS**

The general APL model described in the last section must first be customized to the firm in question before the full benefits of the approach are realizable. Indeed, the process of customizing the model and exploring the hypothesized linkages using the firm's data can be as valuable, if not more so, than using the final model to make predictions of profit impact, because it helps focus managers' attention on relationships between key performance metrics. Customizing the general APL model is a multi-phase process that for maximum benefit should involve a wide cross-section of the firm's senior management team. We next describe the phases in the APL model customization process.

##### *Phase 1: Hypothesized Linkages*

The first phase of developing customized APL models involves the specification of an initial set of hypothesized causal linkages based on the general APL model described above, but modified by management experience and intuition. Also helpful to consider are the observations of employees, as well as those of customers, each of whom might help establish expected linkages for the variables that concern their own behavior. The customized model that is specified should include linkages between specific variables rather than between the groups of variables shown on Fig. 1.

##### *Phase 2: Measurement and Data Collection*

In the second phase of model customization, data are collected to test the validity of the initial hypothesized model and make revisions as the empirical evidence indicates. Prior to data collection, however, metrics must be defined for each

**Table 1.** Measurement of APL Model Variables

Domain	Variable	Illustrative Measures	Data Source
Firm Actions	Operations	Use of process design alternative A,B,C, etc.	All obtained from company records
	Human Resources	No. and type of training programs	
	Marketing & Sales	Local vs. centralized customer service	
	Finance & Accounting	Debt to equity ratio	
Delivered Product or Service	External	No. of lobbyists; public relations budget	Company testing records Mystery shopper study Market survey Reader/Viewer survey
	Product/Service Characteristics	Failure rate; performance specifications	
	Employee Actions	Response time to fulfill customer orders	
	Price Schedule	Ratio of price to average of competitors	
Customer Actions	Customer Communications	No. of ad exposures per month	All obtained from custom or syndicated survey research on a representative cross-sectional sample of customers and prospective customers
	Perceptions	(All based on 7- or 10-point rating scales)	
	Product/Service	Service dependability	
	Price	Reasonableness of price; frequency of discount	
	Buying Process	Ease of ordering; on-time delivery	
	Relationship	Able to rely on sales rep. expertise	
	Brand/Co. Image	Industry leader; innovativeness	
	Attitudes		
	New Customer Attraction	Purchase intention rating scale (5- or 11-point)	
	Customer Satisfaction	Overall satisfaction rating scale (7- or 10- point)	
	Overt Customer Behavior		
Economic Impact	Initial Purchase	% Market who have purchased at least once	All obtained from custom or syndicated tracking survey of all customers in market
	Account Share	% All customer purchases of product/svc. per period	
	Repurchase	% Customers making repurchase	
	New Bus. Referrals	% Customers making a referral; avg. no. referrals each	
	Price Acceptance	Average of prices paid by customer	
	Customer Revenues		
Economic Impact	Cost of Action	\$ expense of action or investment cost	General ledger
	Customer Revenues	\$ sales to specific customers per period	Historical account records

of the variables to comprise the customized model. Table 1 provides a guide to appropriate measures and possible data collection methods for each of the groups of variables in the model.

*Delivered Product or Service.* As shown in Table 1, several measures and data collection methods are useful for quantifying variables within the Delivered Product/Service. Objective measures of service quality, such as failure rates or response times, can be obtained from both company records and scientific observation. Mystery shopping can also be used to objectively measure specific aspects of employees' behavior, such as courtesy and adherence to service standards, using components of service quality scales (Parasuraman, Zeithaml & Berry, 1988). Measures of price schedules can be developed based on the firm's own pricing data and the data on competitors' pricing. Finally, firms can quantify their customer communications based on their advertising expenditures and scores from their advertising tests.

*Customer Attitudes and Perceptions.* Table 1 provides an illustrative listing of customer attitudes and perceptions, their measures, and relevant data collection methodologies. As the information in the table illustrates, while attitudes and perceptions drive overt behavior, they cannot be measured based on behavior. Most of these variables, such as customers' post-purchase satisfaction, will be measured using standard multi-item scales administered to samples of customers in surveys. If the firm does not have suitable measures on hand in its research library, it can either undertake its own research to obtain them or purchase them from syndicated data sources that have already gathered suitable information.

*Customer Actions.* Table 1 also contains a partial list of customer actions, their measures and possible data collection methods. Firms with a narrow customer base will typically have internal data pertaining to the purchase records of each of their customers. Inferences regarding purchase frequency, the mix of products purchased, and the prices paid, can be drawn from these data. For firms with a broad customer base, these data can either be drawn from standardized sources of syndicated data or be collected by the firm itself. For such firms even data collected from a small representative sample of customers might be sufficient to understand the action-profit links. These data will typically be divided according to customer segments.

*Costs.* Finally, for purposes of calibrating APL models it is important to identify not just marketing costs but all costs related to firm actions. Activity-based costing can then be used to assign these costs to each customer segment.

*Unit of Analysis.* An important issue in the data-gathering phase is establishing the appropriate unit of analysis for the variables in the model. For example, in the case of a bank, should customer survey data be gathered for analysis at the level of individual customers, office branches, metropolitan areas, states, or the company as a whole over time? For some linkages, e.g. between customer perceptions and satisfaction, the proper unit of analysis will be the individual customer, and the large customer base permits the use of sampling of customers for both measures, i.e. a typical survey. For others, such as the linkage between Delivered Product/Service metrics and Customer Perceptions, the data on the former may not be available for individual customers. Instead, the unit of analysis may have to be the bank office branch, because that is the most plentiful unit at which both types of data may be available. If so, the customer survey data measuring customer perceptions will have to be aggregated to a branch average, and then related to the appropriate measure of the Delivered Product/Service for the branch (possibly also by aggregating employee characteristics among other measures). In some instances, the unit of analysis may have to be the company as a whole, such as for relating Customer Satisfaction to Customer Retention, in which case both measures would be gathered for a number of succeeding time periods, e.g. months, quarters, or even years. Annual measures at the level of the company as whole are least desirable, since they require either extensive past data, or delay while the needed information is gathered annually. In general, APL models employ multiple units of analysis to make the best use of available information.

### *Phase 3: Assessment of Relationships*

In the third phase of model customization, an analysis is made of the data gathered during the preceding phase for each of the model variables. The analytic methods of choice are simple and multiple regression analysis, since they provide quantitative estimates of the strength of the linkages in the model, depending on the number of predictor variables (one for simple regression, two or more for multiple regression). Regression results are obtained for each set of variables that have been hypothesized to be related. For example, each of the variables in the variable group from which an arrow emanates in the model can serve as an independent variable in the regression analysis, while each variable receiving an arrow is the dependent variable.

The assessment of goodness of fit of the proposed model to the data is an important step. If the goodness of fit is found to be poor, the model development effort must return to Phase 1, in order to identify key variables missing from the model. The regression analysis will directly indicate which of the predictors is



most strongly related to each dependent variable in the model. In general, the variables with the strongest relationships are retained for interpretation and application. As the initial model is evaluated empirically in this fashion, some linkages will be dropped for lack of evidence of strong relationship, while others may need to be added, depending on the success of the regression analyses. Ultimately a final model will emerge, and consideration can turn to application of the model to supporting management decision-making.

#### *Phase 4: Monitoring*

The fourth and final phase of model customization consists of monitoring the APL model developed in the previous phase for any changes in the relationships between variables that indicate new or altered linkages. External factors, such as increased customer expectations or the evolution of the competitive context, as well as internal factors, such as changes in the morale of the firm's labor force, may require revisions in the APL model that has been developed. The changed circumstances may indicate the need to: (1) add or drop variables to the model, (2) add or drop linkages between variables, or (3) modify the estimated strength of existing linkages, all of which have the potential to alter the profit impact of a particular firm action.

For example, consider a firm whose customized APL model includes the following linkages: increasing the incentive compensation offered to the cleaning staff at a hotel (Firm Action) might improve the care with which employees clean guest rooms (Delivered Product/Service). In turn, this improvement increases the perceived cleanliness of guestrooms by customers, and drives in higher customer satisfaction, retention of customers, and customer revenues. Since the incremental revenues exceed the added compensation costs, corporate profitability is increased as well. Over time, however, additional linkages emerge: higher levels of customer satisfaction (Customer Actions) lead to improved interactions between customers and customer-contact employees (another facet of the Delivered Product/Service), which increase the number of compliments about the staff. Employee job satisfaction is increased by the expressions of customer support, and the turnover of employees is reduced, lowering personnel hiring and training costs. These added linkages that emerge over time have thus amplified the profitability of the original action of increasing incentive compensation.

## **5. CASE STUDY**

We briefly discuss the case of IFC Grocers (name disguised), a large retail grocery chain in the southwestern U.S. to illustrate the development and testing

of an APL model customized specifically for a firm. Management of the super-market chain was concerned about improving customer revenues and profits, and was considering a change in the checkout procedure. Focus group research had indicated that customer experiences at the checkout were a key driver of customer satisfaction, and that in turn determined their frequency of visit to the stores in the chain. The existing checkout procedure was known to produce high levels of physical stress for customer-contact employees, low levels of job satisfaction, and high personnel turnover. Management decided to examine the consequences of redesigning the checkout stand to speed the checkout process as well as reduce the physical strain on the employee. However, in the process, the space normally reserved for impulse purchase items, such as candy, soft drinks, and magazines had to be sacrificed, resulting in a potential loss in customer revenues.

Before adopting the new checkout stand, management sought to understand its impact on customers, employees, and overall store profitability. The following customized APL model was developed for this purpose, described with the following equations:

$$\text{STORPROF} = (\text{IMPSALES} + \text{OTHSALES}) - (\text{CHKCOST} + \text{HIRECOST} + \text{OPCOST}) \quad (1)$$

where STORPROF is store profit, IMPSALES is the sales of impulse items, OTHSALES is the sales of other items, CHKCOST is the cost of replacing existing checkout stands, HIRECOST is the total cost of hiring and training, and OPCOST is other operating costs.

Working from this expression, storewide sales of impulse purchase items and other items in the store were hypothesized related to customer actions. Note that rather than separate equations linking customer revenues to customer retention, retention to satisfaction, and satisfaction to perceptions as suggested by the general model framework, we chose to simplify the equations to the two that following, based on separating the sales of impulse sales and other items.

$$\begin{aligned} \text{IMPSALES} = & \beta_0 + \beta_1 \text{SATWAIT} + \beta_2 \text{REALTIME} \\ & + \beta_3 \text{STORFREQ} + \varepsilon_1 \end{aligned} \quad (2)$$

$$\text{OTHSALES} = \beta_4 + \beta_5 \text{OSAT} + \beta_6 \text{SATWAIT} + \beta_7 \text{STORFREQ} + \varepsilon_2 \quad (3)$$

The terms  $\beta_0$  to  $\beta_3$  are the regression coefficients for the equation (2), and  $\varepsilon_1$  is the error term; similarly,  $\beta_4$  to  $\beta_7$  are the coefficients for equation (3) while  $\varepsilon_2$  is the error term.

Next, a model of customer actions was developed to estimate the impact of the proposed change in checkstands on customer revenues. The key elements of this model are outlined below.

$$\text{STORFREQ} = \beta_8 + \beta_9 \text{OSAT} + \beta_{10} \text{SATWAIT} + \beta_{11} \text{EMPSAT} + \varepsilon_3, \quad (4)$$

where STORFREQ is the frequency of store visit, OSAT is overall customer satisfaction, and SATWAIT is customers' satisfaction with their wait at checkout, and EMPSAT is aggregate employee satisfaction.

Because the central issue was the impact of the new checkout stands on customers' waiting experiences, the following causal linkages were hypothesized:

$$\text{SATWAIT} = \beta_{12} + \beta_{13} \text{PERCTIME} + \varepsilon_4 \quad (5)$$

$$\text{PERCTIME} = \beta_{14} + \beta_{15} \text{REALTIME} + \varepsilon_5 \quad (6)$$

$$\text{REALTIME} = \beta_{16} + \beta_{17} \text{CHKSTND} + \varepsilon_6 \quad (7)$$

where PERCTIME is customers' perception of the duration of the wait, REALTIME is the actual duration of the wait, and CHKSTND is a 0–1 dummy variable representing whether or not the new checkout stand is installed.

Finally, the impact of the new checkout stand on employees and hiring costs was modeled as follows:

$$\text{HIRECOST} = \beta_{18} + \beta_{19} \text{EMPTURN} + \varepsilon_7 \quad (8)$$

$$\text{EMPTURN} = \beta_{20} + \beta_{21} \text{EMPSAT} + \varepsilon_8 \quad (9)$$

$$\text{EMPSAT} = \beta_{22} \text{CHKSTND} + \beta_{23} \text{EMPSTRESS} + \varepsilon_9 \quad (10)$$

where EMPTURN is employee turnover, EMPSAT is customer-contact employees' overall satisfaction with the job, and EMPSTRESS is the physical stress experienced by these employees on the job.

If complete data had been available, the customized APL model represented in the equations above could have been estimated simultaneously at a disaggregated level using a simultaneous equations approach (with the exception of equation (1), which is an identity). However, in the absence of such data, the model was estimated piecewise using a controlled field experiment. The experiment was conducted in one store, with data on the variables of interest collected both before and after the installation of the new checkout stand. Data on customer satisfaction and perceived waiting times were collected by means of survey research conducted by the chain. Actual waiting times were measured by analyzing video-

tapes of customers at the checkout. Sales data were collected by aggregating individual customers' sales receipts.

While the piecewise model estimation procedure was not optimal, it nevertheless illustrates a possible approach to establishing linkages in the absence of full information. The customized APL model, after statistical estimates were made of the linkages between variables, showed the impact of improving customers' waiting experiences on store profits. It also helped to appraise whether the redesign of the checkout system was an appropriate way of enhancing customers' waiting experiences, and the financial returns it produced. Finally, the process of developing a customized APL model helped management to begin to think of the firm's business performance as driven by a system of linkages between their actions and those of employees and customers. This change in perspective was a key form of organizational learning to emerge from the development and use of the model.

## **6. DISCUSSION**

The APL model has both common and distinguishing features compared to related work in the area, namely the service profit chain, return on quality model, balanced scorecard model, and customer profitability analysis. In this section we consider some of the major similarities and differences between the APL model and these other approaches. We also outline some of the main questions for further research.

The APL modeling approach is the only approach that is centered about the specific *actions* of the firm and their effects on a variety of variables linked ultimately to profitability. While the service profit chain and return on quality model also involve linkages to profitability, they do not incorporate specific firm actions required to set the chains of effects into motion. Instead, they begin with the variables that are intervening in the APL framework, i.e. quality or employee satisfaction. Since there are inevitably a variety of firm actions suitable for changing the intervening variables, ambiguity may arise when managers are attempting to apply these models.

Further, both the service profit chains and return on quality models are comprised of a fixed single chain of events ostensibly applicable to all firms. In the case of the service profit chain, the chain extends from employee satisfaction to customer satisfaction to profits, and for the return on quality model, from service quality spending to service quality perceptions to customer retention to profits. In contrast, the APL model is highly flexible, since it does not limit the causal relationships to a single pre-specified chain. Instead, the APL model allows any logical sequence of variables that successfully explains

business success and profits. The service profit chain and the return-on-quality framework may thus be considered special cases of the APL model.<sup>2</sup> As a result, managers using the APL approach are forced to explore multiple routes or chains of variables leading to the attainment of corporate profitability.

While the balanced scorecard focuses on sets of financial and non-financial metrics with which to plan and control the enterprise, the APL model emphasizes firm *actions* and how best to achieve customer and corporate profitability. Nevertheless, the two approaches are actually complementary for the implementation of strategy. Since APL models focus on the causal linkages between firm actions and corporate profitability, it accomplishes one of the key desiderata of the balanced scorecard approach, namely linking the various metrics together. It also adds specificity by estimating the numeric relationships between the metrics.

Like the balanced scorecard, the APL model can help firms improve the metrics used for performance measurement and management. The balanced scorecard is legion for its classification of key performance indicators into four basic groupings and for its requirement that they correspond closely to the firm's strategy. Like the APL model, it too requires metrics to be linked. The design and implementation of the balanced scorecard presented by Kaplan and Norton (1996) can be improved substantially with additional identification, specification, and measurement of the causal relationships between the variables. The APL model provides substantial specification of linkages along with an approach to measurement, which should facilitate implementation of the balanced scorecard. The APL model also features making explicit linkages between the various metrics and customer and corporate profitability. As firms develop and test their own customized APL models, the scorecards of these firms should be improved by omitting those variables not clearly linked to profitability, and including others which do demonstrate such causal linkages.

The goal of traditional customer profitability analysis is to assess the drivers of customer revenues and customer costs using activity-based costing, and to thereby estimate the profitability of each customer. The APL model is not only consistent with this approach, but also helps to refine it by incorporating what we term 'network effects', i.e. the impacts of firm actions on the behavior of customers in other segments. Consequently, the APL enables firms to assess the total profitability of serving customers, instead of that derived from only the direct revenues or costs assigned to it.

#### *Directions for Future Research*

While the APL model provides a useful framework for articulating the linkages between firm actions and corporate profitability, further research is needed

to realize the full promise of the approach. The model will benefit from additional attention by scholars seeking to better understand its benefits and limitations, as well as the impediments to its successful utilization. Of particular value would be research addressing the following key questions:

- What are the typical magnitudes of the effects of different firm actions on intervening variables in the APL model, and how do these differ across firms, strategies, industries, etc.?
- What are the most strongly linked chains of variables within the model?
- What are the time lags or delays between pursuit of an action and its impact on intervening variables and corporate profitability?
- Do the various causal linkages in corporate balanced scorecards evolve over time, and if so in what fashion and with what predictability?
- To what extent does identifying and measuring causal relationships (as per the APL model) actually facilitate decision making relative to strategy and implementation?
- Does the use of a causal linkage approach influence the mental models of managers that guide their formulation of strategy?
- What is the impact of identifying and measuring causal relationships on improving management effectiveness?
- To what extent does identifying and measuring causal relationships improve the development, implementation and use of the balanced scorecard?

Whether in the context of the APL model or more general inquiry into performance metrics, research to elaborate causal linkages should begin with small case studies or limited field studies, with the specific objective of identifying the linkages in specific decision contexts and assessing the impacts of different firm actions. Such case studies would provide the foundation for cross-sectional studies across firms and industries to follow in subsequent research. Finally, evidence from controlled business experiments employing both cross-sectional and longitudinal designs would be helpful for documenting cause and effect relationships among the drivers of success and profitability.

Another need for both applied and scholarly research on causal linkages is the development of suitable measures of the variables included in the model. While well-developed measurement protocols exist within each of the management disciplines, there is little overlap between disciplines in the variables studied. For example, research in organizational behavior on the effectiveness of HR firm actions (e.g. compensation, job design, form of supervision, etc.) typically measure results in terms of changes in employees' attitudes and behavior. Marketing scholars gauge the effectiveness of marketing actions in terms of changes in sales, market share or customer satisfaction. Accountants

typically evaluate effectiveness in terms of customer or corporate profitability. As a result, efforts to build integrative, cross-functional models of the drivers of corporate profitability are hindered by the lack of familiarity of researchers with measures from other functional areas. Hence attention to the development of a suitable set of cross-disciplinary measures for research on causal linkages must be accorded high priority.

## 7. CONCLUSIONS

The Action-Profit-Linkage model is offered as a tool to help improve the articulation of the causal linkages between firm actions and corporate profitability. Use of the model should also help shift the focus of managers from simply pursuing a variety of target variables to a more balanced attention to the relationships between the key variables driving the firm's success. The APL model also intended to promote an integrative and systemic approach to the implementation of strategy as well as to the design of performance measurement and management systems.

The model is distinct from other approaches that have been proposed to enhance implementation of strategy owing to its inclusion of specific forms of managerial action and their causal linkages to profitability. It is highly flexible since it does not link firm actions to corporate profitability through a single fixed chain of variables, nor are the latter tied to a relatively invariant set of metrics. We expect that an adoption of the model will not only have a positive impact on research in the various management disciplines but also on the practices related to the management of business enterprises.

## ACKNOWLEDGMENTS

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## NOTES

1. The literature in marketing has shown that customer satisfaction is the result of a mental comparison between ex-ante customer expectations of the product/service and ex-post perceptions of product/service performance (Yi, 1990). In applied research, however, customer expectations have typically had only limited explanatory ability in comparison to perceptions, and as a result, most predictive models have emphasized the latter.

2. While some applications of APL models to human resource management and quality improvement initiatives may resemble in places the service profit chain and return on quality models, others may not.

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# PROCESS-DRIVEN COST ASSOCIATIONS FOR CREATING VALUE

Mohamed E. Bayou and Alan Reinstein

## ABSTRACT

*Sharp differences between Eastern and Western philosophies fundamentally affect management accounting thought and practice. Japan, for example, a process-oriented society, uses techniques such as target costing and Kaizen costing that require process-oriented thinking focusing on continuous improvement (Imai, 1986, 1997). The West, in general a result-oriented society, uses result indices as prime factors for performance evaluation. Accordingly, cost traceability emphasizing cost-to-output (or cost-to-result) methodology dominates Western management accounting literature. Basically, this methodology goes around rather than through the manufacturing process*

*However, the current trend toward integrative comprehensive systems, technologically (as the prevalence of the mega-electronic systems of R/3 and ERP demonstrate) and intellectually (with the increasing practice of 'smart teams'), the globalization of business, partnerships among global entities and their suppliers and sale dealers, and other integrative movements require a different management accounting paradigm that can*

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*account for continuous improvement and value creation by going through rather than around the functions of the entire value chain. Cost associability is presented as a paradigm badly needed for these developments. Many authors lament the decreasing role of management accountants in the new technological environment (IMA, 1997a, 1997b; Cooper, 1996; Kato, 1993; Jones et al., 1993; Brausch, 1992; Williams et al., 1991; Howell & Soucy, 1988). Cost associability can boost management accountants' value-adding role in the new technological environment.*

*Costs are fundamentally associative; they originate, grow, and vanish by associations. As costs draw in or join other costs, they form cost complexes and provide vital information for many strategic decisions. Cost traceability methods do not provide this information since they dwell on cost-to-output rather than on cost-to-cost associations. The paper discusses several important issues that escape the cost traceability methodology, yet are captured by cost associability logic.*

*To test Imai's (1986, 1997) claim on the difference between the West's and East's modes of thinking and the related costing structures, we investigate the differences in the automobile industry's practices, namely the emphases on results and cost associability at General Motors, Ford Motor Company and Honda Motor Company. The discriminant analysis results of testing two hypotheses on result-thinking and cost-associability support Imai's claim. Furthermore, the alarming trend in the 'numbers game' practiced by leading Western corporations and the consequent SEC concern lend further support to the primacy of result-thinking in the West.*

Modern Japanese techniques such as target costing and Kaizen costing generate process-oriented thinking that focuses primarily on process design and improvement and secondarily on results. While such techniques emerge naturally in Japan because it is a process-oriented society (Imai, 1986, 16; 1997), the West generally is a result-oriented society (Imai, 1986, 39):

*in most Western companies, many executives are not even aware that there are such things as process-oriented indices, because such indices have never been available in the company. The questions that the Western manager asks are always directed at the result-oriented indices, such as monthly sales, monthly expenses, number of products produced, and eventually the profits made. We [the Japanese] have only have to look at the reporting figures employed by the typical Western company, such as the cost-accounting data, to see how true this is.*

For management accounting literature, this sharp distinction in orientation has far reaching implications. The result-oriented philosophy provides a logical ground for the cost traceability paradigm that underlies the cost-to-output (or cost-to-result) methodology in the West. In contrast, the process-oriented attitude lays the

foundation for the cost associability paradigm and its cost-to-cost methodology. Cost associability seeks development and improvement of interactions within and among resources, a characteristic critical in today's trend toward integrative technological and intellectual comprehensive systems. Defining cost associability as a costing structure that emphasizes the interactive nature of costs, allows cost interactions to be designed, planned and controlled in order to help apply the application of process-oriented thinking and realize its continuous improvement goals.

This paper develops cost associability as a costing structure to overcome the weaknesses of the cost traceability methodology. Rather than mutually exclusive, the two paradigms are treated as complementing each other. The first section compares the cost associability and cost traceability methodologies. The second section tests empirically Imai's argument regarding the prevalence of result-oriented thinking in Western firms. The hypothesis that cost associability practice is more common in the East than in the West is tested using 11-year data reported by General Motors, Ford Motor Company and Honda Motor Company. Finally, a summary and conclusions are presented.

## **COST TRACEABILITY VS. COST ASSOCIABILITY**

To develop concretely the cost associability structure, we first examine critically the nature of cost traceability as follows.

### *A Critical Examination of Cost Traceability Methodology*

Management accounting literature is replete with systems, techniques, and interpretations whose technical domain articulates relationships between costs and output. For example, cost accumulation systems (job-order costing, process costing and operation costing), cost accounting systems (traditional costing, activity-based-costing (ABC) and activity-based-management (ABM)) and product costing systems (absorption costing, variable costing, direct costing, super-absorption costing, super-variable costing, and super direct costing) build their computational and reporting structures on cost-to-output relationships. Central to these structures is 'cost traceability' as shown in Fig.1.

Cost traceability follows one direction: cost  $\rightarrow$  object (of cost), e.g., products or services. Accordingly, costs economically traceable to the cost object become 'direct costs' and those of immaterial magnitude or untraceable to output become 'indirect', 'overhead', or 'common' costs. Indirect costs are *allocated*, rather than traced, to output using labor hours or labor cost in the traditional costing system (Panel A of Fig. 1) or activities as in the ABC system (Panel B). Corporate expenses are often allocated to output to help determine the full cost of output.

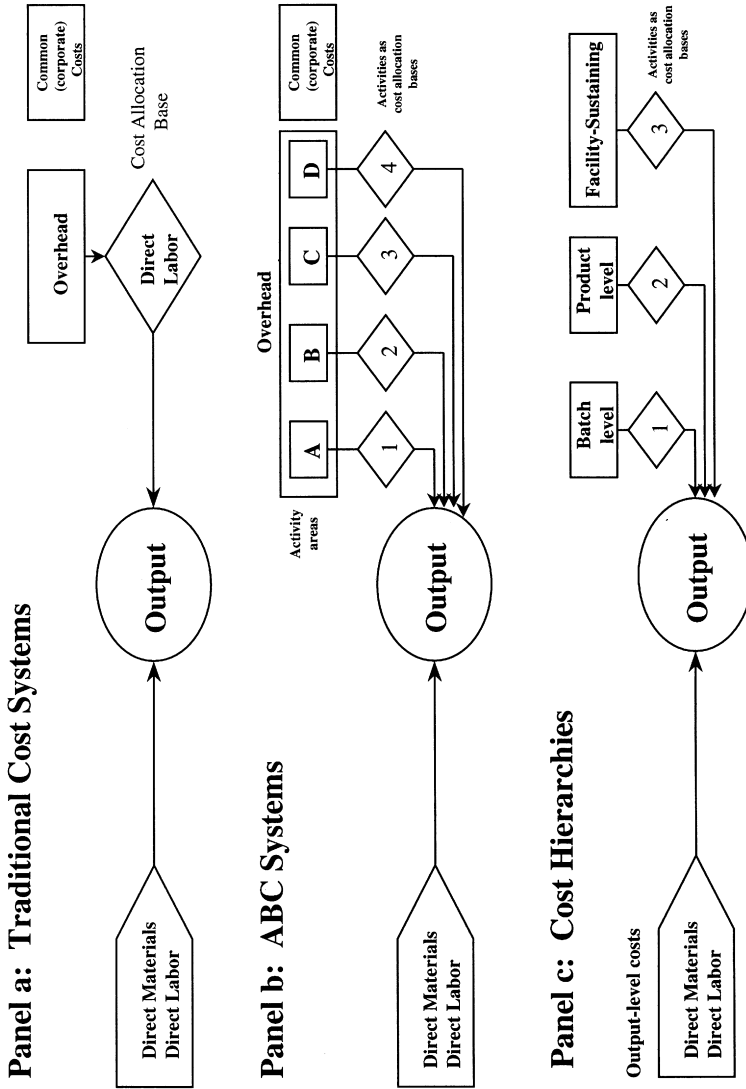


Fig. 1. Cost-to-Object Focus in Cost Traceability Methodology.

A recent addition to ABC, the manufacturing cost hierarchy (Panel C), classifies costs into four groups, output-unit, batch, product-sustaining, and facility-sustaining cost levels (Cooper, 1990). In a result-oriented environment, performance evaluation often concentrates on the cost-to-output relationship as efficiency and effectiveness criteria for judgment.

However, the cost-to-output methodology bypasses an essential dynamic. As input costs increase and the production approaches completion, output gradually emerges with characteristics that did not exist in the individual input resources. Inputs lose their identities as soon as they enter into the value creation process. For example, metal as a raw input and metal in a manufactured aircraft differ: one can fly and the other cannot. Traditionally, this input-to-output transformation has been left to design and manufacturing engineers to form and improve (Meredith, 1992, 23). By skipping this transformation, cost analysis based on cost traceability encounters a discontinuity along the passage from input to output. That is, as cost traceability analysis goes around rather than through the manufacturing process, a 'leap of costing' ensues that may explain the decreasing role of management accountants in the new manufacturing environment (IMA, 1997a, b; Cooper, 1996; Kato, 1993; Jones et al., 1993; Barausch, 1992; Williams et al., 1991, quoted in Jones et al., 1993; Howell & Soucy, 1988).

*Activities, like costs, are associative.* Activities in such cost traceability systems as ABC do not remain independent from each other during the production process; they interact and fuse into other resources during the creation stage of outputting.<sup>1</sup> For example, computer time (machine hours) and expert time (direct labor hours) form an integrative whole in a CAD-CAM project. In the 'focussed factory', consisting of semi-independent cells in the new manufacturing environment, support (indirect) departments are nearly nonexistent. A 'cell' becomes increasingly self-sufficient to integrate all processing activities from the raw material stage to finished product delivery. That is, most activities in the ABC system are associative with each other and with other resources, and independently cannot be traced to output. Indeed, each activity is an association of several subactivities. Ignoring these fundamental activity associations renders a whole costing system too simplistic.

Closely observing the evolution of activity-based costing management (ABCM) systems, Cooper and Slagmulder (1999a, 1999b) call for integrating decentralized functional subactivities into a consolidated architecture to decrease the risk of inconsistency across system designs at local business units. Meanwhile, they explain the necessity for decomposing consolidated (centralized) ABCM systems into subactivities to improve efficiency and effectiveness. They (1999a, p. 12) explain that this mode of activity integration is undergoing a steady, rapid evolution in the ABCM software architecture as the enterprise resource planning

(ERP) software suppliers enter the enterprise performance management (EPM) market. This increasing focus on activity integration represents a rapid evolution from cost traceability to cost associability programming. A successful design of this integrative software, however, requires an understanding of the key areas of differences between these two costing paradigms as discussed below.

### *The Nature of Cost Associability Logic*

Costs are fundamentally associative: they originate, grow and vanish by associations. First, all costs originate in an associative (synthetic) process where an input's monetary and nonmonetary dimensions combine to define the cost (Schoenfeld, 1974, 10–16). Second, once incurred, a cost often draws in, or is driven to, other related costs. For example, associated with labor hours are such costs as wages, fringe benefits, training and retraining, overtime, idle time, supervision, labor safety, strikes, and other labor issues thereby forming a 'labor cost complex'. According to Reitman (1997, A12), "Even when a Big Three company overhauls an old plant at great expense, by contrast [to Japanese auto makers], it is stuck with an older work force and frequently with high-cost union contracts and work rules." The National Safety Council reported that (*The Detroit News* 1997, L1):

Injuries and deaths on the job cost society \$121 billion last year . . . which includes wages and productivity lost by injured workers, administrative expenses and health care . . . The total cost is equal to the combined profits of the 20 largest corporations in America.

Third, cost associability synergistically instigates the value-creation mechanism of the production process. That is, as costs combine (associate) during a production process, output evolves from amalgamated inputs. Applying Kaizen strategies to improve this process, cost accountants can play a significant role, by developing cost tables (Yoshikawa et al., 1990), cost reduction data bases, cost reduction data base management systems (Kato, 1993, 43) and helping management measure the key Kaizen variables of discipline, time management, skill development, participation and involvement, morale and communication (Imai, 1986, 21). Indeed, cost associability and Kaizen are the instruments of the Japanese process-oriented applied thinking, as explained below.

### *Key Areas of Differences between the Two Paradigms*

Cost traceability and cost associability differ considerably in such key areas as performance evaluation, control, specification mode, time horizon of expectation and improvement versus innovation as shown in Fig. 2.

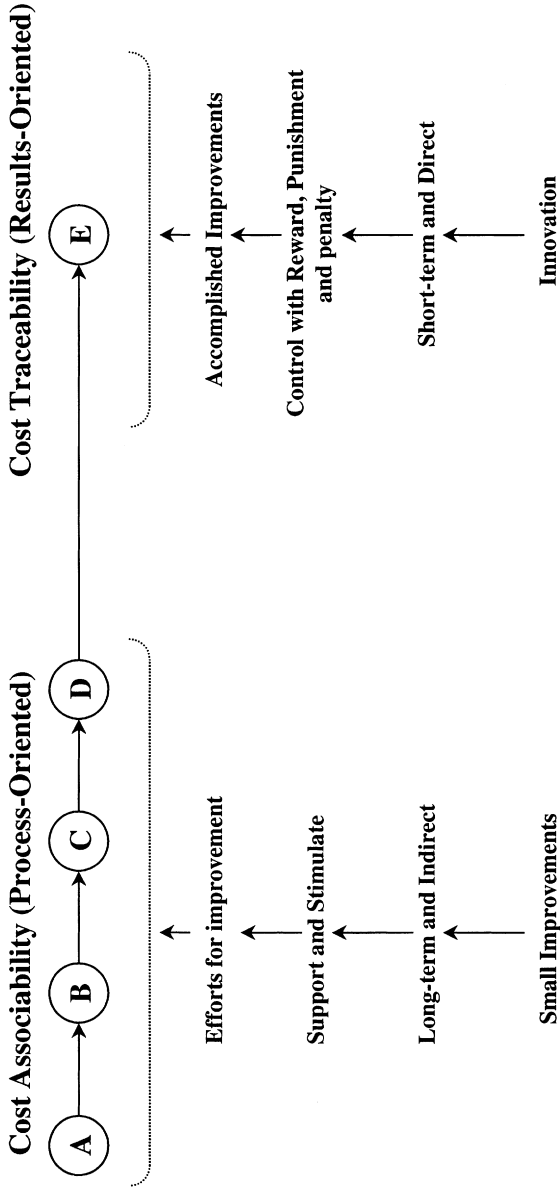


Fig. 2. Comparing Cost Associability and Cost Traceability.



While cost traceability emphasizes output (*results*) as a basis for evaluating performance, cost associability values *efforts* exerted to improve the process. Imai (1986, 17) notes that in the U.S.:

no matter how hard a person works, lack of results will result in a poor personal rating and lower income or status. The individual's contribution is valued only for its concrete results. Only the results count in a result-oriented society.

When results become the major criteria for performance, direct specification of what to accomplish and short-term feedback dominate the control function (Fig. 2). In contrast, performance evaluation in cost associability focuses on long-run efforts to achieve small improvements (rather than on the achievement per se) over the long run. Therefore, support and stimulation, rather than control and its reward/punishment/penalty vehicles, guide performance. In addition, while cost associability supports small improvements over the long run, cost traceability motivates dramatic, abrupt, volatile, short-term innovations that culminate in large changes (Imai, 1986, 24; Monden & Hamada, 1991). Imai (1986, 17) stresses that while not completely ignored in the process-thinking structure, results are neither everything nor the only thing. Thus, not achieving planned results indicates a failure in the process prompting management to identify and correct such process-based errors.

Furthermore, cost-to-cost, rather than cost-to-output, measures provide important means to study strategic cost structures of different firms and industries. Instead of efficiency measures that emphasize input-to-output relationships, cost associability accounts for cost structures and the proper level of technology as shown in Table 1.

Table 1, Panel A shows the manufacturing costs as percentages of total sales revenues in five different industries. These ratios are efficiency measures. Panel B recasts these ratios into cost association measures; for each industry, each cost item is expressed as a percentage of the total cost pool. Panel B measures reveal strikingly similar magnitudes for all four types of resources across the first four industries. The electronics industry's material and labor ratios substantially differ from those of the other industries, a phenomenon highlighted by cost associability.

In brief, output usually evolves gradually rather than emerges spontaneously (Fig. 3). Value is created by combining resources to produce output that requires several activities, including alteration, transportation, storage and inspection (Meredith, 1992, 11). Accordingly, costs are traceable to cost pools rather than directly to output. As costs associate, the risk of cost irrecoverability increases, thereby raising the need for strategic scheduling of significant input costs. For example, in order to increase customer loyalty and satisfaction, a manufacturer employing a job-order costing system must allow customers to change their

**Table 1.** Cost Structures of Five Industrial Groups

**Panel a: Cost Traceability Measures**

Percentage of Cost Component to Total Sales Revenues

Manufacturing Costs	All Companies Surveyed					
	Consumer	Industrial Goods	Basic	Machinery	Electronics	
Direct materials	33.00%	26.00%	32.40%	34.70%	35.50%	33.70%
Direct labor	8.30%	7.70%	8.70%	8.70%	10.30%	6.20%
Energy	2.80%	1.80%	2.30%	5.30%	2.10%	1.80%
Overhead	13.50%	10.30%	14.90%	11.80%	16.50%	13.80%
	57.60%	45.80%	58.30%	60.50%	64.40%	55.50%

Source: Miller et al., (1992)

**Panel b: Cost Associability Measures**

Percentage of Cost Component to Total Cost

Manufacturing Costs	All Companies Surveyed					
	Consumer	Industrial Goods	Basic	Machinery	Electronics	
Direct materials	57.29%	56.77%	55.57%	57.36%	55.12%	60.72%
Direct labor	14.41%	16.81%	14.92%	14.38%	15.99%	11.17%
Energy	4.86%	3.93%	3.95%	8.76%	3.26%	3.24%
Overhead	23.44%	22.49%	25.56%	19.50%	25.62%	24.86%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

specifications and even cancel their orders before completion. Losses from these changes can be minimized with planned cost associations.

Empirically, how do the West and East compare regarding result-oriented thinking and cost-associability practices? The answer to this question is the topic of next section.

### **EMPIRICAL INVESTIGATION OF RESULT-ORIENTED THINKING AND COST-ASSOCIABILITY PRACTICES IN THE WEST VS. THE EAST**

To test Imai’s (1986, 1997) argument that the West focuses its primary attention on results and the East’s primary attention on processes, we conduct the following empirical analysis. This section is organized into two parts as follows:

- (1) Empirical evidence on the prevalence of result-oriented thinking in the West

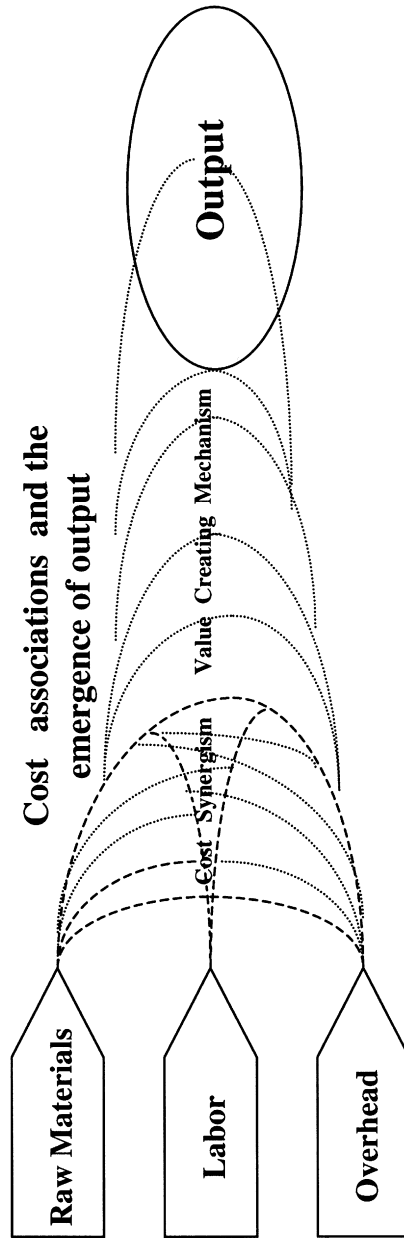


Fig. 3. Cost-to-Cost Focus in Cost Associability Methodology

- (2) Hypothesis testing of result-oriented thinking and cost associability practices in the automobile industry. This industry provides an excellent medium for studying cost associability practices because it has long sought innovative costing systems. If Imai's argument is acceptable, cost associability, as a method of process-oriented thinking, should be more common among Japanese auto firms than among U.S. counterparts.

*Empirical Evidence on the Prevalence of Result-Oriented Thinking  
in the West*

The cost-traceability view focuses on output (results) as a significant element in the relationship cost  $\rightarrow$  output. Results gain significance by two means: (1) magnitude, and (2) timing. Magnitude of results pertains to the size (in absolute values or in percentages of a selected base) of such measures as sales, gross profit, operating income, income before extraordinary gains and losses and net income. Timing of results refers to the conscientious determination of the periods in which these results are reported.

Overwhelming evidence exists showing that many corporations in the West do pay special attention to the magnitude and timing of their operating results. For example, Coca-Cola boldly asserts in its mission statement: "We exist for one reason: to maximize shareholder value over time" (Brown, 1999, p. 61). In recent years, the attention accorded the magnitude and timing of results in the West has reached an alarming level. Such terms as 'earnings management', 'big bath', 'the numbers game', 'the guidance game', and 'game of nods and winks' are becoming common vocabulary in the financial accounting literature (Brown, 1999; Sikora, 1999; Morgenson, 1999; Levitt, 1998; *Journal of Accountancy*, 1998; Schonfeld, 1998; Fortune, 1997). Arthur Levitt, the Securities and Exchange Commission (SEC) chairman, in a heated speech in September 1998 under a category titled 'hocus-pocus', discussed five key 'illusions' he felt were obscuring the financial reporting process: (*Journal of Accountancy*, 1998, p. 13; Levitt, 1998)

- (1) 'Big bath' charges. Companies may overstate one-time charges associated with restructuring, a practice that can help them cleanup their balance sheet. This is based on the theory that the stock market ignores a one-time loss and focuses on future earnings. Levitt warns, "this should not lead to flushing all the associated costs – and maybe a little extra – through the financial statements."
- (2) Creative acquisition accounting. Levitt calls this process 'merger magic' by which a business acquirer uses stock as a price for the acquisition and then

- classifies an ever-increasing portion of this price as ‘in-process’ R&D. The latter is expensed immediately.
- (3) Miscellaneous cookie-jar reserves. Levitt criticizes some companies that use unrealistic assumptions to estimate liabilities as those for sales returns, loan losses or warranty costs whereby “they stash accruals in cookies jars during the good times and reach into them when needed in the bad times.”
  - (4) Materiality. Levitt believes that materiality is misused by certain companies. He asks, if these companies claim that the effect of some errors on the bottom line is insignificant, “why do they work so hard to create these errors? Maybe because the effect can matter.” He adds that missing an earnings projection by a penny can result in a loss of millions of dollars in market capitalization.
  - (5) Revenue recognition. Levitt laments that some companies recognize revenue before the sale is complete when the customer still had the option to void or delay the sale.

*Fortune* (1997, p. 78) named several corporations who have mastered these ‘numbers games’. Brown (1999, p. 62) explains how corporate strategies are designed to manage earnings. He shows that corporations can determine the periods in which the gains and losses from sale of assets are reported.

Schonfeld (1998, p. 256) examines the so-called ‘guidance game’ between corporate officers and Wall Street analysts. In this game, analysts have to guess how much a company will earn every quarter. The guidance that a corporation provides analysts is the clue about what it thinks earnings will be. Usually, this guidance number represents the consensus estimate among analysts. In this game, “If the company’s actual earnings meet or just beat the consensus, both the company and the analyst win: The stock goes up, and everyone looks smart” (Schonfeld, 1998, p. 256) Accordingly, companies are under sever pressure to achieve the consensus earnings estimates, and analysts rely on these companies to help them form their earnings expectations in the first place. The National Investor Relations Institute’s (NIRI) survey in 1998 reported that 79% of 2,600 public companies always or usually give guidance to analysts, up from 10% in 1995. NIRI explains that part of the reason for this increasing trend in guidance is that “analysts beg for it” (quoted in Schonfeld, 1998, p. 256).

Currently, the guidance game is evolving from simple earnings management into managing earnings surprises – the difference between reported earnings and consensus estimates. A key information item in this development is “the pre-announcements before the surprise” (Schonfeld, 1998, p. 257). Toward the end of 1998, there were 2,555 earnings pre-announcements vs. 715 in 1995. According to Schonfeld (1998, p. 257), these statistics represent “further

evidence that companies are managing Wall Street's expectations more aggressively." And this practice appears to be addictive. According to Jay Gould, Bank One Corporate Investor Relations Director, "Once a company begins the process of managing the Street's expectations, it can't simply stop. There is a duty to update estimates when the expectations change" especially when these expectations are decreasing. He adds, "The rewards are great, if it's done well" because it leads to lower investor uncertainty, less volatility and more confidence. However, if it is done poorly, "a company will be in the dog house with Wall Street for up to five years" (quoted in Special reports, 1999, p. 9).

We point out that big-bath and management of earnings practices are also common in other Western nations. Burgstahler and Dichev (1997, p. 99) provide evidence that many firms in Europe manage reported earnings to avoid earnings decreases and losses. They found that two components of earnings, cash flows from operations and changes in working capital, are used to achieve increases in earnings. In the United Kingdom, FRS 12, *Provisions, Contingent Liabilities and Contingent Assets* and FRED 14, *Provisions and Contingencies*, were issued in an attempt to end big-bath provisions (Kirk, 1999, p. 60; Anonymous, *Accountancy* (Ireland), 1998, p. 41; Crichton, 1998, p. 75; Kellas, 1997).

In brief, these increasing trends in big-bath and management of earnings practices among Western companies are evidence for the prevalence of the result-oriented thinking in the West. The implication is that financial reporting and controllership, as corporate staff functions, must support this mode of corporate thinking. Therefore, cost traceability with its emphasis on cost → output in contrast to cost associability with its emphasis on cost → cost, is instrumental to this thinking. The latter inference is a hypothesis; we test it as follows.

#### *Hypothesis Testing of Result-Oriented Thinking and Cost Associability Practices in the Automobile Industry*

We test Imai's (1986, 1997) proposition that the West practices result-oriented thinking more than the East does by the following hypothesis in its null form:

H<sub>1</sub>: US companies and Japanese companies equally practice result-oriented thinking.

A corollary of this hypothesis is that the East practices cost associability more than the West does. Thus, the null form of the second hypothesis is formulated as follows:

H<sub>2</sub>: US companies and Japanese companies equally practice cost associability.

We employ discriminant analysis and use two variables to test each of these hypotheses. To test H<sub>1</sub>, we use the following earnings (results) variables:

- (1) Net income (adjusted for extra-ordinary and special items)
- (2) Earnings per share (EPS) (excluding extra-ordinary and special items)

To test H<sub>2</sub>, we use the following cost association ratios:

- (1) Operating expenses/Cost of goods sold
- (2) Operating expenses/Total expenses and other charges

Data from 11-years consolidated income statements (1988–98) reported by General Motors, Ford Motor Company and Honda Motor Company are extracted from Research Insight of Standards and Poor's Compustat. Honda's income statements reflect U.S. generally accepted accounting principles (GAAP) in U.S. dollars.

Since the three companies differ significantly in size (e.g., sales and total assets), we standardize the profitability variables (net income and EPS). The cost-associability ratios are computed without standardization. Tables 2 and 3 show the results of two discriminant-analysis runs. The two runs are necessary to avoid the multicollinearity problem among the independent variables.

### *Analysis of Results*

The first discriminant-analysis run produced a hit ratio of 0.879 (Table 2) and the second run produced 0.758 (Table 3). Testing the significance of each of these ratios at  $\alpha = 0.01$ , resulted in *t*-values of 4.35 and 2.96, respectively (Tables 2 and 3). Thus, the two ratios significantly discriminate between the

**Table 2.** Discriminant Analysis: First Run

(Independent Variables: Net Income and Operating Expenses/Cost of Goods Sold)				
The Linear Discriminant Function:				
	GM	Ford	Honda	
Constant	-11.28	-19.08	-110.30	
Net Income	1.83	2.42	5.85	
Operating Exp./CGS	165.27	214.95	516.78	
Squared Distance between Companies:				
	GM	Ford	Honda	
GM	0.00	2.04	102.06	
Ford	2.04	0.00	75.25	
Honda	102.06	75.25	0.00	
N = 33;	N Correct = 29;	Proportion correct = 0.879	<i>t</i> = 4.35	P = 0.000

**Table 3.** Discriminant Analysis: Second Run

(Independent Variables: Operating Expenses/Total Expenses and Earnings Per Share)			
The Linear Discriminant Function:			
	GM	Ford	Honda
Constant	-5.78	-4.92	-15.92
Operating Exp./Total Exp.	20.63	19.06	34.31
Earnings Per Share	-1.79	-1.92	-3.40
Squared Distance between Companies:			
	GM	Ford	Honda
GM	0.00	0.13	5.11
Ford	0.13	0.00	6.29
Honda	5.11	6.29	0.00
N = 33;      N Correct = 25;      Proportion correct = 0.758 $t = 2.96$ P = 0.000			

three companies. The extent of this discrimination is shown in Tables 2 and 3 by the size of the linear discrimination functions' coefficients and by the squared distance between each pair of companies.

From these distances, it is clear that Honda substantially differs from GM and Ford regarding the four profitability and cost associability variables. Meanwhile, GM and Ford are not further apart. For example, the squared distance between GM and Honda and between Ford and Honda are 102.06 and 75.25, respectively (Table 2) and 5.11 and 6.29, respectively (Table 3). Between GM and Ford, these squared distances are only 2.04 (Table 2) and 0.13 (Table 3). The size of the three companies has no effect on these discriminating results since all variables used in the discriminant analysis are standardized.

From these results, we reject the null form of hypotheses  $H_1$  and  $H_2$ . This conclusion lends support to Imai's argument regarding the difference between the West's primary attention on result-oriented thinking and the East's primary emphasis on process-oriented thinking. Furthermore, these results account for both the result dimension (measured by net income and EPS) and the process dimension and its corollary of cost associability (measured by association between operating expenses and cost of goods sold and between operating expenses and total expenses and other charges over the period 1988–1998).

## SUMMARY AND CONCLUSIONS

Imai (1986, 1997) claims that the West and East differ significantly in their thinking orientation. The West's thinking is result-oriented, and the East's is



process-oriented. From this claim, we argue that while 'cost traceability' systems in the West are consistent with the result-oriented thinking, 'cost associability' systems are instrumental to the process-oriented thinking. This is a significant argument because it may imply that such Japanese methodologies as Kaizen, just-in-time and total quality management could be unsuitable for a strictly result-oriented environment.

To test empirically Imai's claims and their consequent costing paradigms, we first examine the extent of the West's emphasis on results. Such practices as 'earnings management', 'big bath', 'the numbers game', 'the guidance game', and 'game of nods and winks' provide overwhelming evidence for the highly weighted emphasis on results in the West. Second, we use discriminant analysis to test the hypothesis regarding the emphases on profits and cost-associability practices in the automobile industry. Employing GM and Ford to represent the West side and Honda the East side, the analysis uses data from consolidated income statements reported for the years 1988–1998. The results support Imai's claim.

#### *Limitations of the Study*

One could consider the following considerations as serious limitations of the study.

- (1) Only one company, Honda, was used in the hypothesis testing. This is hardly a good representative of the East's thinking. Our response to this criticism is that we are constrained by data availability. The only Japanese auto company in the Compustat whose consolidated income statements are translated from Japanese GAAP into U.S. GAAP is Honda. Thus, our paper provides some hard evidence on Imai's claims, albeit limited.
- (2) The analysis covers the overall, consolidated financial statements of the three companies. Hence, the relationship between cost-associability practices and the consolidated reports are too remote for meaningful examination. This argument is deficient in two respects. First, to ascertain the ultimate effect of cost-associability programs, one needs to examine the 'total' picture. The cost-associability paradigm driving these programs is not germane to one plant or a segment of the organization. As a broad philosophical orientation, it runs into the fabric of the entire company. One has to study the entire company over many years to form a basis for understanding the extent of this thinking and its application. Second, specific data on cost-associability programs are normally confidential and unavailable to outsiders. And, even if the data is available, our main concern is not with actual performance; rather, we seek the underlying thinking drivers, behind this performance.

## NOTES

1. The term ‘activity’ in activity-based costing is a synthetic (associative) concept as it refers to an *act* to be performed by an *actor* (human or robotic labor) by *acting* on (or *activating*) something to accomplish the *purpose* of the activity according to a *plan* of action. The term activity then must combine (associate) teleologically several elements:

- actor (doer; subject),
- acting (doing),
- object of action (acted on; object of doing),
- purpose (teleology of doing). In the absence of purpose, an activity is a mere accidental event, and
- plan of action.

2. According to Garfield (1992, 170), the word *team* is loosely used in many companies. However, a group carrying this label does not mean it functions as a team. The new form of teams, labeled *smart team*, is “an organic, living system; fluid, flexible, and adaptable; characterized by partnership rather than power struggle. Unlike the old story team, it is managed from within. While *interdependent* with the organization to determine its goals, select its leadership, or choose its members, [a smart team] functions as an autonomous entity with an inherent group intelligence of its own.” In brief, this new development of ‘smart teams’ emphasizes team-member interactions and idea associability analogous to cost associability.

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# Downsizing and Performance: An Empirical Study of the Effects of Competition and Equity Market Pressure

Thomas F. Madison and Donald K. Clancy

## ABSTRACT

*We examine the association between downsizing and performance when consideration is given to competition and equity market pressure. Initial downsizing is associated with improved performance, at least over the five years subsequent to the year in which a firm initially downsized and for firms unconstrained by dominant customers. After initial downsizing, subsequent reductions are associated with poorer performance. Contrary to expectations, equity market pressure does not moderate the overall relationship. For those firms with major customers, lower equity market pressure is associated with better performance and downsizing is not.*

## INTRODUCTION

Nearly half of the industrial companies in the COMPUSTAT files downsized an average of 25.8% during the years 1986 to 1996. However, empirical studies have found mixed results (Table 1) on the effect of downsizing on performance.<sup>1</sup> Accounting measures of performance are not improved by employment down-

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**Table 1.** Summary of Results from Empirical Studies

<b>Accounting Measures Studies:</b>	
Study	Results
Bailey, Bartlesman and Haltiwanger (1994)	Approximately 35% of downsizing plants suffered productivity declines.
Cascio, Young and Morris (1997)	Downsizing employment does not improve return on assets, but downsizing fixed assets does.
Chu (1996)	Downsizing firms perform no worse than their industry with respect to accounting ratios. Productivity is no worse than industry, or improves depending on stated reason for downsizing.
DeMuese, Vanderheiden and Bergmann (1994)	Profit margin, return on assets, return on equity, and market-to-book ratios decreased for downsized firms
<b>Equity Market Studies:</b>	
Blackwell et al. (1990)	Negative (-0.55%) returns to announcement of a downsizing.
Brickley and Van Drunen (1999)	Negative reaction to announcement of facilities consolidations.
Chan, Gau and Wang (1995)	Negative reaction to announcement of facilities consolidations.
Gambola and Tsetsekos (1992)	Negative (-0.58%) returns to announcement of a downsizing.
Lin and Rozeff (1994)	Negative (-2% to -3%) to the announcement of a downsizing.
Nixon(1995)	An optimal level of downsizing results in positive returns.
Worrell, Davidson and Sharma (1991)	Stock returns improved for firms announcing restructuring or consolidation layoffs. Stock returns declined (-0.25%) for firms announcing large layoffs or layoffs for financial reasons.

sizing and the announcement of a downsizing generally reduces stock prices. These studies, except for Chu (1996) and Nixon (1995), examined the unmoderated relationship of downsizing on performance and considered performance for only one or two years following the downsizing. The moderated models do find some positive results for downsizing. These mixed results leave the serious question: Did millions of people lose their jobs for no economic purpose?

This paper examines two propositions. The first proposition is that an initial downsizing will be more beneficial than subsequent downsizings. An initial downsizing is more likely to have beneficial effects through the removal of excesses and the refocusing of the organization. Subsequent downsizings are less likely to be effective as strategic actions as they will signal an organization in decline and will have a more serious effect on employee morale. The

second proposition studied is that the extent of competition and equity market pressure moderate the effects of downsizing on corporate performance. One indication of the lack of pure competition is the presence of dominant customers in a market. Balakrishnan, Linsmeier and Venkatachalam (1996) found that firms adopting just-in-time processes and that had major customers were unable to retain the cost benefits.

Pressure from capital markets will also influence the process of downsizing. Equity market pressure (Stein, 1989) will motivate senior managers to focus on short-term profits and to minimize the signaling effects of wide variations in reported profits. This will be especially true for executives whose compensation is based on current earnings or who have relatively small positions in stock ownership. Thus, firms with high equity pressure (low inside ownership) will tend to downsize over several years, which will be ineffective.

Freeman and Cameron (1993) state that downsizing studies suffer from the lack of long-term empirical perspective. In this paper, we examine the relationship for a longer time period (five years) than reported in prior studies, we make the distinction between initial and subsequent downsizing, and our model includes both moderating and control variables. We find that initial downsizing has a positive association and subsequent downsizing has a negative association with performance. Further, we find that competition is a strong moderator, but that equity market pressure is not. There is a modest effect of equity market pressure for those firms with dominant customers.

Siegel and Sorensen (1999) report that management accountants are spending more time interpreting financial statements and explaining the business implications of decisions to managers. For those who are called upon to explain the financial implications of downsizing and advise senior management, this paper provides evidence of empirical regularities among firms that have downsized.

The remainder of this paper is organized as follows. The presentation starts with downsizing and performance. In the following section, the research method and results are presented. The final section discusses the results.

## **DOWNSIZING AND PERFORMANCE**

In this paper we examine the relationship between two types of downsizing and performance as moderated by product market competition and equity market pressure.

### *Initial and Subsequent Downsizing*

In this paper we will distinguish between two types of downsizing: initial and subsequent. We would expect a positive relationship between an initial downsizing

and performance. In initial downsizings we would expect reductions to remove excess capacity, unnecessary processes, and poorly performing employees. The corporate vision (Mishra, Spreitzer & Mishra 1998; Brockner 1992; Tyler & Bies 1990) presented by senior management to employees can be credibly stated as either "Here is the plan to position our company to be the best competitor in our industry" or "Here is the plan to save our company." With either vision, the employees will have the justified impression that surviving employees will be better off. The statements would be especially credible if senior management can point to years of severe decline prior to the downsizing. However, not every initial downsizing will have beneficial effects on firms. Especially, sensitivity to employees will be required to maintain the common vision and purpose for the firm. For example, the announcement of a job cut for employees is not an opportune time to announce a record pay raise for the chief executive as happened at AT&T (Ramstad, 1994; Keller, 1995).

Continued downsizing in the years following an initial downsizing will signal to the employees that every job is at risk (Norrall, 1999) and weaken the credibility of the vision statements made by senior management. Unfortunately, subsequent downsizing is pervasive with about two thirds of those companies that cut jobs in one year repeating the following year (Cascio, 1995). Subsequent downsizing has a depressing effect on morale. While survivors tend to remain loyal to their companies (Norrall, 1999), approximately 70% no longer trust their senior management (HR Focus, 1993). Primarily due to the lack of trust and dampened employee morale, we would expect a negative relationship between a subsequent downsizing and performance.

Product market competition and equity market pressure will moderate the relationships between initial and subsequent downsizing and performance.

#### *Competition and Effects of Supply Chain Management*

In a market with many buyers, customers will have little leverage over suppliers and prices. On the other hand, a large customer will have leverage over a supplier in negotiations. Large customers can use either an exit or a voice strategy (Helper, 1991) or a combination of both in managing their supply chain. With an exit strategy, the customer threatens to drop the supplier unless prices are reduced and service improved. With a voice strategy, the large customer hires better financial, engineering, and management staffs. These superior staff use knowledge and rhetoric to dominate meetings with suppliers. While the exit strategy is blunt and the voice strategy is more subtle, both result in lower prices to a supplier. Consequently, we posit that firms with one or more major customers will show less improvement in performance after a downsizing. JIT

research (Balakrishnan et al., 1996; Palmer, Gribbin & Tucker, 1995) found results consistent with this proposition.

### *Equity Market Pressure*

The degree of equity market pressure experienced by management will also affect managerial decisions regarding downsizing and thereby affect the impact of downsizing on performance. Stein (1989) posited and Klassen (1997) found that equity market pressure influences managerial behavior. Managers who face greater equity market pressure tend to place greater emphasis on short-run earnings. Thus, managers who face greater equity market pressure will tend to implement downsizing piecemeal in order: (1) to minimize the effect on current earnings of restructuring charges, and (2) to take advantage of periodic improvements in costs and reported short-term operating performance.<sup>2</sup> However, Hitt, Keats, Harback and Nixon (1994) report that employee morale and productivity suffer seriously when layoffs are implemented over several years. Thus, senior managers who buckle under to equity market pressure and implement downsizing piecemeal will have poorer long-term performance as a consequence.

Further, managers facing heavy equity market pressure will unduly react to the prospect of a major customer loss as this would signal a downswing in revenues to equity markets. On the other hand, management under less equity market pressure will be in a better position to withstand the threat of a large customer loss – especially when that customer is only marginally profitable. Therefore, firms with lower equity market pressure should be better able to withstand the leverage of major customers over performance.

In the next section, we describe the research method and present the results of the study.

## **RESEARCH METHOD AND RESULTS**

Firm performance will vary for more reasons than the direct and moderating relationships that are the focus of this paper. Consequently, it is necessary to hold constant the effects on corporate performance of mergers, momentum, industry, technology, research, and size.

### *Control Variables*

Corporate mergers are undertaken to putatively improve the performance of the combining entities. Layoffs are frequently announced to signal prospective performance improvement. However, the disturbance of operations inherent in a corpo-



rate merger may dampen promised improvement. There are mixed results on the performance effects of mergers for the acquirer's shareholders (Jarrell, Brickley & Netter 1988). Thus, an empirical model of downsizing and performance should control for the disturbance effects of merger activity on performance.

Next, performance momentum may both motivate a downsizing and effect observed performance afterward. Once a strong downward trend in performance has begun, it will take both bold action, perhaps including downsizing, and time to turn around the firm. However, Robbins and Pearce (1992) report that firms, which had suffered more financial distress over the two years prior to reductions, exhibit a significantly better turnaround. Perhaps, in these circumstances the management team is more motivated. Vision statements (Mishra, Spreitzer and Mishra, 1998) can be made more convincingly after years of loss. Thus, there is a question of whether momentum will continue dragging down performance or whether a highly motivated turnaround will result. In either case, the empirical model should include a control for the momentum of prior performance.

Performance will also vary across industries with different levels of maturity and competition. For example, if firms that downsize more happen to be in low performance industries, there will be a negative association between the extent of downsizing and performance. Similarly, if the downsizing firms are in industries with mixed performance, then the association between downsizing and performance will be mixed. Thus, an empirical model should hold constant the effects of industry.

In a study of the theory of adaptation, Clancy and Johnson (1999) found that the less adaptable inventory and technology were inversely related to performance. High performance firms tend to have proportionately lower inventories and less, but newer, plant and equipment. However, firms with major customers may be less able to follow an adaptation strategy. Dominant customers can negotiate larger inventories and higher capacity to support customer service levels. Similarly, Palmer, Gribbin and Tucker, (1995) posited that powerful buyers monitor suppliers for investment in the latest technological advances. Thus, firms operating in customer-dominated markets will be under pressure to increase investments in newer property, plant, and equipment. An alternative theory would hold that firms with major customers follow a cost defense strategy. These firms would take some actions that increase costs, such as provide more inventory and production capacity, to defend their prices to customers. Thus, inventory and technology should be included in the model to control for these effects.

Sougiannis (1994) and Shevlin (1991) found that research and development expenditures had a strong positive relationship to subsequent performance. Similarly, Clancy and Johnson, (1999) included research expenditures as a

control and found a strongly positive association with current performance. Thus, past research expenditures should be controlled for because they are expected to strongly affect performance.

Finally, performance should be associated with size. Generic, lower margin products tend to require mass production methods, which are facilitated in larger companies. On the other hand, newer and higher margin products may be produced profitably by smaller companies. In order to capture these effects on performance, size should be controlled for in the empirical model.

### *Measurement and the Estimation Model*

Firm performance (PERF) was measured as the margin of net sales<sup>3</sup> over production costs excluding depreciation. This performance metric is relatively unaffected by discretionary costs or depreciation methods. Cost of goods sold, as reported by Compustat, includes the cost of direct materials and purchased parts, direct and indirect manufacturing labor, and manufacturing overhead<sup>4</sup> before the effect of depreciation. If downsizing is effective in reducing costs, then the cost of goods sold should decrease for downsized firms and performance should increase.

The initial downsizing (INITIAL) was measured as the percentage reduction in employment in the year that the firm entered the study as a downsized firm. A firm initially downsized when they reduced employment by at least 2.5% following two years with no such downsizing. A two-year time period provides some assurance that observed performance is the result of a particular instance of downsizing and not a prior instance. Downsizing less than 2.5% was considered within the normal variation of stable companies. A second measure is the subsequent cumulative downsizing (SUBSQ) in employment over the five-year period following an initial downsizing. Subsequent instances of downsizing of at least 2.5% were accumulated as SUBSQ.

The competition (actually, *less* competition) in the firm's product markets was represented as the presence of one or more major customers (MC). Disclosure of significant or major customers was determined through key word searches of annual reports in the NAARS database of LEXIS-NEXIS®.

In Klassen (1997), the degree of equity market pressure experienced by managers was hypothesized to be inversely proportional to management's ownership interest in the firm, or inside owner concentration (IOC). IOC was measured as the ratio of the number of shares held by the five largest direct owners to the total number of shares outstanding. These data were collected from *Spectrum 6* and *Compact Disclosure* for the downsized firms for each firm year in the five-year period subsequent to the initial downsizing.

The effect of the moderating variables was examined using interaction terms. Neter, Kutner, Nachtsheim and Wasserman, (1996) define interaction effects as effects of the independent variables on the dependent variable that are not additive: the slope of one variable may differ depending on the value of another. Effects can exist due to the interaction of initial downsizing with major customers (MCxINITIAL) or due to the interaction of subsequent downsizing with major customers (MCxSUBSQ). Further, firms with a major customer may have different, presumably lower, intercepts. Similarly, IOC may moderate the relationships to performance of initial and subsequent downsizings. Finally, non-additive interaction effects may exist due to both major customers and inside ownership (MCxIOC).

For the control variables, merger activity (MERGER) was assigned a value of 1 if a firm's footnotes disclosed that the financial report had been affected by merger activity. The momentum (MOMEN) of the firm's performance prior to downsizing was measured as the difference between the firm's before tax and depreciation return on sales for the year before the initial downsizing to two years before. Industry performance (INDP) was measured as the average annual PERF for the non-sampled firms in each 3-digit standard industrial code (SIC) industry<sup>5</sup>. The levels of inventory (INV) were measured in the same year as the performance. Research and development (RES) was lagged one year to allow time for the expenditures to benefit operations through new products. The technology variable was measured with the amount of net plant and equipment (NPE) and the age of net plant. Age of property, plant, and equipment was approximated by the ratio of accumulated depreciation to gross property plant and equipment. Size was measured as the amount of net revenues.

The estimation model for the association of downsizing and performance was:

$$\begin{aligned} \text{PERF} = & b_0 + b_1\text{INITIAL} + b_2\text{SUBSQ} + b_3\text{MC} + b_4\text{MCxINITIAL} \\ & + b_5\text{MCxSUBSQ} + b_6\text{IOC} + b_7\text{IOCxINITIAL} + b_8\text{IOCxSUBSQ} + b_9\text{MCxIOC} \\ & + b_{10}\text{MERGER} + b_{11}\text{MOMEN} + b_{12}\text{INDP} + b_{13}\text{INV} + b_{14}\text{NPE} + b_{15}\text{AGE} \\ & + b_{16}\text{RES} + b_{17}\text{SIZE} + e \end{aligned}$$

In order to avoid the effects of reorganization costs on performance, the pooled regression time period of five years began with the first year following the year of initial downsizing.

### *Sample*

The COMPUSTAT database (years 1984–1996) was the source for firms and the primary source for financial information used in this study. Table 2 provides descriptive statistics on the industries included in this paper. These manufacturing industries were selected because they were among the largest employers in the United States. There were sufficient data to generate 1,592 usable observations from 320 of the total 401 downsizing companies. Averages for the model variables for the full sample and for those with and without major customers are reported in Table 3.

### *Results*

The estimation model was significant (F Value 34.58, Prob > F 0.0001 and Adjusted R<sup>2</sup> 0.264) and the parameter estimates are reported in Table 4. As expected, the estimate for INITIAL was positive and for SUBSQ was negative. The estimate for MC was significant with the sign in the expected direction. Additionally, the interactions of MC and the downsizing variables were significant, which indicated the association of downsizing and performance was different for firms with major customers and firms without major customers. Estimates for the moderating variable IOC were not significant. The estimates for the control variables all have the expected signs and most are significant.

**Table 2.** Industries in Study

SIC	Industries	Firms	Firms Downsized	Percent Downsized
20	Food and kindred products	73	35	48%
22	Textile mill products	33	13	39%
26	Paper and allied products	53	23	43%
27	Printing, publishing	53	25	47%
28	Chemical and allied products	163	53	33%
34	Fabricated metal, excluding Transportation equipment	56	35	63%
35	Industrial, commercial machinery, and computer equipment	158	97	61%
36	Electrical, other electrical Equipment	91	78	86%
37	Transportation equipment	135	42	31%
	Total	815	401	49%

Note: Industry Codes and descriptions are taken from Standard & Poor's Compustat Services, Inc. 1997.

**Table 3.** Comparison of Averages for Study Variables

	Full Sample	MC = 1	MC = 0	<i>t</i> -Value	Sig.
Sample Size	1,592	333	1,259		
PERF	0.329	0.292	0.338	-4.91	**
INITIAL	0.114	0.166	0.102	9.40	**
SUBSQ	0.144	0.145	0.144	0.11	
<i>Moderating Variables</i>					
MC	0.209				
IOC	0.142	0.182	0.132	4.51	**
<i>Control Variables:</i>					
MERGER	0.565	0.410	0.606	-6.51	**
MOMEN	-0.005	-0.022	-0.001	6.46	**
INDP	0.337	0.335	0.338	-0.42	
INV	0.168	0.187	0.163	4.21	**
NPE	0.280	0.246	0.289	-3.88	**
AGE	0.486	0.515	0.478	4.90	**
RES	0.034	0.039	0.032	3.77	**
SIZE	3.767	2.166	4.190	-2.70	**

\*\* *t*-value significant at 0.005 level for mean differences in variables between firms with and without major customers.

We also estimated the empirical model reduced by the deletion of the MC variable and its interactions and with the sample partitioned by those with and without major customers (Table 5). For firms with major customers, the signs of the variables INITIAL and SUBSQ are the reverse of those expected, but the coefficient for IOC is significant. The IOC cross-product coefficients have *t*-values (-1.71 and -1.93) that are approaching 0.05 significance level. The coefficients of the control variables for technology were significant, but reversed. Firms without major customers had model estimates as expected, but contrary to expectations, the IOC terms were insignificant.

## DISCUSSION AND CONCLUSIONS

This study finds empirical support for the proposition that downsizing can improve a firm's performance, but only on initial downsizing for those firms without dominant customers. Thus, the empirical model with moderating and control variables was successful in finding a significant positive effect for downsizing. An estimate for the effect of downsizing is about a 2.2% increase (11.4% $\times$ 0.1768) in the average margin of 32.9%.

The finding of a negative association between subsequent downsizing and performance is consistent with prior literature (Shields & Young, 1992 and Hitt

**Table 4.** Effects on Performance of Downsizing, Competition, and Equity Market Pressure

	Estimate	t-Value
Intercept	0.1699	6.91 **
INITIAL	0.1768	3.28 **
SUBSQ	-0.0582	-2.56 *
<i>Moderators:</i>		
MC	-0.0630	-4.08 **
MCxINITIAL	-0.3350	-3.85 **
MCxSUBSQ	0.1354	2.92 **
IOC	0.0181	0.58
IOCxINITIAL	-0.1133	-0.56
IOCxSUBSQ	-0.0613	-0.77
MCxIOC	0.0653	1.52
<i>Controls:</i>		
MERGER	-0.0187	-2.75 *
MOMEN	-0.2990	-4.75 **
INDP	0.5466	16.38 **
INV	-0.1512	-4.40 **
NPE	-0.0489	-2.42 *
AGE	-0.0003	-0.01
RES	0.9915	9.05 **
SIZE	-0.000683	-2.49 *
	<i>Adj. R-Sq.</i>	0.264
	<i>N</i>	1,592

\* *t* significant at 0.05 level \*\* *t* significant at 0.005 level

et al., 1994), which suggests that as downsizing becomes repetitive, the ability of the firm to improve performance is impeded. This would occur due to an adverse impact of the subsequent downsizing on morale. It may also have occurred as a result of a decline in productivity of the remaining employees due to inexperience with new duties. Consequently, senior management should not believe that the success of the first downsizing necessarily continues to a second or third instance.

Taken together, these results imply that worker job loss related to initial downsizing is justified by higher margins, but that subsequent job loss is associated with lower margins. This would imply that subsequent downsizing events should signal a firm in decline rather than one with improving performance. Further, studies of the ethics of downsizing (Hopkins & Hopkins, 1999) appear to have an empirical basis for questioning the rationale for subsequent downsizing.

**Table 5.** Effects on Performance of Downsizing for Firms with and without Major Customers

	With Major Customers		No Major Customers	
	Estimate	<i>t</i> -Value	Estimate	<i>t</i> -Value
Intercept	-0.0294	-0.69	0.2007	6.97 **
INITIAL	-0.0976	-1.18	0.1472	2.43 *
SUBSQ	0.0720	1.52	-0.0536	-2.19 *
<i>Moderator:</i>				
IOC	0.2303	3.76 **	-0.0004	-0.01
IOCxINITIAL	-0.5099	-1.71	0.0876	0.33
IOCxSUBSQ	-0.3363	-1.93	-0.0747	-0.82
<i>Controls:</i>				
MERGER	0.0010	0.08	-0.0222	-2.76 **
MOMEN	-0.3034	-2.97 **	-0.2681	-3.44 **
INDP	0.3225	4.60 **	0.5620	14.68 **
INV	0.0212	0.35	-0.2103	-5.03 **
NPE	0.1487	3.05 **	-0.0740	-3.27 **
AGE	0.2207	3.56 **	-0.0322	-0.91
RES	1.0954	6.73 **	0.9975	7.20 **
SIZE	-0.001410	-2.07 *	-0.000617	-2.03 *
<i>Adj. R-Sq.</i>	0.344		0.251	
<i>N</i>	333		1,259	

\* *t* significant at 0.05 level \*\* *t* significant at 0.005 level

There are more subsequent downsizings in the data than there are initial downsizings. If downsizing were pooled as a single category for study, then there would be a negative association between downsizing and performance. Thus, the results of this study can be reconciled with the overall negative results found in the literature (Cascio, Young & Morris, 1997).

Firms with dominant customers appear to have a different model of performance. Even though the initial downsizing of firms with major customers was larger (16.6% vs. 10.2%), these employee reductions were not associated with improved margins. These findings are contrary to the supplier-supportive strategy suggested by Palmer, Gribbin and Tucker (1995) as dominant customers did apparently exercise buying power and demand price concessions from downsizing firms. Low pressure from equity markets (high IOC) was able to partially counteract the dominance of major customers.

Downsizing firms with major customers appear to be different in important ways from those without major customers. This is the second paper that finds important differences in performance based on the presence of major customers.

Balakrishnan et al. (1996) found results consistent with these for JIT adopting firms. Except for subsequent downsizings and industry performance, the averages for most of the study variables were significantly different between the two groups. The signs of the model coefficients were noticeably different for downsizing, inside ownership, inventory, net plant, and age. The positive coefficients on inventory, net plant, and age are consistent with cost-plus pricing. The higher average expenditure for research and development may indicate that major customers do, as Palmer et al. (1995) suggest, force suppliers to keep abreast of the latest technology in their industry. The positive parameter estimate for net plant may be an indication that firms with major customers have some success in substituting technology for labor. This may be the case if contracts with major customers result in less demand fluctuation for the supplier with the result that the scale of their technology investments is more appropriate. Another plausible explanation is that among the firms with major customers, those with higher margins can afford to keep more inventory and net plant. Further, they may have sufficient margin to be unconcerned regarding the age of the equipment.

Equity market pressure was less successful than competition in moderating the relationship between downsizing and performance. Inside ownership was significant only for those firms with major customers and results in an average increase in margins of 4.2% ( $0.182 \times 0.2302$ ). This result is consistent with the higher average IOC of customer dominated firms (18.2% vs. 13.2%).

The control variables were important in holding constant a number of characteristics and events. For the overall model and for the firms with no major customers, the merger variable was significant with the expected sign. The reduction in margins associated with a merger was about 2%. Thus, the negative announcement effects of mergers on stock prices found in other studies (e.g., Jarrell, Brickley & Netter 1988) is confirmed within the context of downsizing firms and accounting performance measures.

Next, performance momentum was significant with a sign indicating that the larger the previous decline in earnings rate, the larger is the current margin, which is consistent with the turn-around literature (Robbins & Pearce, 1992). Since the prior performance is held constant in the model, these results on downsizing do not support the proposition that it is momentum alone that drives the poor results for downsizing. The negative signs on inventory, net plant, and age in the overall model are consistent with Clancy and Johnson (1999) as holding these less adaptable assets results in lower performance. The size and significance of the coefficient for past research expenditures confirms the importance of past research expenditures in studies of performance. Further, downsizing that affects research and development would appear to be counter-



productive (Bommer & Jalajas, 1999). Souigiannis (1994) and Shevlin (1991) are confirmed with a different measure of performance, sample of companies, and time period.

In summary, initial downsizing was found to be associated with better performance for firms in non-customer-dominated markets. Subsequent downsizing was found to be associated with poorer performance. Downsizing was not associated with performance for firms with major customers, but equity market pressure moderated the relationship somewhat.

## NOTES

1. The effect of downsizing on performance has been studied from a number of approaches. Greenhalgh, Lawrence and Sutton (1988) studied the relation of downsizing and organizational decline. Worrell, Davidson and Sharma (1991) and Dial and Murphy (1995) studied the effect of downsizing on shareholder value. Dougherty and Bowman (1995) and Bommer and Jalajas (1999) reported on the effect of downsizing on innovation. Brocker, Grover, Reed and DeWitt (1992) and De Vries and Balazs (1996) studied the effect on attitudes, loyalty, and productivity of the firm's surviving employees. Downsizing is an aspect of turning around declining performance (Hofer 1980, Hambrick & Schecter, 1983; Robbins & Pearce, 1992). Downsizing was the result of shifting philosophies of corporate focus, for example the core competency focus of the late 1980s and early 1990s (Leatt, Baker, Halverson & Aird, 1997). Downsizing has been characterized as management responding to poor reported performance in a reactive manner rather than in a proactive manner (Hamel & Prahalad, 1994; Shields & Young, 1992). Similarly, management implemented broad, non-selective cost-cutting programs, often focused on payroll and benefits, in order to achieve immediate cost-savings (Robertson, 1987) and improve performance ratios. Finally, Hopkins and Hopkins (1999) considered the ethics of downsizing.

2. The structure of management compensation may influence how a particular firm's management responds, i.e., management may elect the 'big bath' approach depending upon bonus parameters. This study attempts to control for any managerial tendencies to report other losses in the year of downsizing by observing performance over the five years following the year of downsizing.

3. In order to remove the interactive effects of size on model parameters, all monetary amounts, except net revenues, were deflated by sales (Hirschey & Weygandt, 1985; Clancy & Johnson, 1999).

4. Manufacturing overhead may contain discretionary cost items. To the extent that it does, changes in margin may result from managerial discretion rather than downsizing. This study attempts to control for that possibility by examining performance over a 5-year period. Over this period, discretionary items should have little coincident association with downsizing.

5. In a few cases, the 3-digit SIC industries were combined in order to obtain at least 6 non-sampled companies in each industry performance group for calculating INDP. This resulted in 24 industry groups.

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# MATCHING PRODUCTIVITY MEASURES WITH BUSINESS MISSION AND UNCERTAINTY

Zahirul Hoque

## ABSTRACT

*The results of an empirical assessment of the importance of matching productivity measures with business mission and perceived environmental uncertainty (PEU) are reported. Hypotheses were tested using data collected from a sample of New Zealand manufacturing firms using a mailed survey. The results support earlier findings linking contextual factors to performance evaluation systems. The data indicate that business mission influences the extent to which firms use productivity measures for performance evaluation. Furthermore, PEU had a greater impact on the relative use of productivity measures. The results also suggest that when a build mission is pursued, high levels of PEU are associated with increased use of productivity measures.*

## INTRODUCTION

Despite widespread interest in researching how productivity should be measured in an organization (Armitage & Atkinson, 1990; Hansen, Mowen & Hammer,

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1992; Christopher, 1993; Brinker, 1997), no study in management accounting concerned with assessing how organizational circumstances such as strategy and business environment play significant roles in the design and use of productivity measurement systems. This apparent gap in prior research provides the motivation for the present study. Productivity measurement systems are those organizational tools, managerial actions and activities that are associated with the systematic appraisal of the organization's performance. The literature in this area suggests that a productivity measurement system may provide timely, relevant and different kinds of information for operational control that are not well covered by traditional costing methods (Christopher, 1993; Zimmerman, 1995; Hansen & Mowen, 1997; Kaplan & Atkinson, 1998).<sup>1</sup>

This paper examines how a specific-business mission and environmental uncertainty may influence the extent to which firms use productivity measures for performance evaluation. Based on prior contingency research (for an up-to-date review of this literature, see Chapman, 1997 plus Hertmann & Moers, 1999), it is expected that adoption rates of a productivity measurement system are significantly related to strategic priorities and managers' perceived environmental uncertainty. Hypotheses were tested by using data collected from a sample of New Zealand-based manufacturing firms. The results support earlier findings linking contextual factors to performance measurement systems.

The next section of this work reviews the relevant literature and develops the tested hypotheses. Subsequent sections describe the study's research method, findings along with interpretation, limitations and conclusions.

## RESEARCH HYPOTHESES

Taking a contingency theory perspective (Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Woodward, 1965), this paper considers business unit mission and environmental uncertainty as the potential predictors of the use of productivity measures (the dependent variable) in organizations. It is based on the rationale that strong senior managers' perceptions of organizational and environmental factors are associated with greater reliance on productivity measurement systems for operational control and decision-making (for details, see Simons, 1995).<sup>2</sup> A general description of the contextual variables and how they are expected to be associated with the dependent variable follows.

### *Productivity Measurement Systems*

Productivity refers to how effectively resources (including time) are managed in order to achieve customer satisfaction and flexibility objectives (Lynch & Cross,

1991, p. 75). Productivity is normally measured by a notion of outputs to inputs and signifies the financial impact the unit has on the firm (Hansen & Mowen, 1997; Lynch & Cross, 1991). A productivity measurement system is considered multi-dimensional as it serves both as an informational and motivational tool. This system indicates: (1) overall or specific efficiency (how well resources are used), (2) effectiveness (what quality, cycle time, etc. is achieved compared with what is desirable), and (3) trends (how productivity changes over time).

Lynch and Cross (1991) believe that strategically driven measures provide both management and employees with the means to identify with the success of the strategy, and track their own contributions to its achievement. A productivity measurement system incorporates a wide range performance indicators, financial as well as operational, thus providing managers with continuous signals as to what is most important in their day-to-day work and where efforts must be directed (Armitage & Atkinson, 1990; Lynch & Cross, 1991; Zimmerman, 1995; Kaplan & Atkinson, 1998). It has also been claimed that a productivity measurement system: (1) enables an organization to assess its success or failure in several areas such as product quality, customer satisfaction and cost effectiveness (Armitage & Atkinson, 1990); (2) helps determine period-to-period improvements in productivity (Kaplan & Atkinson, 1998); (3) allows managers to evaluate their efforts to improve productivity and assesses managers' ability to control input usage (Hansen, Mowen & Hammer, 1992); and (4) develops productivity indices to supplement the information being reported by traditional cost accounting systems (Banker, Datar & Kaplan, 1989; Kaplan & Atkinson, 1998). Lynch & Cross, (1991 pp. 105–106) suggest that productivity measures dominate company scorecards for performance evaluation (see also Hemmer, 1996, p. 89; and Kaplan & Norton, 1996).

### *Business Mission*

Several writers (e.g. Hope & Hope, 1995; Whittington 1993; Kaplan & Norton, 1996; Simons, 1995) suggest that a performance measurement system in an organization should encourage actions that are congruent with organizational mission. Lynch and Cross (1991) demonstrate how a business unit's mission directly translates into how it plans to reach its strategic goals and what performance measures are truly critical to the unit's success.

This paper uses Govindarajan and Gupta's (1985) business mission typology, which relates to the nature of the strategic goal pursued (Guilding, 1999). It constitutes a continuum with pure 'build' at one end and pure 'harvest' at the other end. Market share is a paramount objective where the strategic goal is to build, even if at the cost of short-term financial results. At the other end of the



continuum a harvest mission aims at maximizing short-term earnings and cash flow even if loss of market share results.<sup>3</sup> The importance of business mission as a contextual variable in the study of control systems has been stressed by several researchers (e.g. Govindarajan & Gupta, 1985; Govindarajan & Fisher, 1991; Govindarajan & Shank, 1992; Guilding, 1999).

It has been suggested that build managers are more likely to experience greater dependencies with external individuals and organizations than are harvest managers (Govindarajan & Fisher, 1991; Govindarajan & Gupta, 1985; Shank & Govindarajan, 1989; Govindarajan & Shank, 1992). A build mission signifies additional capital investment (greater dependence on capital markets), expansion of capacity (greater dependence on the technological investment), increase in market share (greater dependence on customers and competitors), and increase in production volume (greater dependence on raw material suppliers and labor market). Banker, Datar and Kaplan (1989) suggest that in the long run competitive market-forces prevent the firm from passing cost increases on to customers and sustainable competitive advantage arises only by having higher productivity than competitors or by offering specialized products and services that competitors cannot match. Thus, costs might be less significant in build than in harvest situations; build units therefore are more likely to place greater emphasis on keeping production up to budgeted levels and identifying bottlenecks than are harvest units.

The above discussion suggests that organizations pursuing a build mission (increasing sales and market share) would tend to place relatively greater emphasis on a formal productivity measurement system to monitor a wide range of business events in the fiercely competitive environment. Conversely, harvest firms operate in a stable and narrow product market, and thus stability of their market is congruent with reliance on traditional costing information. Accordingly, in a harvest situation decision-makers' emphasis upon a productivity measurement system is likely to be relatively lower. These arguments lead to the following hypothesis:

**Hypothesis 1:** A high emphasis, by management, upon a build mission is positively associated with a greater emphasis upon productivity measurement related activities than when management emphasizes a harvest mission.

#### *Environmental Uncertainty*

Previous contingency studies have found that the amount of management accounting information that managers use for decision-making is a function of their firm's external environment (Gordon & Naryanan, 1984; Chenhall &

Morris, 1986; Mia, 1993; Chong & Chong, 1997). In line with this argument, environmental uncertainty in this study is considered as an important influential factor of managers' use of a productivity measurement system. Environmental uncertainty refers here to managers' perceptions of the predictability and stability in various aspects of their organization's industrial, economic, technological, competitive and customer environment (Miles & Snow, 1978; Gordon & Naryanan, 1984; Ezzamel, 1990; Mia, 1993; Chenhall & Morris, 1986; Chong & Chong, 1997).

Gordon and Naryanan (1984) suggest that managers' greater perceived environmental uncertainty (PEU) implies greater difficulty in predicting future events; therefore, they need timely, relevant, and accurate information to deal with uncertain operating situations and such information is less critical to decision making in organizations that are stable. In studying the relation between PEU and budgeting, Ezzamel (1990, p. 186) pointed out that, in situations of high PEU, actual results seldom conform to budget targets, not only because of the level of managerial competence but also as a result of the unpredictability of environmental changes. Chenhall and Morris (1986, p. 18) suggest that business units that face unpredictable change may find that traditional financial evaluation systems such as static budgets are ineffective control devices because the initial standards rapidly become out of date. Recent research has shown that organizations in which managers have greater PEU experience more complex communication and coordination problems; such a situation causes managers to place greater emphasis on a system that is broad and multidimensional, and which helps managers understand and manage environmental uncertainties effectively (Mia, 1993; Mia & Chenhall, 1994; Libby & Waterhouse, 1996; Chong & Chong, 1997).

The above discussion suggests a greater need for increased communication within firms operating in high level of PEU. This need for greater communication may be satisfied with greater usage of a productivity measurement system. The argument is that a productivity measurement system places emphasis on performance indicators that not only trace the financial performance of the firm but also those that track customer satisfaction and innovation, together with production to accomplish organizational goals. It is proposed that as managers' PEU increases, their use of productivity measures also increases, because of the need for more information for decision-making. In contrast, when managers perceive lower uncertainty, they tend to place less emphasis on productivity improvement related activities, because a productivity measurement system may have little to offer. Thus low PEU may induce firms to continue using traditional costing systems for decision-making and control. These arguments form the basis of the following hypothesis:

**Hypothesis 2:** When firms experience high levels of perceived environmental uncertainty, managerial emphasis upon productivity measures for performance evaluation would be higher than in low perceived environmental uncertainty situations.

*Business Mission, PEU and the Choice of Productivity Measures*

The preceding hypotheses posit the direct relationship: (a) between business mission and the choice of productivity measures, and (b) environmental uncertainty and the choice of productivity measures. The literature on organizations has also suggested the linkage between business mission and uncertainty. For example, researchers (e.g. Govindarajan & Shank, 1992; Whittington, 1993; Hope & Hope, 1995) point out that, as business mission differs, companies will have different operating environments, and hence have different management control systems design requirements. Govindarajan and Shank (1992) suggest that the level of PEU is high for firms following a build mission and it is relatively low when a harvest mission is pursued. Drawing on this line of thinking, this paper sought to establish whether business mission and PEU in combination affects the choice of productivity measures in organizations. It is expected here that when firms pursue a build mission, the level of PEU is relatively high and that this relationship leads to the firm placing greater emphasis on using a wide range of productivity measures for performance evaluation. This possibility is summarized in the following hypothesis:

**Hypothesis 3:** When a build mission is pursued, increased perceived environmental uncertainty results in greater use of productivity measures for performance evaluation of the firm than when a harvest mission is pursued.

## RESEARCH METHOD

The research method consisted of two stages. The first was a pilot study, based on interviews with ten key employees (e.g. chief executive officers, accountants, and production managers) of five companies within the greater Wellington region and on reviews of supporting documentation (e.g. internal memos, working papers, organizational structure, management reports, etc.). The aims of the pilot study were to: (1) obtain contextual information, (2) test the initial draft of the questionnaire, and (3) identify the type of persons suitable for the questionnaire study – the second stage of research.

The pilot study revealed that the chief executive officer was the person most likely to provide accurate and useful information regarding his/her firm's business mission and control processes such as productivity measurement systems. Consequently, in the second stage of research the questionnaire<sup>4</sup> was mailed in late 1996 to chief executive officers in 200 New Zealand manufacturing firms, randomly selected from the 1994 edition of *New Zealand Business Who's Who*.<sup>5</sup> A total of 114 useable questionnaires (57%) were returned. A follow-up letter, which was sent to each non-respondent firm four weeks after the initial mailing, and several telephone calls yielded such a respectable response rate. The existence of possible response bias between early and late responses was undertaken by using a *t*-test. No significant differences were found in the results. Furthermore, the *t*-test reveals no significant differences between respondents and non-respondents in terms of size and industry membership. Thus it is reasonable to believe that non-response bias in this study is not significant. A profile of the respondents is included in Table 1.

### Variable Measurement

Business mission was measured using the typology identified by Govindarajan and Gupta (1985). This generic typology has been the subject of extensive empirical and theoretical investigation (Govindarajan & Shank, 1992; Guilding,

**Table 1.** Profile of the Sample

Industry classification*	Size of firms by number of full time Employees					Total
	Below 100	100-399	400-699	700-999	1000 +	
Food, beverage and tobacco	4	9	2	1	1	17
Wood and paper product	5	3	1	1		10
Petroleum, coal and chemical	4	9	3	2	1	19
Non-metallic (glass, ceramic, cement)	9	4	2	1	1	17
Machinery and equipment	2	7	1	2	2	14
Printing, publishing and recorded media	7	7	2	2	1	19
Metallic (iron and steel) product	2	3	1	-	-	6
Textile, clothing, footwear and leather	3	5	3	1	-	12
Total (N)	36	47	15	10	6	114

\*Based on the Australian and New Zealand Standard Industrial Classification (ANZSIC).

1999). Respondents were asked to mark the appropriate description that most closely fitted their organizations in comparison to other organizations in their industry (see Govindarajan & Gupta, 1985 for the instrument).

PEU was measured using a ten-item instrument developed by Gordon and Naryanan (1984). This instrument was originally developed by Gordon and Naryanan following several writers such as Duncan (1972), Khandwalla (1972, 1977), Ferris (1978) and Miles and Snow (1978). The items covered in the instrument are consistent with the context of today's environmental situations discussed in the contemporary literature (see D'Aveni, 1995; Hamel & Prahalad 1994; Cooper, 1995; Goldman, Nagel & Preiss, 1995). Furthermore, it is a well tested and robust instrument widely used in other studies (Mia, 1993; Gul & Chia, 1994; Chong & Chong, 1997). The instrument was also pre-tested during the pilot study stated above. In general, the participants revealed these items to be matters of concern for their organization's current operating environment. Respondents were asked, on a five-point Likert-type scale ranging from one (very predictable) to five (very unpredictable), to indicate their perceptions of the stability and intensity of their organization's market, economic, legal, technological, competitive and customer environment.

Pearson correlation coefficients between the uncertainty variables were significantly positively correlated to one another, indicating that they may constitute one or more factors (Bryman & Cramer, 1990). A principal component analysis (PCA) of the ten environmental items extracted one factor explaining 60.5% of the variance. Therefore, a single scale was derived by means of a weighted average of respondents' scores for items within the factor. The Cronbach alpha (Cronbach, 1951) coefficients were computed to test the reliability of the instrument used. The Cronbach alpha 0.74 for the scale indicated that the scale was internally reliable (Nunnally, 1967). The means and standard deviations of responses to each question on PEU factors and the factor loadings are presented in Table 2.

The use of productivity measures was measured using the instrument developed by Armitage and Atkinson (1990). These authors derived this instrument from intensive fieldwork within seven large Canadian firms. The twenty-six items of the instrument are consistent with the performance pyramid of Lynch and Cross (1991, p. 65) and the Kaplan and Norton (1996) balanced scorecard. Hemmer (1996, p. 89) suggests that Armitage and Atkinson's (1990) twenty-six items instrument includes thirteen nonfinancial measures. As also can be seen from Table 3, Armitage and Atkinson's twenty-six productivity measures ensure an effective link between strategy and firms' emphasis on both financial and operational measures. These twenty-six items were also pre-tested during which ten executives were encouraged to comment on items which were

**Table 2.** Reduction of Perceived Environmental Uncertainty (Independent) Variables: Factor Matrix Using PCA and Descriptive Statistics

Items	Mean	Std. Dev.	Factor Loading
Bidding for purchases of raw materials	3.12	0.88	0.58
Competition for work-force	3.06	0.84	0.71
Price competition	3.83	0.94	0.66
New products development	4.03	0.79	0.47
Economic stability	3.69	0.92	0.55
Technological environment	4.00	0.95	0.44
Market activities of competitors	3.83	0.94	0.69
Tastes and preferences of customers	3.79	1.09	0.73
Legal, political and economic constraints	3.98	1.09	0.54
New scientific discoveries in the industry	3.71	1.32	0.62

N = 114.

unclear and irrelevant to them. Whilst most of them perceived all of the questions as relevant and meaningful in their organizational circumstances, some questions needed to be reworded in the light of their comments. Respondents were asked, on a five-point scale of one (little extent) to five (to a great extent), to indicate the extent to which each of these measures are currently in use in their organization. The Cronbach alpha for this instrument is 0.76, which is well above the generally accepted minimum criterion level of 0.5 and 0.6 (Nunnally, 1967).

A factor analysis extracted six factors with eigenvalues greater than one explaining 71.2% of the variance. To increase the interpretability of these factors, the scores of each factor have been rotated (Kaiser, 1958) using the oblique direct oblimin method (with  $\delta = 0$ ). A single scale has been constructed for each factor by taking the weighted average of respondents' scores for each item within the factor. Table 3 shows the mean responses and the standard deviations of the responses to the twenty-six questions, together with factor loadings and the Cronbach alpha statistics.

As can be seen from Table 3, the factor analysis results in the following six weighted averaged productivity measurement systems factors: (1) monetary output/input measures, (2) physical output/input measures, (3) non-financial efficiency measures, (4) accrual accounting based measures, (5) monetary based efficiency ratios, and (6) non-financial based measures. The means and standard deviations for each item, factor loading and the Cronbach alpha for each factor involving weighted averaging are shown in Table 3. The Cronbach alpha for each factor involving weighted averaging is well above the lower limits of normal acceptability.

**Table 3.** Reduction of Productivity Measurement Systems (Dependent) Variables: Factor Matrix Using PCA\*, Descriptive Statistics and the Cronbach Alpha Statistics

Factor	Title and Items	Mean	Std. Dev.	Factor Loading	Cronbach Alpha
1	<b>Monetary Output/Input Measures</b>				0.71
	Output to capital	4.17	1.07	0.70	
	Output to inventory	3.69	1.15	0.58	
	Output to direct materials	3.46	0.90	0.57	
	Output to total cost of inputs	2.88	1.11	0.54	
	Output to direct labour	3.69	1.13	0.53	
2	<b>Physical Output/Input Measures</b>				0.69
	Output to direct labour-hours	3.48	1.20	0.82	
	Output per shift	1.98	1.00	0.81	
	Output per employee	2.44	1.26	0.51	
3	<b>Non-financial Efficiency Measures</b>				0.74
	Actual production to budgeted production	3.65	1.17	0.76	
	Direct materials efficiency variance	3.81	1.21	0.65	
	Labour-machine efficiency	4.23	1.33	0.57	
	Standard direct labour hours to actual direct labour hours	3.71	0.76	0.56	
	People/equipment capacity usage ratios	2.58	1.13	0.52	
4	<b>Accrual Accounting Based Measures</b>				0.65
	Net income to assets	3.79	1.04	0.76	
	Operating income to sales	3.65	1.17	0.71	
	Inventory to sales	3.85	0.94	0.65	
	Earnings per share	3.67	1.15	0.64	
	Flexible budget dollars to total actual dollars	3.18	1.20	0.54	
5	<b>Monetary Based Efficiency Ratios</b>				0.63
	Pay-roll to output	3.04	1.07	0.79	
	Variable costs to output	2.88	1.13	0.77	
	Overhead costs to output	3.17	1.14	0.66	
6	<b>Non-financial Based Measures</b>				0.70
	Actual time to projected time	2.21	0.98	0.72	
	On-time delivery	2.29	0.91	0.65	
	Defect rates	3.08	1.19	0.56	
	Payback period	3.18	1.09	0.52	

\*Oblique rotation - oblimin method. N = 114.

## RESULTS

The results presented in Table 4 provide strong support for Hypothesis 1 and Hypothesis 2. Build mission is significantly positively associated, as postulated, with all but one of the productivity measurement variables. The individual correlation coefficients for the variables are generally high ranging from 0.11 to 0.48. These results suggest that firms pursuing a build mission tend to emphasize a greater need for improved performance via greater firms' use of productivity measures. Table 4 shows negative associations between majority of the productivity measurement systems related variables and harvest mission, as expected. Thus, hypothesis 1 is accepted.

Pearson correlation coefficients between PEU and productivity measurement variables presented in Table 4 provide strong support for hypothesis 2. Managers' PEU is significantly associated, as postulated, with all of the productivity measurement variables. These results indicate that firms those perceive themselves to be in highly uncertain environmental situations tend to positively emphasize productivity measurement systems for managerial planning and decision-making such as performance evaluation of the firm.

Hypothesis 3 posits a combined effect on the choice of productivity measures in performance evaluation of business mission and uncertainty. To test this hypothesis, the following regression model was employed:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_1X_2 + e$$

Where

- Y = use of productivity measures,
- X<sub>1</sub> = business mission,
- X<sub>2</sub> = perceived environmental uncertainty (PEU),
- X<sub>3</sub> = interaction between X<sub>1</sub> and X<sub>2</sub>,
- e = error term.

To permit an acceptance of the hypothesis, the coefficient of the interaction term in the regression equation is required to be both positive and significant (Allison, 1977; Southwood, 1978). The results of this regression are presented in Table 4 and provide strong support for the hypothesized relationship. The interaction term,  $b_3$ , is both positive and significant ( $t = 2.102$ ,  $p < 0.01$ ), as expected. The model explained 19.4% of the variance in the dependent variable ( $F = 2.193$ ,  $p < 0.01$ ). These results suggest that there is a relationship between a build mission and higher levels of environmental uncertainty, which, in turn, causes management place greater emphasis on the use of productivity measures for performance evaluation.



**Table 4.** Pearson Correlation Coefficients Between Productivity Measurement Systems (Dependent) Variables and the Contextual Variables

Dependent Variables (Factors)	Contextual Variables		
	Build Mission	Harvest Mission	Perceived Environmental Uncertainty
Monetary output/input measures	0.26**	-0.18*	0.32**
Physical output/input measures	0.32**	-0.24*	0.51**
Non-financial efficiency measures	0.11	-0.18*	0.32**
Accrual accounting based measures	0.43**	0.14	0.60**
Monetary based efficiency ratios	0.48**	-0.09	0.55**
Non-financial based measures	0.41**	-0.25**	0.57**

\*\* $p < 0.01$ ; \* $p < 0.05$ .

**Table 5.** The Relationship Between Mission and Uncertainty, and their Combined Effect on the Choice of Productivity Measures

Variable	Coefficient estimate	Standard error	<i>t</i> -statistic
Intercept	4.634	1.039	4.420*
Business mission (a)	0.150	0.162	0.836
Perceived environmental uncertainty (b)	0.746	0.029	2.226*
Interaction: (a) × (b)	0.556	0.005	2.102*

Model F-statistic = 2.193\*; Adjusted R-square = 19.4%

\*  $p < 0.01$ .

## DISCUSSION AND CONCLUSION

This paper sought to examine the relationship between firms' productivity measurement related activities and contextual factors of business mission and environmental uncertainty. It attempted to address an important and topical question, namely the use of productivity measurement systems. Previous studies primarily dealt with technical aspects of the productivity measures, that is, how to develop metrics to measure productivity of the firm. Little attention was given to understanding how productivity measurement systems may be affected by organizational circumstances such as strategy and environmental uncertainty, as measured in this study. This paper attempted to address this situation within a sample of New Zealand manufacturing organizations.

The study identified, via a factor analysis of responses to a questionnaire, six productivity measures related factors: monetary output/input, physical output/input, non-financial efficiency, accrual accounting, monetary based efficiency and non-financial based measures. The analysis of the data indicated significant and positive associations between build strategy and all of the above factors. The high and positive relationships between build mission and all rotated variables suggest that managers who perceive themselves to be in build situations tend to positively emphasize productivity measures for performance evaluation. Harvest mission appeared to be negatively associated with majority of the productivity measurement related rotated variables, thereby suggesting that, as managers in harvest situations perceive less environmental uncertainty, they tend to attach less importance to other types of control systems such as productivity measurement. This evidence is consistent with suggestions made in the literature that strategy plays a vital role in the choice of performance measures (see Kaplan & Norton, 1996; McNair, Lynch & Cross, 1990; Lynch & Cross, 1991; Hope & Hope, 1995; Hemmer, 1996; Ittner, Larcker & Rajan, 1997).

The correlation analysis revealed positive and significant associations between environmental uncertainty and all of the six productivity measurement related factors. The strength and consistency of these results suggest that where management perceive greater environmental uncertainty, they tend to perceive productivity measurement systems to be potentially useful for their organizational performance evaluation.

The study provided further evidence that the choice of productivity measures was a function of a two-way interaction between a build mission and high PEU. Govindarajan and Gupta (1985), Simons (1987, 1990) and Govindarajan and Shank (1992) reach similar conclusions and suggested that firms in a build mission situation experience high PEU; consequently they require additional information to cope with the complexities of the environment. On the other hand, when PEU is low in a harvest mission situation, managers' emphasis upon a formal productivity measurement system would be lower (see also Lynch & Cross, 1991; Whittington, 1993; Simons, 1995; Hemmer, 1996).

#### *Limitations*

Like most survey research of its kind, the results reported in this paper are subject to three primary limitations. First, the questionnaire used in this paper drew upon three earlier studies: Gordon and Naryanan (1984), Govindarajan and Gupta (1985), and Armitage and Atkinson (1990). It must be recognized that the performance and operating environment literature is rapidly emerging.

So, caution must be undertaken in interpreting the results reported in this paper. Further research is required to validate its findings by developing 'new' instruments based on contemporary issues discussed in the recent literature in the area (see for example, Whittington, 1993; D'Aveni, 1994; Hamel & Prahalad, 1994; Cooper, 1995; Lynch & Cross, 1991; Simons, 1995; Kaplan & Norton, 1996). Second, the study was restricted to examination of the impact of two of many organizational circumstances on managers' productivity measurement systems related behavior. Future research may extend this study by examining how productivity measurement systems may be affected by other organizational circumstances, such as size, industry characteristics, authority structure, culture, technological uncertainties, and competitive uncertainties. Third, with hindsight, it would have been interesting to relate organizational performance to the relationships between strategy, environmental and use of productivity measures. Further study could be undertaken to address this situation.

The above notwithstanding, the findings reported in this paper and further research should improve our understanding of the factors that play a significant role in the adoption and use of performance measurement systems. It is hoped that this study will initiate a direction for empirically based studies leading to prescriptions for both practitioners and managers.

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## NOTES

1. Traditional costing methods, as represented in mainstream textbooks and articles in leading journals, refer to systems of product costing and quantitative systems of planning and control such as budgetary control and standard costing.

2. In his book *Levers of Control* (1995), Simons shows that decision-makers' choices of a particular control system reflect their personal beliefs, reveal their opinions of subordinates, affect the probability of goal achievement, and influence the organization's long-term ability to adapt and prosper. He describes four different 'systems' or 'levers' that can be used for the successful implementation of a management control system:

belief systems; boundary systems; diagnostic control systems; and interactive control systems. These four levers, according to him, are nested, and each offers some measure of guidance to the strategy process. Belief systems and interactive systems expand and define the opportunity space of the firm. Boundary systems and diagnostic systems constrain and focus attention on strategic domains and opportunities. Simons places a great emphasis on a positive relationship between top management's perceptions (or beliefs) about the context in which the organization operates and its management control systems design.

3. It should be recognized that some business units may pursue both 'build' and 'harvest' mission at the same time. This is, however, not the central focus of the current study. Future researchers may wish to explore this issue further.

4. As this study has used instruments originally developed by previous studies, they are not reproduced here for reasons of space.

5. This was the latest edition at the time of this paper.

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# CONSEQUENCES OF PARTICIPATIVE BUDGETING: THE ROLES OF BUDGET-BASED COMPENSATION, ORGANIZATIONAL COMMITMENT, AND MANAGERIAL PERFORMANCE

Jeffrey J. Quirin, David P. Donnelly  
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## ABSTRACT

*This paper investigates the relationship between two organizational constructs, budgetary participation and budget-based compensation, and two individual characteristics, organizational commitment and performance. A theoretical model is tested using a cross-organizational design. Measures were gathered from a sample of 107 employees from 15 organizations. Consistent with the theoretical model, results reveal that budgetary participation leads to increased use of budget-based compensation. Budget-based compensation, in turn, leads to increased levels of organizational commitment, and commitment leads to higher performance. Participation continues to have a significant positive effect on performance after controlling for budget-based compensation and organizational commitment.*

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## INTRODUCTION

Budgets are a commonly used managerial accounting tool that have two primary functions. First, budgets provide a means of establishing goals through planning and coordinating the firm's activities. Second, managers often use budget-related information as a benchmark for evaluating employee performance. Budgetary participation is the process in which subordinates participate in deciding the budget goals and possess some degree of influence on the final budget (Greenberg et al., 1994).

Accounting researchers have long sought to understand the relationship between budgetary participation and employee performance, but the evidence is mixed. Numerous studies have found participation to have a strong positive effect on job performance (e.g., Argyris, 1952; Becker & Green, 1962), while others report that the relationship is positive but not overwhelmingly strong (Merchant, 1981; Brownell, 1982a). Still others report a negative relationship between the two (Stedry, 1960; Bryan & Locke, 1967). In addition, several researchers have examined the effects of intervening variables which may help explain the linkage between participation and performance.

One such intervening variable is organizational commitment (Nouri & Parker, 1998). For many years, industrial psychologists have stated that an individual's level of organizational commitment affects his/her performance. The current study contributes to this line of literature by identifying an additional construct which affects an employee's level of commitment in a participative budgeting setting. A theoretical model is proposed in which performance is the consequence variable in a participative budgeting framework. The relationship between these variables is affected by two intervening variables: budget-based compensation and organizational commitment. Managers who rely heavily on budget-based numbers for evaluation purposes possess distinctly different managerial styles than managers who rely little on the budget to evaluate subordinates. Budget-based compensation is thereby the degree to which managers use budget-related goals to evaluate and determine an employee's compensation and promotion. Organizational commitment is defined as the employee's acceptance of organizational goals and his/her willingness to exert effort on behalf of the organization.

Prior research suggests participative budgeting and budget emphasis interact to affect managerial performance (Dunk, 1989; Brownell & Dunk, 1991), and that participation typically leads to increased use of a budget-based incentive structure (Shields & Young, 1993). This paper proposes that budget-based compensation, in turn, may lead to increased levels of organizational commitment. Increased levels of organizational commitment are then expected to lead

to higher job performance (Nouri & Parker, 1998). Using a cross-organizational design and a path analysis technique, results of the main analysis support the hypotheses regarding the proposed theoretical model and the aforementioned relationships. Additional analysis reveals that participation continues to have a significant positive effect on performance even after controlling for budget-based compensation and organizational commitment.<sup>1</sup>

The remainder of this paper is organized into four sections. The first section presents the theoretical development, while the second section discusses the research method including data collection and measurement information. In the third section, empirical results are presented. The final section concludes with a summary and discussion.

## **THEORETICAL DEVELOPMENT**

### *Participation and Budget-Based Compensation*

A body of literature has attempted to explain the relationship between participation and performance by investigating the interaction of managerial style with participation (i.e., Brownell, 1982a; Brownell & Hirst, 1986; Dunk, 1989; Brownell & Dunk, 1991). The basic premise of these studies is that employee performance would not decrease under a leadership style emphasizing budget attainment, if budgetary participation were allowed. Results of these studies suggest that a manager's evaluative style does interact with budgetary participation, and this interaction does have at least some effect on employee performance.

The information gathered by management during the participative budgeting process is used for at least two purposes (Shields & Young, 1993). First, information supplied by subordinates improves the overall efficiency of resource allocation among the operating units. Second, the information from participation can be used to design more effective budget-based incentive systems that can be used to increase motivation. It is conjectured that when participative budgeting is used more extensively, managers possess an evaluation style which makes greater use of incentives that reward performance based on meeting or exceeding the budget (i.e., budget-based compensation). Shields and Young (1993) report evidence supporting this in a study of the antecedents and consequences of participative budgeting. This leads to the first hypothesis, as depicted in Fig. 1, stated in the alternative form:

H1: There is a positive relationship between budgetary participation and budget-based compensation.

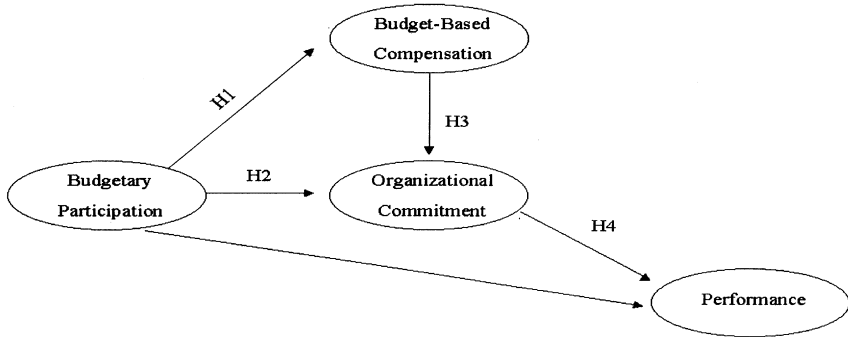


Fig. 1. Theoretical Model

### *Participation and Organizational Commitment*

For the past two decades the concept of organizational commitment has grown in popularity in the literatures of industrial psychology and organizational behavior. The concept has received a great deal of empirical study both as a consequence and an antecedent of other work-related variables of interest. In theory, committed employees should work harder, remain with the organization, and contribute more effectively to an organization (Mowday et al., 1979). Mowday et al. (1982) suggest that gaining a greater understanding of the processes related to organizational commitment has implications not only for employees and organizations, but also for society as a whole. Society tends to benefit from employee's organizational commitment in terms of lower rates of job movement and perhaps higher national work productivity and/or quality.

Two common approaches have evolved in the commitment research: behavioral and attitudinal (Brown, 1996). In the behavioral approach, a person attains a state or position of commitment as a result of engaging in committing behaviors. Engaging in these behaviors makes it costly to subsequently reverse a position or disengage from some line of activity. Thus, to act is to commit oneself (Salancik, 1977). According to the attitudinal approach, commitment develops as a result of some common work experiences, perceptions of the organization, and personal characteristics. These factors lead to positive feelings about the organization which in turn becomes commitment (Mowday et al., 1982).

Hanson (1966) argued that members of an organization associate themselves more closely with and become better acquainted with budget goals if they are involved in the creation of the budget. Furthermore, participation allows employees to become better acquainted not only with budget objectives but also

all organizational goals. Organizational commitment is developed from work experiences and individual perceptions according to the attitudinal view of commitment. Since organizational commitment involves the belief in and acceptance of organizational goals and values, an employee's work experiences through budgetary participation could lead to increased levels of organizational commitment. Using data from a single organization, Nouri and Parker (1998) found evidence to support this relationship.

Mathieu and Zajac (1990) note that most studies which have investigated relationships between firm characteristics and the organizational commitment construct have done so from a single organization perspective. They note that this is problematic for two reasons. First, because all employees are sampled from a single setting, there is little or no variance in their perceptions of organizational characteristics. Second, previous studies have examined relationships between aggregate features and organizational commitment by computing correlations at the individual level of analysis. In fact, they should be investigated using cross-level designs (Rousseau, 1985). By employing a sampling technique which utilizes subjects from 15 large U.S. corporations, the current study attempts to avoid these limitations. The following hypothesis, also depicted in Fig. 1, results:

H2: There is a positive relationship between budgetary participation and organizational commitment.

#### *Budget-Based Compensation and Organizational Commitment*

A body of literature has attempted to address the question of whether or not managers' evaluation styles have an impact on subordinate performance. The sequence commenced with Hopwood's (1972) assertion that managerial styles focusing primarily on accounting numbers for pay and promotion purposes (i.e., a budget-based compensation scheme) would lead to decreases in performance. However, Otley (1978) found that a leadership style emphasizing budget attainment was related to high levels of performance. It is possible that an intervening variable could be the cause of this inconsistency in the literature. This paper proposes that an individual's level of organizational commitment is directly affected by his/her manager's evaluation style, and that the resulting level of commitment affects the employee's performance. Specifically, budget-based compensation, a construct which measures how heavily a manager relies upon budget-based information for pay and promotion decisions, is thought to affect an individual's level of organizational commitment, which in turn affects that individual's performance.

Once again, the attitudinal approach to organizational commitment asserts that work experiences and perceptions of the organization form the employee's ultimate commitment level. Having a compensation system that rewards employees for meeting budget-based goals allows employees to set compensation and/or promotion-related goals for themselves which are congruent with organizational-wide goals. It is more likely that an employee will believe in and accept organizational goals (become committed) if these goals are common to their own. It is predicted that this is more likely under budget-based compensation circumstances.

An additional rationale which suggests a linkage between budget-based compensation and organizational commitment centers around the employee's perception of their own contribution to the organization. Morris and Steers (1980) suggest that as employees become more aware of their own contribution to the organization the heightened awareness enhances ego involvement and thereby increases their attitudinal commitment. Managers utilizing budget-based compensation schemes often discuss with employees how meeting budget-based goals not only affects their individual status (e.g., raise or promotion), but also how meeting individual budget targets affects the company as a whole. Thus, it is predicted that an individual employee's contribution to the organization can be assessed more readily by him/her when budget-based performance measures are utilized. This discussion leads to the following hypothesis (also depicted in Fig. 1):

H3: There is a positive relationship between budget-based compensation and organizational commitment.

### *Organizational Commitment and Performance*

A primary objective of industrial behavioral research is to identify the determinants of employee performance. More specifically, determining ways of increasing performance has incredible implications from a practical standpoint. Numerous studies have viewed organizational commitment as an antecedent to various organizational constructs including performance (Randall, 1990). Work by Mowday et al. (1974) suggests that highly committed employees do perform better than less committed ones, as highly committed employees by definition are willing to exert greater effort on the job. Ferris (1981) found that the performance exhibited by junior-level professional accountants was in-part affected by their level of organizational commitment. Similarly, in a study of the determinants of auditor performance, Ferris and Larcker (1983) indicated that an auditor's rated performance was primarily a function of motivation and orga-

nizational commitment. The results of Randall's (1990) meta-analysis reveal that organizational commitment has a positive relationship with employee performance, but that this relationship is small.

The majority of the studies investigating the commitment construct do so through a single organization methodology (Mathieu & Zajac, 1990). The Ferris (1981) and Ferris and Larcker (1983) studies noted above are two examples. An additional single organization study is that by Nouri and Parker (1998). They found that organizational commitment positively affected performance and partially mediated the participation/performance relationship. This study hypothesizes that in a multi-organizational sample an employee's performance is a function of his/her organizational commitment. Employees with greater commitment are expected to yield better performance. The following hypothesis results:

H4: There is a positive relationship between organizational commitment and performance.

## **RESEARCH METHOD**

### *Data Collection*

In order to allow for cross-organizational generalizability, data was collected using a survey questionnaire sent to a total of 240 managers from a cross-section of 15 large U.S. companies. Companies were selected based upon the number of their employees who were graduates of a large, mid-western public university. The sample of companies represented a variety of industries. Some of the companies represented in the sample include AT&T, Boeing, Conoco, General Electric, IBM, Payless Shoe Source, Phillips Petroleum, Southwestern Bell Telephone, Sprint, and Wal-Mart. Employees who received surveys were randomly selected from an alumni database at the university. Sixteen employees from each of the 15 companies were sent questionnaires. Respondents were chosen from a variety of functional areas including accounting, finance, marketing, and production operations.

A survey instrument package was distributed directly to each potential respondent and returned via mail. Accompanying each questionnaire was a cover letter containing an explanation of the research as well as instructions for completing the survey. A self-addressed, stamped envelope was also included.

Of the 240 surveys distributed, respondents returned a total of 107 usable surveys for a response rate of 45%. The average respondent was 39 years old, had 16 years of work experience, and supervised 25 employees.

*Measures*

The variables measured in the questionnaire include budgetary participation, budget-based compensation, organizational commitment, and job performance. All measures were drawn from prior literature. A copy of the complete research instrument is reported in the Appendix, and descriptive statistics for all measures are reported in Table 1.

To measure budgetary participation, Milani's (1975) six-item scale was used. The instrument attempted to assess the respondent's involvement in and influence on the budget process. The instrument was written in a seven-point Likert-type format ranging from (1) very little to (7) very much. Satisfactory reliability and validity have been reported for the scale by prior researchers (e.g., Mia, 1988; Nouri & Parker, 1998). In the current study, the Cronbach alpha was 0.94.

Budget-based compensation was measured using a four-item instrument developed by Searfoss (1976). The instrument asks respondents whether their compensation and promotion is related to their budget performance. The items were designed on a seven-point Likert-type scale anchored by: (1) strongly disagree and (7) strongly agree. The instrument's reliability and validity have been acceptable in prior research (e.g., Nouri & Parker, 1996). In the current study, the Cronbach alpha was 0.87.

Mowday et al.'s (1979) nine-item short-form instrument was used to measure organizational commitment. The instrument was written in a seven-point Likert-type format ranging from: (1) strongly disagree to (7) strongly agree. A response of (7) indicates a high level of organizational commitment. Prior studies report acceptable levels of reliability and validity for the nine-item scale (e.g., Blau, 1987; Nouri & Parker, 1998). In this study, the Cronbach alpha was 0.91.

Performance was measured using Mahoney et al.'s (1963, 1965) multi-dimensional nine-item scale. Respondents were asked to evaluate their individual performance with regard to eight performance dimensions, such as planning, coordinating, supervising, and staffing. Respondents were then asked to rate

**Table 1.** Descriptive Statistics

Variable	Mean	Std. Deviation	Observed Range	Cronbach Alpha
Budgetary Participation	20.72	10.46	6 – 41	0.94
Budget-Based Compensation	14.03	6.10	4 – 26	0.87
Organizational Commitment	47.23	8.94	23 – 63	0.91
Performance	5.75	0.74	2 – 7	—

their overall effectiveness in the final question. The instrument was constructed using a seven-point Likert-type scale ranging from: (1) well below average to (7) well above average. It was found in this study that upon regressing the overall performance dimension on the eight performance dimensions, 54% of the variation in the overall effectiveness dimension was explained. This finding is consistent with Mahoney et al.s' results and suggests that the overall rating significantly reflects the variation in performance on the eight dimensions. Consequently, the overall assessment of performance was used in the data analysis. This procedure is consistent with prior research (i.e., Brownell, 1982a; Dunk, 1989; Brownell & Dunk, 1991).

Although several studies have criticized self-reported measures of performance as unreliable due to leniency bias (e.g., Parker et al., 1959), other studies have noted that leniency bias is inconsequential unless the bias is systematically related to an independent variable (Chenhall & Brownwell, 1988; Kren, 1992). The use of self-reported measures also minimizes the 'halo' effect which may occur with superior ratings (Nealy & Owen, 1970; Heneman, 1974). Halo effects result from the tendency to evaluate 'globally' or for managers to evaluate on only one cognitive dimension.

### *Path Analysis*

Path analysis was used to evaluate the proposed hypotheses. The path model used in the analysis corresponds to the model in Fig. 1. In Fig. 1, each link between the variables has a path coefficient that measures the impact of the antecedent variable in explaining the variance in the outcome variable. For example, the path coefficient for the link between budgetary participation and organizational commitment indicates the increase in organizational commitment, measured in standard deviations, associated with a one standard deviation increase in budgetary participation. Values for the path coefficients were estimated using regression and correlation analysis (Asher, 1983). The path coefficient value is the standardized beta coefficient found by regressing the outcome variable on the appropriate antecedent variable(s).

## **EMPIRICAL RESULTS**

### *Main Analysis*

Table 2 reports the correlation matrix for the variables. Table 3 presents the results of the main analysis and lists each hypothesis and its corresponding



**Table 2.** Correlation Matrix

	Budgetary Participation (1)	Budget-Based Compensation (2)	Organizational Commitment (3)	Performance (4)
(1)	1.000			
(2)	0.249**	1.000		
(3)	0.226**	0.221*	1.000	
(4)	0.339**	-0.005	0.227**	1.000

$n = 107$

One tailed significance

\*  $p < 0.05$

\*\*  $p < 0.01$

**Table 3.** Path Analysis Results

Dependent Variable	Independent Variable	Associated Hypothesis	Path Coefficient	$t$ -value	$p$ -value
BC	BP	H1	0.249	2.63	0.005
OC	BP	H2	0.182	1.87	0.032
	BC	H3	0.175	1.81	0.037
P	OC	H4	0.227	2.39	0.009

$n = 107$

BP = Budgetary Participation

BC = Budget-Based Compensation

OC = Organizational Commitment

P = Performance.

path coefficient, each of which were estimated using regression or correlation analysis.

Hypothesis 1 predicts that there is a positive relation between budgetary participation and budget-based compensation. The path coefficient linking participation and budget-based compensation is 0.249 and is significant at the  $p < 0.005$  level. Thus, participative budgeting is positively associated with the use of budget-based compensation.

Hypothesis 2 predicts that there is a positive relationship between budgetary participation and organizational commitment. The corresponding path coefficient is 0.182 and is significant at the  $p < 0.032$  level. This result implies that employees who are allowed to participate in the budget-setting process possess higher levels of organizational commitment.

Hypothesis 3 predicts that there is a positive relationship between budget-based compensation and organizational commitment. The path coefficient

linking these two variables is 0.175 and significant at the  $p < 0.037$  level. This result supports hypothesis 3 and suggests that employees who are evaluated by their superiors via budget-based measures possess higher levels of organizational commitment.

Hypothesis 4 predicts that there is a positive relationship between organizational commitment and employee performance. The path coefficient for this theoretical link is 0.227 and is significant at the  $p < 0.009$  level. Thus, employees with higher levels of organizational commitment also perform at higher levels.

*Additional Analysis*

In aggregate, the results of the main analysis are very supportive of the proposed theoretical model. One advantage of path analysis is that the relative magnitude of the underlying effects can be assessed by decomposing the total relationships into direct, indirect, and spurious components (Asher, 1983). Table 4 provides information regarding the decomposition of the relationships in the proposed theoretical model.

As shown in Table 4, three of the relationships have indirect effects associated with them. The indirect effect of budgetary participation on organizational commitment is 0.044. This effect can be calculated by multiplying the direct effect of the budgetary participation/budget-based compensation relationship by

**Table 4.** Decomposition of Observed Correlations

Combination of Variables	Observed Correlation	=	Direct effect	+	Indirect effect	+	Spurious effect
BP/BC*	0.249		0.249		—		—
BP/OC	0.226		0.182		0.044		—
BC/OC	0.221		0.175		—		0.046
BP/P	0.339		0.330		0.009		—
BC/P	-0.005		-0.127		0.032		0.09
OC/P	0.227		0.181		—		0.046

BP = Budgetary Participation

BC = Budget-Based Compensation

OC = Organizational Commitment

P = Performance

Solutions to indirect effect calculations:

$$BP/OC = BP \rightarrow BC \times BC \rightarrow OC = 0.249 \times 0.175 = 0.044$$

$$BP/P = (BP \rightarrow BC \times BC \rightarrow P) + (BP \rightarrow BC \times BC \rightarrow OC \times OC \rightarrow P) + (0.249 \times -0.127) + (0.249 \times 0.175 \times 0.181) + (0.182 \times 0.181) = 0.009$$

$$BC/P = BC \rightarrow OC \times OC \rightarrow P = 0.175 \times 0.181 = 0.032$$

the direct effect of the budget-based compensation/organizational commitment relationship ( $0.249 \times 0.175$ ). This result implies that only a small portion of the 0.226 correlation between budgetary participation and organizational commitment is indirect in nature.

The indirect effect of budgetary participation on performance can be calculated in a similar manner (see Table 4 footer for calculation). Only a small portion (0.009) of the correlation between the two variables can be attributed to indirect effects. Thus, the direct effect of budgetary participation on performance is 0.330. Further analysis reveals this direct effect to be significant at the  $p < 0.001$  level.

The most interesting correlation decomposition concerns the relationship between budget-based compensation and performance. Although the correlation between the two variables is insignificantly negative ( $-0.005$ ), the direct effect between the two variables is  $-0.127$ . Additional analysis reveals this direct effect to be marginally significant ( $p < 0.093$ ). However, the indirect effect between budget-based compensation and performance is positive (0.032). This suggests that budget-based compensation has a small positive effect on performance indirectly through organizational commitment. The remaining spurious effect between budget-based compensation and performance is also positive at 0.09. The spurious effect represents the influence of budgetary participation, which is a common antecedent of budget-based compensation, organizational commitment, and performance. The positive sign of the spurious effect supports prior literature (e.g., Brownell, 1982a; Brownell & Dunk, 1991), as the existence of budgetary participation in an organization causes the spurious effect of budget-based compensation on performance to be positive.

Collectively, the results suggest that while budget-based compensation is directly associated with performance in a negative manner, budget-based compensation also has a positive indirect effect on performance through organizational commitment. This could potentially explain the literature inconsistencies surrounding the Hopwood (1972) and Otley (1978) debate. The two components (direct and indirect) of the correlation between managerial evaluation style (budget-based compensation) and performance possess conflicting signs, when organizational commitment is included as an intervening variable in the relationship.

## DISCUSSION

A large body of accounting research has investigated the relationship between budgetary participation and employee performance and found mixed results.

This paper provides further examination of the linkages between budget participation and performance. A theoretical model is proposed in which performance is a consequence of budgetary participation. This relationship is expanded by the introduction of two additional constructs: budget-based compensation and organizational commitment. Budget-based compensation is a concept which measures to what extent managers utilize budget-based performance for subordinate compensation and promotion decisions. Given the conflicting results of a body of literature which has attempted to address the question of whether or not managers' evaluation styles have an impact on subordinate performance, this paper proposes that budget-based compensation leads to increased levels of organizational commitment, and increased commitment, in turn, leads to higher performance.

Using a cross-organizational design and a path analysis technique, results of the main analysis reveal that budgetary participation leads to increased use of budget-based compensation plans as well as increased levels of organizational commitment. Results also show that budget-based compensation leads to higher organizational commitment with commitment then leading to higher performance. Additional analysis suggests that the relationship between budget-based compensation and performance is complex. While having an insignificant zero-order correlation with performance, budget-based compensation was found to have a marginally significant negative direct effect on performance. Furthermore, budget-based compensation's indirect effect on performance through organizational commitment is positive. Thus, it appears that modeling manager evaluation style and performance alone is not sufficient to understand the complex relation between the two variables.

Prior studies have largely ignored the issue of intervening variables in the managerial style/performance relationship. Although much research has investigated the interaction of manager evaluation style and participation on performance (e.g., Brownell, 1982a; Brownell & Hirst, 1986; Dunk, 1989; Brownell & Dunk, 1991), the results of this study suggest that other intervening variables likely play a role in the relationship between a manager's evaluation style and subordinate performance. One avenue for future research would be to analyze the effects of additional organizational psychology constructs on this relationship. Job satisfaction and motivation-related factors could be considered.

The findings of this survey are subject to several limitations. First, survey studies are by nature subject to both lack of control limitations and potential bias associated with self-reporting. Second, problems of omitted and uncontrolled intervening or moderating variables may also exist. Third, the sample of employees was gathered from a database of alumni from one mid-western university. To the extent that graduates of this university do not represent the

population of employees found in the overall corporate environment, the results may not be representative. The authors do feel, however, that the sample represents a variety of critical segments of the economy (e.g., utilities, retail, wholesale, technology). Finally, in interpreting the results of this study, causality must be considered. The underlying method behind the path analysis technique used in this study is correlation analysis. Because a correlation does not imply causality (a positive correlation between two variables does not necessitate one causing the other), theoretical development must be incorporated into path analysis when causality is being considered. For example, in the current paper the authors do predict that one variable causes another. This causal prediction is based upon both theory and correlation. Thus, when the correlation and path analysis results are interpreted this must be considered. Although alternative methodologies, such as experiments, may be able to provide more information about causality, their ability to model complex organizational behavior may be limited. With respect to this study, a laboratory experiment may be able to yield more causality than a survey approach, but simulating organizational commitment in a laboratory setting would be difficult.

## NOTE

1. In a comprehensive review of the participative budgeting literature, Brownell (1982b) concluded that an unequivocal statement about the relation between participation and performance cannot be made; sometimes participation works and sometimes it does not. Given the mixed findings provided by this stream of literature, the authors do not present a formal hypothesis linking participation and performance. However, the nature of this relationship is presented in the empirical results section of this paper, and a linkage between participation and performance is supplied in Fig. 1.

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## APPENDIX

### *Survey Instruments*

#### *Budgetary Participation*

1. The portion of the budget I am involved in setting.
2. The amount of reasoning provided to me by a superior when the budget is revised.
3. The frequency of budget-related discussion with superiors initiated by me.
4. The amount of influence I feel I have on the final budget.
5. The importance of my contribution to the budget.
6. The frequency of budget-related discussions initiated by my superior when budgets are being set.

#### *Budget-Based Compensation*

1. Budget variances have been mentioned by my superior as factors in his/her consideration of me for promotion.
2. Budget variances in my department have been mentioned by my superior as factors in considering me for pay raises.

3. Pay increases are closely tied into budget performance.
4. Budget performance is an important factor in getting a promotion.

*Organizational Commitment*

1. I am willing to put in a great deal of effort beyond that normally expected in order to help this organization be successful.
2. I talk up this organization to my friends as a great organization to work for.
3. I would accept almost any type of job assignment in order to keep working for this organization.
4. I found that my values and the organization's values are very similar.
5. I am proud to tell others that I am a part of this organization.
6. This organization really inspires the very best in me in the way of job performance.
7. I am extremely glad that I chose this organization to work for over others I was considering at the time I joined.
8. For me this is the best of all possible organizations for which to work.
9. I really care about the fate of this organization.

*Performance*

1. My performance with regards to planning (i.e., determining goals and policies, budgeting, preparing agendas).
2. My performance with regards to investigating (i.e., collecting and preparing information, financial reports, inventorying).
3. My performance with regards to coordinating (i.e., exchanging information with others, arranging meetings, advising others).
4. My performance with regards to evaluating (i.e., assessment of employee performance, product and financial report inspection).
5. My performance with regards to supervising (i.e., directing, leading, counseling and training subordinates).
6. My performance with regards to staffing (i.e., college recruiting, employment interviewing, promoting employees).
7. My performance with regards to negotiating (i.e., purchasing, selling, advertising, dealing with sales representatives).
8. My performance with regards to representing (i.e., advancing general organizational interests).
9. My overall performance.



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# PERFORMANCE MEASUREMENT AND THE USE OF BALANCED SCORECARD IN CANADIAN HOSPITALS

Yee-Ching Lilian Chan and Shih-Jen Kathy Ho

## ABSTRACT

*Administrators in Canadian hospitals have begun introducing changes and implementing modern management tools in their organizations to deal with their financial crises while providing world class health service to the public. Balanced scorecard, a performance measurement and strategic management system, is one of the new tools adopted by management in hospitals. However, there has been little systematic evaluation on the use of balanced scorecard in health care. As a first step in filling this gap, this paper assesses the extent of balanced scorecard initiatives in Canadian hospitals.*

*Results of a survey of a national sample of Canadian hospitals show that the financial and customer perspectives are most important to our respondents in managing their organizations, even though the perceived usefulness of these performance as well as other perspectives in meeting their needs is less than expected.*

*By and large, the responding executives have a good understanding of balanced scorecard. About one-third of the hospitals surveyed have implemented balanced scorecard and the executives commented that technical*

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*know-how and management commitment are the major factors determining if the implementation will be successful or not. For the implementers of balanced scorecard, their scorecards consist of measures on all four performance perspectives (customer, internal business process, financial, and learning and growth) and a relatively balanced mix of outcome measures and performance drivers. There is, however, an extensive use of quantitative and non-financial indicators for the customer, internal business, and learning and growth perspectives.*

## INTRODUCTION

Universal health care has been a cornerstone of Canada's social policy. Its citizens have come to expect world class service in this area and the government has provided generous funding support in the past. The funding environment, however, has changed since the 1990s. The federal and provincial governments not only cut back on funding but also demand greater accountability from the healthcare operators. In addition, skyrocketing healthcare costs have made it more difficult for healthcare operators to maintain the first class service expected by the public.

As a response to the changing operating environment, healthcare administrators have begun to implement modern management tools in their organizations to solve their financial problems while sustaining world class service. Business process reengineering (Ho, Chan & Kidwell, 1999) and continuous quality improvement (Chan & Ho, 1997) are some management tools that have been implemented in American and Canadian hospitals, with varying degrees of success. Balanced scorecard, a performance measurement and strategic management system, is one of the new tools adopted by management in hospitals. However, there has been little systematic evaluation on the use of balanced scorecard in health care. As a first step in filling this gap, this paper assesses the extent of balanced scorecard initiatives in Canadian hospitals. It examines the hospital executives' perception on their organization's current performance measurement system, identifies factors that drive hospital management to undertake a balanced scorecard initiative, and attempts to find out why some balanced scorecard programs fail. Finally, the potential involvement of some Canadian hospitals with balanced scorecard in the future is reported.

The remainder of the paper is organized as follows. First, a brief review on the trend in performance measurement is presented.<sup>1</sup> Then, a description of *Balanced Scorecard* and the potential benefits of balanced scorecard to hospital management will be examined. Next, the methodology used in this study will be discussed and the findings of the survey reported. Some concluding remarks

and implications for practice are then presented with limitations of the study included in the final section.

## **TRENDS IN PERFORMANCE MEASUREMENT**

Performance measurement is an essential component of whatever change process is adopted. It can give feedback on the effectiveness of plans and their implementation (Chang & Chow, 1999). Both business management and accountants are keenly aware of the important role performance measurement plays in an organization's planning and control system. Reporting on the past performance of companies is one of the fundamental uses of performance measurement systems.

Traditionally, the focus of performance measurement has been on financial measures such as sales growth, profits, return on investments and cash flows. There is, however, increasing concern among business managers on the over-reliance of financial measures in performance evaluation.

In a survey on the quality, uses and perceived importance of various financial and non-financial measures, Lingle and Schiemann (1996) reported wider disparities between the perceived quality and importance of non-financial measures as compared to financial measures. Perceived inadequacies in a traditional performance measurement system which focuses on financial measures, have led many organizations to switch to and put greater emphasis on forward-looking non-financial measures such as customer satisfaction, employee learning, and innovation (Ittner & Larcker, 1998, p. 206). The Institute of Management Accountant (IMA) has long advocated the creation of a broad-based performance measurement system. Statement Number 4U (IMA, 1995, p. 10) stated that ". . . performance indicator systems must be forward-looking as well as historical, must focus on significant external relationships as well as internal functions or processes, and must track leading non-financial and financial indicators."

Despite the growing interest in incorporating non-financial measures in an organization's performance measurement system, empirical evidence on the linkage of non-financial measures with share value and future financial performance is inconclusive.

Amir and Lev (1996) examined a number of customer-related non-financial measures in the cellular telecommunication industry to assess the relevance of financial and non-financial measures on share value. They found that, on a stand-alone basis, financial information is largely irrelevant to security valuation. Non-financial measures, on the other hand, are highly value-relevant. When combined with non-financial measures, earnings (a financial measure) do contribute to the explanation of share prices. Banker et al. (1998), for instance, reported positive association between customer satisfaction measures and future

financial (accounting) performance whereas Foster and Gupta (1997) and Ittner and Larcker (1997) found that higher levels of customer satisfaction are not necessarily associated with higher levels of profits.

It is important to note that performance measurement and performance management are not the same. Each segment in a large organization may develop highly specific performance measurement information for its own operations, and this will allow that segment to operate effectively. However, while each manager strives to optimize the information of performance of his division, the overall performance of the organization may be sub-optimized (Rummler & Brache, 1995). Only a performance management system engenders strategic evolution and ensures goal congruence. As balanced scorecards provide a comprehensive, top-down view of enterprise performance with a strong focus on vision and strategy, through the use of balanced scorecard, performance management can be greatly facilitated (Missroon, 2000). This paper attempts to examine the use of balanced scorecard as a performance management system in Canadian hospitals and find out whether its implementation has been successful. What follows is a description of balanced scorecard and its potential contribution to healthcare.

## **BALANCED SCORECARD AND HEALTHCARE**

Balanced scorecard is a strategic measurement and management system. It translates an organization's mission and strategy into a balanced set of integrated performance measures. It complements the traditional financial perspective with other non-financial perspectives such as customer satisfaction, internal business process, and learning and growth. It also mixes outcome measures, the lagging indicator, with performance drivers, the leading indicator, because "outcome measures without performance drivers do not communicate how the outcomes are to be achieved" (Kaplan & Norton, 1996, p. 150). By selecting appropriate performance drivers and outcome measures to fit in the theory of business in a chain of cause and effect relationship, the organization will have a better idea of how to achieve its potential competitive advantage.

The balanced set of performance measures tells a concise yet complete story about the achievement and performance of the organization toward its mission and goals. It provides a holistic view of what is happening in the organization. By tying these performance measures to rewards, balanced scorecard ensures that the employees will do what is best for the organization as a whole.

The first step in designing a balanced scorecard is the identification of strategic goals. The strategic goals need to be agreed upon before scorecard measures can be developed. Otherwise, the scorecard measures might not reflect

the organization's mission and strategies. After the critical first step, the design and implementation process can be divided into four stages as described below:

- (1) translating the vision and gaining consensus;
- (2) communicating the objectives, setting goals, and linking strategies;
- (3) setting targets, allocating resources, and establishing milestones; and
- (4) providing feedback and learning (Kaplan & Norton, 1996).

Similar to other for-profit and service organizations, balanced scorecard can be used by hospitals to do the following (Kaplan & Norton, 1996, p. 19):

- clarify and gain consensus about strategy,
- communicate strategy throughout the organization,
- align departmental and personal goals to the strategy,
- link strategic objectives to long-term targets and annual budgets,
- identify and align strategic initiatives,
- perform periodic and systematic strategic reviews, and
- obtain feedback to learn about and improve strategy.

A *true* balanced scorecard can have at least six benefits to healthcare providers: It can add customer insights, refocus internal operations, energize internal stakeholders, strengthen customer acquisition efforts, strengthen customer relations, and increase loyalty and returns of value (MacStravic, 1999). Although many successful stories of using balanced scorecard has been reported in other industries and service organizations, little evidence of its application to hospitals has been reported (Chow et al., 1998). Nevertheless, there was a strong consensus among prominent researchers from many countries about the need to use balanced scorecard reporting by healthcare providers (Forgione, 1997).

## **HOSPITAL SURVEY**

### *I. Sample Selection and Characteristics of Hospitals*

A random sample of 555 hospitals was selected from the *Guide to Canadian Healthcare Facilities, 1998–1999*, which represent about one-third of all hospitals and related facilities in the English-speaking provinces of Canada. The questionnaire<sup>2</sup> was first reviewed by colleagues of the researchers and then mailed to the Chief Executive Officer (CEO) or President of the hospital in the summer of 1999.

Of the 555 questionnaires sent out, 121 completed questionnaires were returned, representing a response rate of 21.8%. Table 1 presents a summary of the characteristics of the sample hospitals.<sup>3</sup>

**Table 1.** Characteristics of Respondent Hospitals

	Number of hospitals that have heard of balanced scorecard	Number of hospitals that have not heard of balanced scorecard	Total number of respondent hospitals
Number of Beds			
< 100	32 (33.0%)	14 (58.4%)	46 (38.0%)
101 – 250	26 (16.5%)	5 (20.8%)	31 (25.6%)
251 – 500	19 (29.9%)	5 (20.8%)	24 (19.9%)
> 500	20 (20.6%)	0 (0.0%)	20 (16.5%)
Total	97 (100.0%)	24 (100.0%)	121 (100.0%)
Teaching Affiliation			
Teaching	31 (32.0%)	3 (12.5%)	34 (28.1%)
Non-Teaching	66 (68.0%)	21 (87.5%)	87 (71.9%)
Total	97 (100.0%)	24 (100.0%)	121 (100.0%)

Among the 121 respondent hospitals, over two-thirds are not affiliated with any academic health centers and they do not provide training for interns and residents. The sample hospitals are small, with 46 of them having less than 100 beds under their care and only 20 hospitals have over 500 beds. The majority (80%) of the respondent hospitals have heard of balanced scorecard and among these 97 hospitals, the number of hospitals which has implemented balanced scorecard (43 in total) in their organizations is fewer than the non-adopters (54 in total).

Results of the Chi-square tests of independence indicated that implementers of balanced scorecard tend to be larger hospitals ( $\chi^2 = 21.08$ ,  $p < 0.01$ ) and are affiliated with teaching institutions ( $\chi^2 = 14.20$ ,  $p < 0.01$ ). This is not unexpected as larger teaching hospitals do have more resources and are more innovative than smaller community hospitals in undertaking new initiatives.

## *II. Executives' Perception on Performance Measurement*

### *A. Expectation Gap on Performance Measures*

As suggested by Kaplan and Norton (1992), a typical balanced scorecard should include four components: the customer perspective, the internal business perspective, the learning and growth perspective, and the financial perspective, all of which are key success factors for most organizations.

Even though discussion and application of balanced scorecards have been concentrated on business organizations (see e.g., Kaplan & Norton, 1993; Vitale, Mavrincac & Hauler, 1994), executives in our respondent hospitals indicated that

**Table 2(a).** Hospital Executives’ Perception on the Importance and Success of Performance Perspectives in Managing Their Organizations

Performance Perspectives	Mean Response <sup>1</sup> (Standard Deviation)					
	Importance of performance perspectives in managing organizations			Success of performance perspectives in managing organizations <sup>2</sup>		
	All hospitals (n=121)	Hospitals that have heard of balanced scorecard (n = 97)	Hospitals that have not heard of balanced scorecard (n = 24)	All hospitals (n=121)	Hospitals that have heard of balanced scorecard (n = 97)	Hospitals that have not heard of balanced scorecard (n = 24)
Customer Perspective	4.61 (0.62)	4.67 (0.57)	4.38 (0.58)	3.53 (1.20)	3.55 (1.24)	3.46 (1.02)
Internal Business Perspective	4.27 (0.80)	4.32 (0.80)	4.08 (0.78)	3.09 (1.31)	3.02 (1.41)	3.38 (0.92)
Learning and Growth Perspective	4.04 (0.86)	4.08 (0.81)	3.88 (1.03)	2.67 (1.48)	2.61 (1.54)	2.92 (1.47)
Financial Perspective	4.62 (0.54)	4.67 (0.52)	4.42 (0.58)	3.89 (1.04)	3.90 (1.05)	3.88 (0.99)

<sup>1</sup>The higher the response, the greater the executives’ perceived importance (or success) of the performance perspective in managing their organizations (response scale of 1 to 5 where 1 = not at all and 5 = extremely).

<sup>2</sup>There is a significant difference ( $p < 0.01$ ) between the executives’ perceived importance and success of the four performance perspectives in managing their organizations.

these four performance perspectives are important to managing their organizations. The financial and customer perspectives were reported to be extremely important with mean responses of 4.62 and 4.61, respectively (see Table 2(a)). These responses are consistent with the mission of healthcare organizations, which is to provide quality health care to patients, their customers. The emphasis on the financial perspective also reflects the hospitals’ turbulent operating environment where there are severe funding constraints but an increasing fiscal responsibility on healthcare operators. The learning and growth perspective, as indicated by our respondents, is still an important performance perspective (mean response of 4.04) in managing their organizations. Its importance, however, is the least among the four performance perspectives. This may be



**Table 2(b).** Difference in Hospital Executives' Perception on the Importance and Success of Performance Perspectives in Managing Their Organizations

	Mean Response <sup>1</sup> (Standard Deviation)					
	Importance of performance perspectives in managing organizations		Success of performance perspectives in managing organizations		Difference between the importance and success of performance perspective in managing organizations <sup>2</sup>	
	Hospitals that have not developed balanced scorecard (n = 78)	Hospitals that have developed balanced scorecard (n = 43)	Hospitals that have not developed balanced scorecard (n = 78)	Hospitals that have developed balanced scorecard (n = 43)	Hospitals that have not developed balanced scorecard (n = 78)	Hospitals that have developed balanced scorecard (n = 43)
Performance Perspectives						
Customer Perspective	4.55 (0.62)	4.72 (0.59)	3.35 (1.33)	3.86 (0.83)	1.20	0.86
Internal Business Perspective	4.23 (0.72)	4.35 (0.92)	2.94 (1.40)	3.37 (1.16)	1.29	0.98
Learning and Growth Perspective	3.95 (0.88)	4.21 (0.80)	2.58 (1.53)	2.83 (1.53)	1.37	1.38
Financial Perspective	4.58 (0.88)	4.70 (0.56)	3.83 (0.99)	4.00 (1.11)	0.75	0.70

<sup>1</sup>The higher the response, the greater the executives' perceived importance (or success) of the performance perspective in managing their organizations (response scale of 1 to 5 where 1 = not at all and 5 = extremely).

<sup>2</sup>There is no significant difference in the executives' perceived difference in the importance and success of the four performance perspectives in managing their organizations between the two groups of hospitals that have and have not implemented the balanced scorecard.

attributed to the fact that continuing education and professional development is mandated for the medical profession and the growth (expansion) of Canadian hospitals is driven by changes in demographics as well as directed by the Ministry of Health. Thus, there is little need for healthcare executives to monitor the learning and growth of their organizations.

Despite the importance stressed on the four performance perspectives, a small number of the respondent hospitals did not report performance indicators on the learning and growth (16 hospitals), internal business (10 hospitals) and customer (5 hospitals) perspectives. Performance indicators on the financial

perspective, on the other hand, were reported by all respondent hospitals, since they are mandated to submit their operating plans and financial reports to the Ministry of Health. On the other hand, Canadian hospital administrators could also have become more and more responsible fiscally and rely more heavily on financial indicators in managing their organizations.

Executives of the respondent hospitals, however, indicated that the performance indicators reported by their organizations have only been moderately successful in meeting their needs and expectations. As shown in Table 2(a), the mean responses on the perceived success of the performance indicators in meeting the needs and expectations of hospital management are about one point less than the perceived importance of the indicators in managing their organizations. These differences are statistically significant. Thus, there is a significant gap between the expectation and reporting of performance indicators in our sample of Canadian hospitals.

Since both the financial and customer perspectives were perceived to be of utmost importance to the executives in managing their organizations, it is likely that more resources have been committed to developing and measuring performance indicators for these perspectives. Accordingly, executives will use these performance indicators more frequently and perceive them to be useful tools in managing their organizations. Thus, the expectation gap, as reported here, is smaller for the financial and customer perspectives but larger for the learning and growth and internal business perspectives.

As indicated in Table 2(b), there is no significant difference in the expectation gap between the two groups of hospitals that have and have not implemented balanced scorecard on all four performance perspectives. The expectation gap for the implementers of balanced scorecard, however, is relatively smaller on the customer and internal business perspectives than the non-adopters. This could be attributed to the fact that the implementers have invested much effort in developing performance indicators on the customer as well as the internal business perspectives that they have greater confidence in these performance indicators and less discontent with their use.

#### *B. Types and Number of Performance Measures*

As reported by the executives of the respondent hospitals, the proportion of financial indicators in their organization's performance measurement system is significantly greater than (57.6%) the proportion of non-financial indicators (43.4%). This is consistent with the observation that the financial performance perspective (mean response of 4.62) is extremely important to the executives in managing their organizations. Nevertheless, they strongly agreed that traditional financial measures are necessary but not sufficient for a performance

measurement system (mean response of 4.06 on a five-point scale where the higher the response, the stronger the agreement).

Despite the possibility of information overload, 50 hospital executives (42%) reported that their organizations use somewhere between 13 and 24 performance indicators to evaluate their corporate performance. A small percentage of the respondent hospitals (12.4%) rely on fewer than six performance indicators in evaluating their organization's overall performance, and about one-sixth of the respondent hospitals use over 24 performance indicators. By and large, senior administrators of the respondent hospitals tend to use more performance indicators in managing their organizations.

### *C. Perception of Current Performance Measurement System*

As shown in Table 3, executives of the respondent hospitals strongly agreed that more non-financial measures, which provide information about their organization's current and potential competitiveness, should be included in their organization's performance measurement system (mean response of 4.17). They felt that financial measures are necessary but not sufficient (mean response of 4.06), since these financial measures, which describe past/current performance, do not necessarily reflect their organization's potential competitiveness (mean response of 3.72). This is consistent with the current trend that financial measures are inadequate and more non-financial measures should be included in a performance measurement system. There, however, is no agreement on whether their organization's performance measurement system is simply an ad hoc collection of financial and non-financial measures (mean response of 3.05). In fact, there were more hospital executives who felt that their organization's performance measurement system is an ad hoc collection of performance measures (47%) than a well-established system of performance measures (42%).

The respondents, in general, agreed that there is a direct linkage between their organization's long-term strategy and the performance measures (mean response of 3.57) included in their organization's performance measurement system. However, they neither agreed nor disagreed with the statement that these performance measures have been used effectively in integrating and executing the details of their corporate strategy (mean response of 2.96). An in-depth analysis on the responses indicated that about one-third of the respondents felt that his organization's performance measures have been effective in strategic implementation.

In sum, the executives felt that more non-financial measures should be included in their organization's performance measurement system and the use of performance measures in executing corporate strategy may not have been as effective as expected.

**Table 3.** Executives’ Perception on Their Organization’s Performance Measurement System

	Mean Response <sup>1</sup> (Standard Deviation)		
	All hospitals (n = 121)	Hospitals that have not implemented balanced scorecard (n = 78)	Hospitals that have implemented balanced scorecard (n = 43)
More non-financial measures, which provide information about your organization’s current and potential competitiveness, should be included.	4.17 (0.85)	4.17 (0.81)	4.19 (0.93)
Traditional financial measures are necessary but not sufficient.	4.06 (0.98)	4.00 (0.94)	4.16 (1.04)
Financial measures describe past/current performance and do not necessarily reflect your organization’s potential competitiveness.	3.72 (1.02)	3.63 (1.05)	3.88 (0.96)
There is a direct linkage between your organization’s long-term strategy and performance measures.	3.57 (0.98)	3.51 (0.96)	3.67 (1.02)
The performance measures reflect a clear, articulated corporate strategy.	3.21 (1.03)	3.15 (0.98)	3.30 (1.12)
Your organization’s current performance measurement system relies too heavily on financial measures.	3.19 (1.25)	3.44 <sup>2</sup> (1.16)	2.74 (1.31)
Your organization’s current performance measurement system is an ad hoc collection of financial and non-financial measures.	3.05 (1.42)	3.36 <sup>2</sup> (1.35)	2.49 (1.39)
The performance measures have been used effectively in integrating and executing the details of corporate strategy.	2.96 (0.99)	2.87 (0.96)	3.12 (1.03)

<sup>1</sup>The higher the response, the stronger the executives’ agreement with the statement in describing their organization’s performance measurement system (response scale of 1 to 5 where 1 = strongly disagree, 3 = neutral, and 5 = strongly agree).

<sup>2</sup>There is a significant difference ( $p < 0.01$ ) in the mean response between the two groups of hospitals that have and have not implemented balanced scorecard.

### *III. Executives' Understanding of Balanced Scorecard*

Among the executives who have heard about balanced scorecard,<sup>4</sup> they have a very good understanding on the characteristics of a balanced scorecard. On a scale of 1 (strongly disagree) to 5 (strongly agree), the executives indicated that a balanced scorecard should include an appropriate mix of outcome measures and performance drivers (see Table 4) and that it links an organization's mission and strategy with objective measures. There is, however, still a slight misconception that balanced scorecard is more a performance measurement system (mean response of 4.08) than a strategic management system (mean response of 3.92) among the executives of the respondent hospitals. Nevertheless, they did not think that the balanced scorecard is simply an ad hoc collection of financial and non-financial measures (mean response of 2.11) and it is *not* a fad (mean response of 2.32).

Between the two groups of hospitals that have and have not implemented the balanced scorecard, their executives' understanding on balance scorecard is similar but responses from the former group are more definite (see Table 4). This suggests that executives in hospitals that have implemented balanced scorecard (BSC hospitals) have a better understanding of the characteristics of a balanced scorecard and a stronger belief on its contribution to strategic management than the non-adopters. For implementers of balanced scorecard, their experience could have confirmed their understanding that balanced scorecard is not an ad hoc collection of measures (mean response of 1.93) and it is *not* a fad (mean response of 2.26). The executives also felt strongly about the potential contribution of balanced scorecard as it links an organization's mission and strategy with objective measures (mean response of 4.35) and its benefits will outweigh its costs if implemented successfully (mean response of 4.09).

Also, as indicated in Table 3, for BSC hospitals, their executives disagreed with the statements that their organization's performance measurement system is an ad hoc collection of financial and non-financial measures (mean response = 2.49) and that it relies too heavily on financial measures (mean response = 2.74). In fact, there is a significant difference in the executives' perception of their organization's current performance measurement system on these two aspects between the two groups of hospitals that have and have not implemented balanced scorecard. Executives of BSC hospitals indicated that their performance measurement system consists of a more balanced set of financial and non-financial measures, which are linked to their organization's strategic objectives.

**Table 4.** Executives' Perception on Balanced Scorecard

	Mean Response <sup>1</sup> (Standard Deviation)		
	Hospitals that have heard of balanced scorecard (n = 96)	Hospitals that have implemented balanced scorecard (n = 43)	Hospitals that have not implemented balanced scorecard (n = 53)
An appropriate mix of outcome (lagging indicators) and performance drivers (leading indicators) should be included in a balanced scorecard.	4.31 (0.59)	4.17 (0.55)	4.15 <sup>2</sup> (0.57)
Balanced scorecard linked an organization's mission and strategy with objective measures.	4.20 (0.79)	4.35 (0.65)	4.08 <sup>2</sup> (0.81)
Balanced scorecard is a performance measurement system.	4.08 (0.79)	4.35 (0.75)	3.87 <sup>2</sup> (0.83)
Balanced scorecard complements the financial measures of past performance with operational measures that drive future performance and growth.	3.93 (0.73)	4.07 (0.70)	3.81 (0.74)
Balanced scorecard is a strategic management system.	3.92 (0.84)	4.00 (0.87)	3.85 (0.82)
The benefit will outweigh the costs if a balanced scorecard was implemented successfully	3.91 (0.71)	4.07 (0.67)	3.77 <sup>2</sup> (0.72)
Balanced scorecard produces a concise model to assist managers in tracking the organization's progress.	3.88 (0.68)	4.09 (0.68)	3.70 <sup>2</sup> (0.64)
Balanced scorecard provides a holistic view of what is happening in the organization.	3.76 (0.86)	3.95 (0.90)	3.60 <sup>2</sup> (0.79)
Balanced scorecard articulated and communicated the mission and goals of an organization better than traditional mission and goal statements.	3.41 (0.94)	3.42 (1.01)	3.40 (0.88)
Balanced scorecard is a fad.	2.32 (0.88)	2.28 (0.96)	2.36 (0.81)
Balanced scorecard is an ad hoc collection of financial and non-financial measures.	2.11 (0.99)	1.93 (0.91)	2.26 <sup>2</sup> (1.04)

<sup>1</sup>The higher the response, the stronger the executives' agreement with the statement in describing the characteristics of balanced scorecards (response scale of 1 to 5 where 1 = strongly disagree, 3 = neutral, and 5 = strongly agree).

<sup>2</sup>The difference in mean responses between the two groups of hospitals that have and have not implemented balanced scorecard is significant at  $p < 0.05$

#### *IV. Reasons for Not Implementing Balanced Scorecard*

Of the 54 hospitals that have decided not to implement balanced scorecard, 39 have provided responses on the possible reasons of their decision. As shown in Table 5, there are five major factors that contributed to the executives' decisions of not implementing balanced scorecard. They are the lack of skills and know-how; management is too busy solving short-term impending organizational problems; too time-consuming in developing balanced scorecards; too difficult in defining and measuring outcome measures and performance drivers of balanced scorecard; and inadequate executive sponsorship.

These reasons are rather general as technical know-how and management commitment is critical to successful execution of any initiatives brought forward in an organization. If the organization lacks the expertise and commitment in implementing balanced scorecard, it is advisable to postpone the implementation until such time when the organization is ready. In other words, this group of executives did not perceive the urgency of implementing balanced scorecard as there are other organizational issues that need their attention or maybe they are still uncertain about the value of balanced scorecard to their organizations.

#### *V. Experience of Hospitals That Have Implemented Balanced Scorecard*

##### *A. Objectives of Implementing Balanced Scorecard*

As reported by executives of BSC hospitals, their most important objective is to become a learning and growing organization (see Table 6). Other objectives such as the desire to achieve focus on organizational change and strategies as well as to align programs and investments with organizational strategies are also important objectives for their decision to develop balanced scorecards for their organizations. This is consistent with the notion that balanced scorecard is not merely a performance measurement system but a management tool for strategy implementation. Despite the high expectation of executives on the contribution of balanced scorecard to their organizations, they felt that their organizations have only been moderately successful in achieving the objectives set out by implementing balanced scorecard. As shown in Table 6, the mean responses on the executives' rating of their organization's success in achieving the objectives are in a range of 2.97 to 3.40 on a five-point scale where the higher the response, the greater the success. There is a noticeable gap between the importance of the objectives and the executives' perception on how successful their organizations have achieved these objectives with balanced scorecard. The largest gap exists in the objective of becoming a learning and growing organization and all gaps are found to be statistically significant at  $p < 0.01$ .

**Table 5.** Extent of Factors Affecting Decisions of Not Implementing Balanced Scorecard and Contributing Towards Unsuccessful Implementation of Balanced Scorecard

	Mean Response <sup>1,2</sup> (Standard Deviation)	
	Hospitals that have not implemented balanced scorecard (n = 39)	Hospitals that have implemented balanced scorecard (n = 24)
Lack of skills and know-how.	<b>3.36</b> (1.20)	<b>3.13</b> (1.19)
Management is too busy solving short-term impending organizational problems.	<b>3.28</b> (1.34)	<b>3.50</b> (1.22)
Too time consuming in developing balanced scorecard.	<b>3.18</b> (1.19)	<b>3.25</b> (1.03)
Too difficult in defining and measuring outcome and performance drivers of balanced scorecard.	<b>3.08</b> (1.20)	<b>3.21</b> (0.98)
Inadequate executive leadership.	<b>3.00</b> (1.45)	2.63 (1.24)
Lack of linkage of balanced scorecard to employees' rewards.	2.82 (1.37)	2.75 (1.15)
The standard ready-made scorecards do not fit the organization's strategic implementation.	2.77 (1.06)	2.67 (1.41)
Lack of linkage of balanced scorecard to employees' personal goals.	2.69 (1.42)	2.79 (1.41)
The organization does not know what objectives will be achieved with development of a balanced scorecard.	2.62 (1.18)	2.71 (1.33)
Lack of interest and enthusiasm from staff.	2.59 (1.16)	2.79 (1.06)
Lack of buy-in from medical staff.	2.56 (1.39)	2.88 (0.99)
Case for changes is neither clear nor compelling.	2.51 (1.27)	2.54 (1.18)
No pilot project was implemented prior to developing balanced scorecard.	2.46 (0.97)	2.46 (1.22)
Organization's strategic goals were not in place before the balanced scorecard is implemented.	2.33 (1.11)	<b>3.04</b> (1.46)
Organizational resistance to change.	2.10 (1.12)	2.58 (1.02)
Organization has worked too intensively and too long in developing a perfect balanced scorecard, thereby destroying momentum and enthusiasm.	1.62 (0.85)	1.78 (0.98)

<sup>1</sup>The higher the response, the larger the extent the factors have affected their decisions of not implementing balanced scorecard and contributing towards unsuccessful implementation of balanced scorecard (response scale of 1 to 5 where 1 = not at all and 5 = extremely).

<sup>2</sup>There is no significant difference ( $p < 0.01$ ) in the mean response on the extent of factors affecting decisions of not implementing balanced scorecards and contributing towards unsuccessful implementation of balanced scorecard between the two groups of hospitals that have and have not implemented the balance scorecard.



**Table 6.** Importance and Success of Achieving Organizational Objectives for Hospitals That Have Implemented Balanced Scorecard

Organizational Objectives	Mean Response <sup>1</sup> (Standard Deviation)	
	Importance of achieving organizational objectives with balanced scorecard	Success of achieving organizational objectives with balanced scorecard
• To become a learning and growing organization.	4.19 (0.91)	3.00 (0.90)
• To align programs and investments with organizational strategies.	4.09 (0.95)	3.40 (0.89)
• To achieve focus on organizational change strategies.	4.07 (0.91)	3.16 (0.92)
• To respond to the compelling needs for change.	3.95 (0.87)	3.26 (1.03)
• To maintain a balance between different goals and objectives.	3.81 (0.85)	3.32 (0.84)
• To develop competitive advantage.	3.60 (1.14)	2.97 (0.97)
• To develop leadership capabilities of management.	3.56 (1.08)	3.05 (0.96)

<sup>1</sup>The higher the response, the greater the executives' perceived importance (or success) of achieving organizational objectives with balanced scorecard (response scale of 1 to 5 where 1 = not at all and 5 = extremely). There is a significant difference between the executives' perceived importance and success of balanced scorecard in achieving the organizational objectives.

This significant expectation gap can be attributed to various factors. It could be due to the inexperience and lack of organizational support for the implementation of balanced scorecard in the BSC hospitals. Or, it could be due to the *high* expectation of hospital executives on what balanced scorecard can accomplish for their organizations. What follows is a report on what factors were perceived by our respondent executives to be vital to successful implementation of balanced scorecard and contributed to their failing efforts.

#### *B. Factors Necessary for Balanced Scorecard to Succeed*

This group of hospitals has been involved in developing balanced scorecards for two years, on average. Even though over 95% of these hospitals have developed a balanced scorecard at the corporate level, only two-thirds have implemented balanced scorecards at the departmental level. This may be

attributed to their lack of expertise in developing balanced scorecards, since less than 10% of the hospitals ranked their organizations as advanced implementers of balanced scorecard while the majority (over 65%) felt that they are novice users and beginners of the tool.

Given two years of experience in implementing balanced scorecards, only one executive claimed that the implementation has been very successful while three executives concluded that the implementation has been mostly unsuccessful. About three-quarters of the executives commented that the implementation has been moderately and quite successful and the rest made no comment as their organizations have just implemented balanced scorecard. When asked to list three factors that are necessary for balanced scorecard to succeed, the commitment and buy-in of senior management and clinical staff has been mentioned over and over again by the executives. The ease of data collection as well as the accuracy, timeliness, and relevance of data/performance measures reported have also been cited as factors that are key to successful implementation of balanced scorecard. Other key factors reported by the executives include support of the organization's infrastructure, especially its information system, and education of staff on the implementation of balanced scorecards.

### *C. Reasons for Unsuccessful Implementation of Balanced Scorecard*

Only 24 of the 43 executives of BSC hospitals responded on the extent that various factors have led to their organization's unsuccessful implementation of balanced scorecard (see Table 5). The responses are similar to and not significantly different from those identified by the non-adopters of balanced scorecard. Management identified the following factors: too busy solving short-term impending problems, too time consuming in developing balanced scorecards, too difficult in defining and measuring outcome and performance drivers of balanced scorecard, and the lack of skills and know-how. Another factor, the organization's strategic goals were not in place before the balanced scorecard was implemented, also contributed to their failing efforts. This suggests that some of the respondent hospitals have overlooked the importance of establishing their organization's mission and strategies first, which is essential to the successful implementation of balanced scorecard. Inadequate executive leadership, on the other hand, does not have an extensive impact on their unsuccessful implementation (mean response of 2.63) as compared to hospitals that decided not to implement balanced scorecard (mean response of 3.00).

In sum, lacking technical know-how and management commitment are the key factors that contributed towards the organization's unsuccessful implementation of balanced scorecard.

#### *D. Performance Indicators Used in Balanced Scorecard*

Patient satisfaction is the most frequently cited performance indicator for the customer perspective (see Table 7). Executives in BSC hospitals depend on the findings of patient satisfaction survey to determine if their customers, the patients, are satisfied with the care and service received. The number of complaints received and the waiting time for services are the other two performance indicators that our respondent hospitals have developed for the customer perspective of their balanced scorecard. The focus on patient-related performance indicators confirms that providing world class health service to the public continues to be the mission of our sample of Canadian hospitals, despite the fiscal constraints imposed on them.

With respect to the internal business perspective, a large variety of performance indicators have been reported by the respondent BSC hospitals. Table 7 includes a partial list of the common indicators cited and unlike performance indicators for the customer perspective, there is no single indicator that dominates the list. The performance indicators, in general, can be grouped into three categories: patient-related indicators, employee-related indicators, and operation-related indicators. The patient-related indicators provide management insight on the effectiveness of the health services provided to patients. Employee-related indicators focus on the lost time caused by absenteeism or injury. This allows hospital management to gain some understanding on employee morale and their working conditions. Operation-related indicators, on the other hand, provide information on how organization resources are used in serving patients and whether they have been used efficiently.

On the learning and growth perspective, many of the indicators reported are related to education of staff and research activity (see Table 7). Many of these indicators such as education dollars spent, education hours, research grants, and number of published articles are quantifiable and objective. Measures on new program initiatives, new services rendered and quality improvement have also been reported for the learning and growth perspective.

The two most commonly cited indicators for the financial perspective include measures on case cost and variance analysis. The cost per case is a unique financial indicator for hospitals. It provides management with sounder benchmarks to monitor the costs of resources used in caring for patients and to plan for continuous improvements than the traditional, function-based hospital costing system. Variance analysis, a comparison of actual against budgeted expenditures, is an effective tool in cost control. Other financial indicators such as working capital ratios, current ratios, debt ratios, revenues and expenses, cash flow, operating margin, as well as surplus and deficit are also reported by the respondent hospitals. These financial ratios and measures are commonly

**Table 7.** Performance Indicators Reported by Hospitals That Have Implemented Balanced Scorecard

Customer Perspective	Internal Business Perspective	Innovation and Growing Perspective	Financial Perspective
<i>Patient-Related Indicators:</i>	<i>Patient-Related Indicators:</i>	<i>Research-Related Indicators:</i>	<i>Patient-Related Indicators:</i>
Patient satisfaction survey	Length of stay	% change in research grants	Cost per day
Number of complaints	Patient outcome study	Research funding	Cost per patient day per specialty
Waiting times	Complication rate	Number of external presentations	Cost per case
Waiting lists	Incidence rate	Number of published articles	Cost per acute case
Resolution time	Mortality rate	Peer-reviewed research	Cost per weighted case
	Readmission rate	Research involvement	
	<i>Employee-Related Indicators:</i>	<i>Education-Related Indicators:</i>	<i>Variance-Related Indicators:</i>
	Absenteeism	Number of students per week	Budget variance
	Paid sick hours per employee	Courses attended	Monthly variance
	Staff injury/Loss time rate	Education hours for staff	
	Staffing efficiency	Education participation	
	Workers' Compensation Board lost work hours rate	Number of in-house education sessions	
		Education dollars spent	
		% of expenditure on education and training	
<i>Other Indicators:</i>	<i>Operation-Related Indicators:</i>	<i>Other Indicators:</i>	<i>Other Indicators:</i>
Accreditation survey	Activity level	Number of quality improvement teams	Total cost per lab test
Physician satisfaction	Day surgery rate	New program initiation	Cash flow
	Utilization rate	New services rendered	Working capital (ratio)
	Workload statistics		Current ratio
	Safety performance		Long-term debt (ratio)
	Surgical wait time		Revenue mix
	Emergency room waiting time		% Admin. Expense to total expense
	Waiting list		Expenses and revenues
			Investment return
			Investment margin
			Operating margin
			Surplus and deficit

used in evaluating the financial position and operating performance of for-profit businesses. The increasing use of these financial indicators implies that executives of Canadian hospitals are well aware of the importance of financial sustainability, especially with the fiscal constraints and escalating healthcare costs, in managing their organizations.

As shown in Table 7, a substantial number of the performance indicators reported by the respondent hospitals in their balanced scorecard are related to patients. The patient-related indicators not only focus on the quality of care (e.g., patient satisfaction) but also the cost of care (e.g., cost per patient day, cost per case) provided to patients. As can be seen here, our respondents are committed to their organization's mission of providing world class services to their patients but they also recognize the importance of cost control in these turbulent times of funding cuts. The use of such performance indicators in the balanced scorecard implies that our responding executives still focus on maintaining first class health service to the public while at the same time, containing costs.

In addition to the large number of financial indicators, many of the indicators reported by the respondent hospitals are quantifiable. The number of qualitative indicators, such as patient satisfaction, physician satisfaction, research involvement, is very limited. In fact, results of the satisfaction survey are generally quantified on the bases of the response scales used. Thus, there is a strong emphasis on the use of quantitative indicators in the hospitals' balanced scorecards. This can be attributed to the perceived objectivity and relative ease of developing quantitative measures as compared to qualitative indicators. The mix of financial versus non-financial indicators, on the other hand, is quite different. There seems to be a greater number of non-financial indicators than financial indicators for the customer, internal business, and learning and growth perspectives. Only a few financial indicators, such as education dollars spent and research grants, are used.

Even though there are a fair number of outcome measures (e.g., utilization rate, cost per case, operating margin), a number of performance drivers are reported in the respondent hospitals' balanced scorecards. For instance, reports on waiting times, number of complaints, and resolution time allow management to anticipate patients' and physicians' responses on the satisfaction survey. Also, the hospital's safety performance may have a direct impact on staff's lost time caused by injury and costs of workers' compensation. Similarly, the number of outside presentations and published articles are, in one way or another, affected by the extent of research involvement and grants received by staff.

**Table 8.** Enthusiasm Toward Balanced Scorecard and the Expectation of Future Involvement in Hospitals That Have Implemented Balanced Scorecard

	Number of Hospitals (Percentage)	
Compared to one year ago, the enthusiasm of implementing balanced scorecard in your organization has:		
• changed significantly more	12	(28.6%)
• changed somewhat more	18	(42.9%)
• not changed	11	(26.2%)
• changed somewhat less	1	(2.4%)
• changed significantly less	0	(0.0%)
During the next five years, the use of balanced scorecard in your organization is expected to:		
• change significantly more	29	(69.0%)
• change somewhat more	9	(21.4%)
• not change	3	(7.2%)
• change somewhat less	1	(2.4%)
• change significantly less	0	(0.0%)

By and large, the balanced scorecards developed by our respondent hospitals have included outcome measures and performance drivers on all four perspectives. There is greater reliance on the use of non-financial than financial indicators in the customer, internal business, and learning and growth perspectives, and only a limited number of qualitative indicators are reported.

*E. Enthusiasm on Balanced Scorecard*

Even though the majority of the executives felt that their organizations have only been moderately successful in implementing balanced scorecard and achieving the desired objectives, their enthusiasm on balanced scorecard has grown. About three-quarters of the executives indicated that their enthusiasm in implementing balanced scorecard in their organizations have either changed significantly or somewhat more (see Table 8). Moreover, over 90% of the executives expected the use of balanced scorecard in their organizations to increase significantly or somewhat more over the next five years (see Table 8). This implies that the vast majority of our respondents have had a positive experience with the implementation and they felt that balanced scorecard could be a good management tool for their organizations.

## **CONCLUDING REMARKS AND IMPLICATIONS FOR PRACTICE**

In response to the turbulent operating environment, Canadian hospitals have turned to modern management tools to manage their organizations. Balanced scorecard, a performance measurement and strategic management system, is one of the modern tools adopted by management in Canadian hospitals.

Executives of the respondent hospitals, in general, felt that the financial and customer perspectives are extremely important to managing their organizations. All respondent hospitals have included performance indicators for the financial perspective in their performance measurement system and only five have not done so for the customer perspective. There is, however, an expectation gap among executives on the importance of these performance perspectives and their usefulness in managing their organizations. For hospitals that have implemented balanced scorecard, their expectation gap is less on the customer and the internal business perspectives as compared to hospitals that have not implemented balanced scorecard.

With respect to balanced scorecard, our respondents have a pretty good understanding on its characteristics and linkage to strategic management. The lack of technical know-how and management commitment are cited as the major reasons by one-third of the respondent hospitals that have decided not to implement balanced scorecard. For hospitals that have implemented balanced scorecard, these two factors also determine if the implementation will be successful or not. By and large, executives of BSC hospitals felt that their organizations have only been moderately successful in its implementation. Moreover, balanced scorecard, as a management tool, has not been extremely successful in achieving the organization's desired objectives of becoming a learning and growing organization and achieving focus on organizational change and strategies.

For hospitals that have developed balanced scorecards, their scorecards have reported measures on all four perspectives, with an emphasis on patient-related indicators. There is a relatively fair mix of outcome measures and performance drivers in their balanced scorecard but there is an extensive use of quantitative and non-financial indicators for the customer, internal business, and learning and growth perspectives.

Despite the moderate success in the development of balanced scorecards, executives of the respondent hospitals are still enthusiastic about the tool and they expect its use to increase significantly in their organizations over the next five years. At this stage, the respondent hospitals have only limited experience on the implementation of balanced scorecard - an average of two years. But with more experience, the respondent hospitals will be in a better position

to deal with implementation problems of balanced scorecard. Executives of BSC hospitals are still confident about the contribution of the tool to their organizations and consider it to be a useful tool in strategic management and performance measurement.

Thus, for administrators who want to implement balanced scorecard in their hospitals, they must be ready to provide the leadership, commit the resources and train their staff for the implementation to enhance its contribution to the organization and be successful. They should evaluate the indicators presented in Table 7 and decide which ones are applicable to their organizations. Meanwhile they can learn from BSC hospitals, especially with respect to the measurement of performance indicators. This would make the implementation smoother and more likely to succeed than the early adopters of balanced scorecard. Finally, hospital management should attempt to strike a better balance between the use of financial and non-financial indicators as well as qualitative and quantitative indicators when developing the balanced scorecards for their organizations.

## **LIMITATIONS OF THE STUDY AND FUTURE RESEARCH OPPORTUNITIES**

As in any mailed survey, limitations affecting the generalization of this study are related to the perception of the respondents and a potential for self-selection bias.

The most fundamental concern is that survey study deals with respondents' perception which are not hard data. The survey instrument was designed to solicit respondents' understanding of their organization's performance measurement system and balanced scorecard. It is, however, difficult to ascertain that the respondents' interpretation of the questions is exactly what the researchers have in mind. It is also possible that the respondents may have mistaken their organization's performance measurement system to that of a *true balanced scorecard*, which has gained recognition in the management literature.

A response rate of 21.8% of a national sample of Canadian hospitals for the current study is similar to other survey studies. However, it is likely that hospital executives who have heard about and implemented balanced scorecard are more likely to respond to surveys such as this than executives whose organizations have not developed balanced scorecard. Thus, these factors should be assessed in generalizing the findings reported in the study.

The results reported here indicate that balanced scorecard is a fairly new management tool to Canadian hospitals and it may be premature to assess its usefulness in hospital management. In order to assess its contribution to hospital



management, longitudinal field studies on a sample of hospitals will shed greater insight on various implementation issues related to balanced scorecard, as well as its value to hospital management. As reported here, there is a significant expectation gap on the importance of various organization objectives and the success of achieving these objectives with balanced scorecard implementation. Also, as pointed out by Ittner and Larcker (1998), there is limited empirical evidence on the role of balanced scorecard in strategic planning, more research on the benefits of balanced scorecard on performance measurement and strategic management is needed. Finally, the balanced scorecards developed by the sample hospitals can be used as a guideline for other hospitals that are interested in developing their own balanced scorecard. Since the Canadian healthcare sector is publicly funded, its operating environment is quite different from that in the United States. Future studies on comparing the balanced scorecards, implementation issues, and value of balanced scorecard to Canadian and American hospitals can be conducted to better understand the contribution of balanced scorecard in hospital management.

## NOTES

1. See Ittner and Larcker (1998) for a detailed description of emerging performance measurement practices.

2. Copies of the questionnaire can be obtained from the authors.

3. The 121 completed questionnaires were analyzed to determine if there is any significant difference in the characteristics of the early and late respondent hospitals. Results of the statistical tests indicated that there is no significant difference between the two groups with respect to:

- (a) hospital size as measured by the number of beds;
- (b) teaching affiliation;
- (c) whether the respondents have or have not heard of balanced scorecard; and
- (d) whether the respondent hospitals have or have not implemented balanced scorecard.

4. One of the 97 executives who have heard of balanced scorecard did not respond to the question on their understanding of balanced scorecard and the findings are based on 96 completed response.

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# ANALYZING ACTIVITY COST VARIANCES

Charles Y. Tang and Harry Davis

## ABSTRACT

*This study develops an integrative approach to analyze variances in activity costing. The traditional variance analysis improperly attributes the joint cost variances to a single (or only a few) causing variable(s) and ignores the effects of other relevant variables. As the result, it systematically understates (overstates) the effect of the variables that are computed earlier (later) in their assumed substitution sequence. The integrative approach developed in this study improves variance analysis. It approximates the actual curve that separates individual effects of each causing variable to properly partition the joint variances. It provides unbiased and objective analysis. The integrative approach offers a direct and intuitive analysis and eliminates the need for any unrealistic assumption on “substituting sequences.”*

## INTRODUCTION

Activity-based costing relates cost closer to activities and thereby provides a foundation for meaningful cost variance analyses. However, there has been little improvement in accounting literature in the area of analyzing cost variances. The analyses are still based on the traditional step-wise substitution approach.

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The main problem with this approach is that the sequence of substituting relevant variables affects the results of analyses. The issue regarding which sequence is the *correct* sequence has been a subject of decade long debates (e.g., Peles, 1989; Bastable et al., 1988; Shank et al., 1977; Chumachenko, 1968; Hasseldine, 1967). The sequence debate, though inconclusive so far, remains relevant and important today. It arises in the new environment of activity-based costing as well as in the general budget variance analyses whenever actual (target) outcome represents a product of influencing variables such as output level, activity input, and cost rate (e.g., Mak & Roush, 1996).

This article shows that the step-wise substitution approach improperly attributes the joint variances to the effect of a single (or a few) independent variable(s) and ignores the effects of others. It systematically understates (overstates) the effect of the variables that are computed earlier (later) in their assumed substituting sequence, regardless of the sequence used. With this method, the relation between variances and causing variables are misinterpreted.

The integrative approach of variance analysis presented in this paper views each variable that affects the activity costs as a part of an integrated system rather than an isolated factor. It can therefore capture the interaction between variables. The interactive approach comprises of two-steps. First, it converts the joint variances into single-effect components by dividing the variances into smaller time intervals. This downsizes the joint variances. Second, it attributes the remaining joint variances on each interval equally to the causing variables. The separation curves used by the integrative approach to separate individual effect of causing variables approximate the true separation curves. It thus provides unbiased and objective analyses. Estimation errors can be reduced to any desired tolerance limit. Unlike the step-wise substitution approach, the integrative approach does not impose any arbitrary substituting sequence, and thus free from the sequence problem.

The remainder of the paper is organized as follows. The first section examines the problems in the existing methods. Following that, the paper discusses the properties of the joint variances and develops the integrative approach. It then discusses some other issues related to the application of the integrative approach. The last section summarizes and concludes.

## **SUBSTITUTION SEQUENCES AND ITS EFFECT ON COST VARIANCE ANALYSIS**

The step-wise substitution approach treats each variable that affects activity costs as a single isolated factor and does not allow interaction between variables. The joint variances are attributed to a single, or a few, of the causing variables that are

substituted toward the end of the sequence, resulting in an overstatement for these variables. The effects of the variables substituted earlier in the process are completely ignored, resulting in an understatement. This section examines all possible substituting sequences in the often-used two- and three-variable models and shows that a *correct* sequence that many researchers have assumed does not exist.

### THE TWO VARIABLE MODEL

A two-way variance analysis can be presented in a two-variable model as follows:

$$\begin{array}{rcl}
 \text{Actual cost:} & S_1 = Q_1 * R_1 & \\
 \text{Target cost:} & S_0 = Q_0 * R_0 & \\
 \hline
 \text{Cost variances:} & \Delta S = S_1 - S_0 = Q_1 * R_1 - Q_0 * R_0 & 
 \end{array}$$

where:

- $S_1$  ( $S_0$ ) = actual (target) cost;
- $Q_1$  ( $Q_0$ ) = actual (target) total activities;
- $R_1$  ( $R_0$ ) = actual (target) cost rate;
- $Q_1 = Q_0 + \Delta Q$ ;
- $R_1 = R_0 + \Delta R$ ;
- $\Delta S, \Delta Q, \Delta R$  = variances in cost, activity, and rate, respectively.

The variances in activity and rate ( $\Delta Q$  and  $\Delta R$ ) cause the cost to deviate from its target level  $S_0$  by a variance  $\Delta S$ . For both accounting and managerial decision making purposes, accountants need to quantify the individual effects of each causing variables in the cost variance  $\Delta S$ , i.e., to dichotomize the variance  $\Delta S$  into an activity variance (caused by  $\Delta Q$ ) and a rate variance (caused by  $\Delta R$ ).

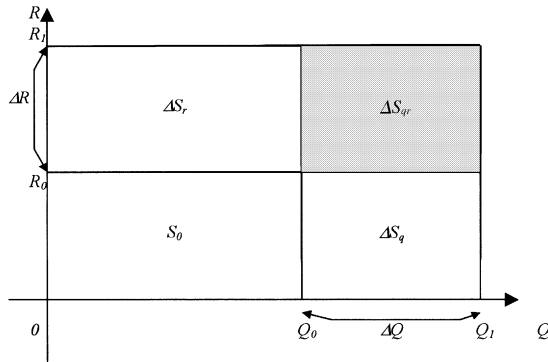
The existence of the joint variances makes the task difficult to accomplish under any conventional method. Fig. 1 shows a graphical presentation of the variances and its relationship with variable  $Q$  and  $R$ . The total budget variance  $\Delta S$  has three components:  $\Delta S_q$ ,  $\Delta S_r$ , and  $\Delta S_{qr}$ .

$$\Delta S = \Delta S_q + \Delta S_r + \Delta S_{qr}$$

where:

$$\begin{array}{l}
 \Delta S_q = \Delta Q * R_0, \\
 \Delta S_r = \Delta R * Q_0, \\
 \Delta S_{qr} = \Delta Q * \Delta R,
 \end{array}$$

The total variances in a two-variable model consist of three components: two single-effect variances ( $\Delta S_r$  and  $\Delta S_q$ ) and a joint variance ( $\Delta S_{qr}$ ).  $Q$  and  $R$  are independent variables and  $S$  is the dependent variable. Subscript 1 (0) indicates actual (target) value. The single-effect variances are attributable to one of the causing variables. The joint variance, on the other hand, is the result of the interaction between the two variables, and should not be attributed solely to any single variable.



where:  $S_1$  ( $S_0$ ): actual (target) cost;  
 $Q_1$  ( $Q_0$ ): actual (target) activity;  
 $R_1$  ( $R_0$ ): actual (target) rate;  
 $\Delta S$ : total variances of outcome, or  $\Delta S = S_1 - S_0 = R_1 * Q_1 - R_0 * Q_0 = \Delta S_r + \Delta S_q + \Delta S_{qr}$   
 $\Delta R$  ( $\Delta Q$ ): rate (activity) deviation from its budgeted level;  
 $\Delta S_r$  ( $\Delta S_q$ ): single-effect component attributable to changes in  $R$  ( $Q$ ), or  
 $\Delta S_r = \Delta R * Q_0$  and  $\Delta S_q = \Delta Q * R_0$ ; and  
 $\Delta S_{qr}$ : joint variance that is attributable to both  $R$  and  $Q$ , and  $\Delta S_{qr} = \Delta R * \Delta Q$ .

Fig. 1. Graphical Presentation of Variances:  $S = Q * R$ .

Of the three components,  $\Delta S_q$  and  $\Delta S_r$  are single-effect variances and attributable to one of the causing variables.<sup>1</sup>  $\Delta S_{qr}$  is a joint variance and represents the interaction between the two variables. The quantification of individual effect of causing variables requires a further partitioning of this joint variance to individual effects.

Using the traditional step-wise substitution approach, one can use one of the two possible substituting sequences. The first sequence, which is commonly used in textbooks, substitutes  $Q_1$  for  $Q_0$  before any substitution for variable  $R$ . In this sequence, the activity and the rate variances are computed as:

$$\text{Activity variance} = R_0 * Q_1 - R_0 * Q_0 = R_0 * (Q_0 + \Delta Q) - R_0 * Q_0 = \Delta S_q,$$

$$\text{Rate variance} = R_1 * Q_1 - R_0 * Q_1 = (R_0 + \Delta R)(Q_0 + \Delta Q) - R_0 * (Q_0 + \Delta Q) = \Delta S_r + \Delta S_{qr}.$$

The second sequence substitutes  $R_1$  for  $R_0$  before any substitution for variable  $Q$ . In this sequence, the rate and the activity variances are computed as:

$$\text{Rate variance} = R_1 * Q_0 - R_0 * Q_0 = (R_0 + \Delta R) * Q_0 - R_0 * Q_0 = \Delta S_r,$$

$$\begin{aligned} \text{Activity variance} &= R_1 * Q_1 - R_1 * Q_0 = (R_0 + \Delta R) * (Q_0 + \Delta Q) \\ &\quad - (R_0 + \Delta R) * Q_0 = \Delta S_q + \Delta S_{qr}. \end{aligned}$$

The two alternative sequences produce different results. With the first sequence, the joint variance  $\Delta S_{qr}$  is solely attributed to variable  $R$ . The effect of  $Q$  on the joint variance is disregarded. Under the second sequence, the joint variance is solely attributed to variable  $Q$ . The effect of  $R$  on the joint variance is, likewise, disregarded. Furthermore, the individual effect of the variable substituted first in the sequence is always understated since its effect in the joint variance is excluded. The individual effect of the variable substituted later in the sequence is always overstated since the entire joint variance is attributed solely to this variable. The choice of sequence is arbitrary, and in either case, the results are biased.

### THE THREE VARIABLE MODEL

Three-way cost variance analysis can be generalized using a three-variable model as follows:

$$\Delta V = V_1 - V_0 = Q_1 * M_1 * C_1 - Q_0 * M_0 * C_0$$

where the subscript ‘1’ (‘0’) denotes the actual (target) numbers and the cost  $V$  is the product of output ( $Q$ ), activity input ( $M$ ) and cost rate of activity ( $C$ ). Figure 2 shows a graphical presentation of the variance components and their relationships with the three variables. The total variance consists of seven variance components as follows:

$$\Delta V = \Delta V_q + \Delta V_m + \Delta V_c + \Delta V_{cm} + \Delta V_{cq} + \Delta V_{mq} + \Delta V_t$$

where:

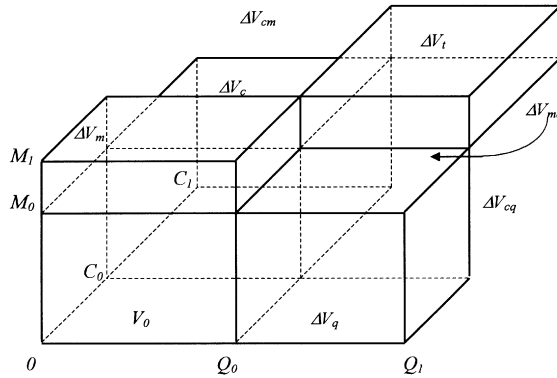
$\Delta V_q (= \Delta Q * M_0 * C_0)$ ,  $\Delta V_m (= \Delta M * Q_0 * C_0)$ , and  $\Delta V_c (= \Delta C * Q_0 * M_0)$  are single-effect variances;

$\Delta V_{mq} (= \Delta M * \Delta Q * C_0)$ ,  $\Delta V_{cm} (= \Delta C * \Delta M * Q_0)$ , and  $\Delta V_{cq} (= \Delta C * \Delta Q * M_0)$  are two-factor joint variances;

$\Delta V_t (= \Delta Q * \Delta M * \Delta C)$  is three-factor joint variance.



The total variances in a three-variable model consist of seven components: three single-effect variances ( $\Delta V_q$ ,  $\Delta V_m$ , and  $\Delta V_c$ ), three two-factor joint variances ( $\Delta V_{mq}$ ,  $\Delta V_{cm}$ , and  $\Delta V_{cq}$ ), and one three-factor joint variance ( $\Delta V_i$ ). The two-factor joint variances are the results of the interaction between a pair of changing variables. The three-factor joint variance is the result of the interaction among all three variables. The three two-factor joint variances ( $\Delta V_{mq}$ ,  $\Delta V_{cm}$ , and  $\Delta V_{cq}$ ) are left out of the graph to improve readability.



where:  $V_1$  ( $V_0$ ): actual (target) costs;  
 $Q_1$  ( $Q_0$ ): actual (target) output;  
 $M_1$  ( $M_0$ ): actual (target) activity input;  
 $C_1$  ( $C_0$ ): actual (target) cost rate;  
 $\Delta V$ : total variance, or  $\Delta V = V_1 - V_0 = \Delta V_q + \Delta V_m + \Delta V_c + \Delta V_{mq} + \Delta V_{cm} + \Delta V_{cq} + \Delta V_i$ ;  
 $\Delta V_q$ ,  $\Delta V_m$ ,  $\Delta V_c$ : single-effect variances,  
 $\Delta V_q = \Delta Q * M_0 * C_0$ ,  $\Delta V_m = \Delta M * Q_0 * C_0$ , and  $\Delta V_c = \Delta C * Q_0 * M_0$ ;  
 $\Delta V_{mq}$ ,  $\Delta V_{cm}$ ,  $\Delta V_{cq}$ : two-factor joint variances,  
 $\Delta V_{mq} = \Delta Q * \Delta M * C_0$ ,  $\Delta V_{cm} = \Delta M * \Delta C * Q_0$ , and  $\Delta V_{cq} = \Delta C * \Delta Q * M_0$ ; and  
 $\Delta V_i$ : three-factor joint variance, or  $\Delta V_i = \Delta Q * \Delta M * \Delta C$ .

Fig. 2. Graphical Presentation of Variances:  $V = Q * M * C$ .

The two-factor joint variances are the results of interaction between two of the variables, and the three-factor joint variance the result of the interaction among all three independent variables. The step-wise substitution approach attributes the joint variances in the same arbitrary manner as in the two-variable model. Using  $Q \rightarrow M \rightarrow C$  sequence, the variances can be computed as:

Quantity variance:  $V_q = \Delta Q * M_0 * C_0 = \Delta V_q$ ,

Input variance:  $V_m = \Delta M * Q_1 * C_0 = \Delta V_m + \Delta V_{mq}$ ,

Rate variance:  $V_c = \Delta C * Q_1 * M_1 = \Delta V_c + \Delta V_{cq} + \Delta V_{cm} + \Delta V_i$ .

This analysis has the following three problems: (1) the effect of  $Q$  on  $\Delta V_{mq}$ ,  $\Delta V_{cq}$  and  $\Delta V_l$  is completely excluded from individual effect  $V_q$  because  $Q$  is the first variable substituted in the sequence; (2)  $\Delta V_{mq}$  is solely attributed to the effect of  $V_m$ , even though it is also affected by  $Q$ . Further, the effect of  $M$  on  $\Delta V_{cm}$  and  $\Delta V_l$  are excluded from the individual effect of  $V_m$ ; and (3) two-factor joint variances  $\Delta V_{cq}$  and  $\Delta V_{cm}$  and the three-factor joint variance  $\Delta V_l$  are solely attributed to the individual effect of  $C$ , the last variable in the substitution sequence.

There are a total six possible substituting sequences for a three-variable model. Results of using all of the six sequences are summarized in Table 1. With every sequence, the individual effect of the variables substituted earlier is understated due to the exclusion of joint variances, and the individual effect of those substituted later is overstated. Table 1 also shows that a decision maker can reach four different conclusions on the individual effect of every variable. For example, the quantity variance can be  $\Delta V_q$ ,  $\Delta V_q + \Delta V_{mq}$ ,  $\Delta V_q + \Delta V_{cq}$ , or  $\Delta V_q + \Delta V_{mq} + \Delta V_{cq} + \Delta V_l$  depending on the sequences used.

### THE INTEGRATIVE APPROACH

Joint variances are the result of interactions between variables and should be treated as such. The interactive approach presented in this section allows all variables change simultaneously and interact with each other. It properly partitions the joint variance by tracking the actual curve that separate the individual effect of causing variables in the joint variances, and thereby provides unbiased and objective analyses.

### CONVERSION OF THE JOINT VARIANCES INTO SINGLE EFFECT VARIANCES

A joint variance can be effectively converted into single-effect variances according to the theorem of differentials. If  $S$  is a function of  $Q$  and  $R$ , or  $S = f(Q, R)$ , then the increment of function  $S$  at the point  $(Q_0, R_0)$  can be expressed as follows:

$$\Delta S = f(Q_0 + \Delta Q, R_0 + \Delta R) - f(Q_0, R_0) = \frac{\partial S}{\partial Q} * \Delta Q + \frac{\partial S}{\partial R} * \Delta R + \omega\rho$$

where:

$\Delta Q$  and  $\Delta R$  represent the changes in variable  $Q$  and  $R$  at the point of  $Q_0$  and  $R_0$ , respectively;

**Table 1.** A Comparison of Results Using All Possible Substituting Sequences for Model  $V = Q * M * C *$  Under the Step-wise Substitution Approach

Variances	Analysis of variance based on different substituting sequences					
	$Q \rightarrow M \rightarrow C$	$Q \rightarrow C \rightarrow M$	$M \rightarrow Q \rightarrow C$	$M \rightarrow C \rightarrow Q$	$C \rightarrow Q \rightarrow M$	$C \rightarrow M \rightarrow Q$
Quantity variance	$\Delta V_q$	$\Delta V_q$	$\Delta V_q + \Delta V_{mq}$	$\Delta V_q + \Delta V_{mq} + \Delta V_{cq} + \Delta V_t$	$\Delta V_q + \Delta V_{cq}$	$\Delta V_q + \Delta V_{mq} + \Delta V_{cq} + \Delta V_t$
Input variance	$\Delta V_m + \Delta V_{mq}$	$\Delta V_m + \Delta V_{mq} + \Delta V_{cm} + \Delta V_t$	$\Delta V_m$	$\Delta V_m$	$\Delta V_m + \Delta V_{mq} + \Delta V_{cm} + \Delta V_t$	$\Delta V_m + \Delta V_{cm}$
Rate variance	$\Delta V_c + \Delta V_{cq} + \Delta V_{cm} + \Delta V_t$	$\Delta V_c + \Delta V_{cq}$	$\Delta V_c + \Delta V_{cq} + \Delta V_{cm} + \Delta V_t$	$\Delta V_c + \Delta V_{cm}$	$\Delta V_c$	$\Delta V_c$

where:

$V, Q, M, C$ : costs, output, activity input, and cost rate, and  $V = Q * M * C$ ;  
 $\Delta V$ : total variance, or  $\Delta V = V_1 - V_0 = \Delta V_q + \Delta V_m + \Delta V_c + \Delta V_{mq} + \Delta V_{cm} + \Delta V_{cq} + \Delta V_t$ ;  
 $\Delta V_q, \Delta V_m, \Delta V_c$ : single-effect components of total variances, or  
 $\Delta V_q = \Delta Q * M_0 * C_0, \Delta V_m = \Delta M * Q_0 * C_0,$  and  $\Delta V_c = \Delta C * Q_0 * M_0$ ;  
 $\Delta V_{mq}, \Delta V_{cm}, \Delta V_{cq}$ : two-factor joint-effect components, or  
 $\Delta V_{mq} = \Delta Q * \Delta M * C_0, \Delta V_{cm} = \Delta M * \Delta C * Q_0,$  and  $\Delta V_{cq} = \Delta C * \Delta Q * M_0$ ;  
 $\Delta V_t$ : three-factor joint-effect components, or  $\Delta V_t = \Delta Q * \Delta M * \Delta C$ .

Table 1. Continued

Note:

The step-wise substitution method needs to assume a substituting sequence. For a model of three variables, there is a total of six possible sequences and each of them will yield a different set of results. The table shows the results of using all six possible sequences. The result of applying the sequence  $Q \rightarrow M \rightarrow C$  can be verified using the following procedure:

- (1) Start with the budgeted numbers:  $V_0 = Q_0 * M_0 * C_0$ ,
- (2) Substitute the value of Q with actual on the basis of (1):  $V_2 = Q_1 * M_0 * C_0$ ,
- (3) Substitute the value of M with actual on the basis of (2):  $V_3 = Q_1 * M_1 * C_0$ ,
- (4) Substitute the value of C with actual on the basis of (3):  $V_1 = Q_1 * M_1 * C_1$ ,

Then, Quantity variance:  $V_q = V_2 - V_0 = \Delta Q * M_0 * C_0 = \Delta V_q$ ,  
 Input variance:  $V_m = V_3 - V_2 = \Delta M * Q_1 * C_0 = \Delta V_m + \Delta V_{mq}$ ,  
 Rate variance:  $V_c = V_1 - V_3 = \Delta C * Q_1 * M_1 = \Delta V_c + \Delta V_{cq} + \Delta V_{cm} + \Delta V_t$ .

This sequence is the prevailing sequence in the current accounting textbooks.

This table also shows that the joint variances are excluded from the effects of the variables substituted earlier in the sequences and included entirely in the effect of variables substituted later. This problem produces a systematic bias in that it always understates (overstates) the effect of variables substituted earlier (later) in the substituting sequence. The problem exists in every case.

$\rho = \sqrt{(\Delta R)^2 + (\Delta Q)^2}$ , a geometrical mean of variances;

$\omega$  is a random variable correlated with  $\Delta Q$  and  $\Delta R$ , and  $\omega \rightarrow 0$  when  $\rho \rightarrow 0$ ;  
 $\omega\rho$  is an error term, which is a higher level infinitesimal as  $\Delta Q$  and  $\Delta R$  approach 0.

Therefore, the total differential of the function  $S$  is:

$$dS = \lim_{\substack{\Delta Q \rightarrow 0 \\ \Delta R \rightarrow 0}} \Delta S = \frac{\partial S}{\partial R} * \Delta R + \frac{\partial S}{\partial Q} * \Delta Q.$$

This basic theorem has the following implications:

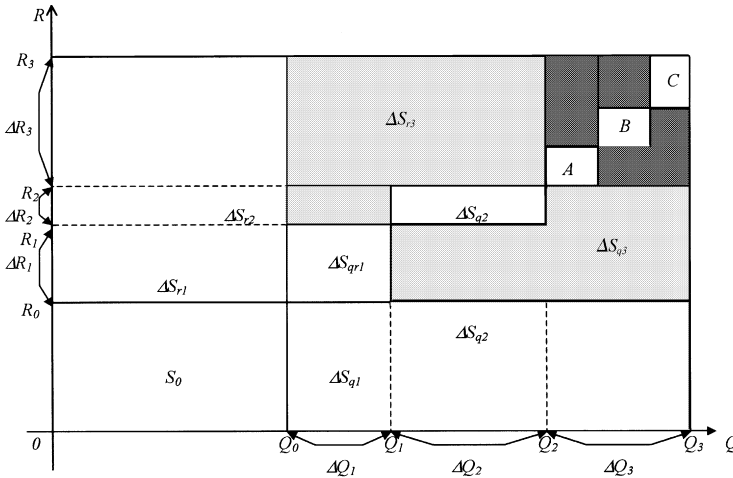
- (1) If changes of  $Q$  and  $R$  are relatively large, then there will be a joint variance  $\omega\rho$  in  $\Delta S$ ;
- (2) When changes in  $Q$  and  $R$  are divided into infinitely small intervals, i.e.,  $\Delta Q$  and  $\Delta R$  approach 0, the joint variance becomes 0, and the total joint variance can be expressed as the sum of single-effect variances.

Thus, we can convert the joint variances into single-effect components, by dividing the changes in  $Q$  and  $R$  into numerous small intervals. The effect is shown in Fig. 3.

For the two-variable model  $S=Q*R$ ,  $\Delta Q$  and  $\Delta R$  are first divided into three small intervals ( $\Delta Q = \Delta Q_1 + \Delta Q_2 + \Delta Q_3$ ; and  $\Delta R = \Delta R_1 + \Delta R_2 + \Delta R_3$ ). This simple division increases our knowledge about the joint variances. Compared to Fig. 1, where the entire  $\Delta S_{qr}$  is a ‘black box’, in Fig. 3 part of the joint variance has been converted into single-effect components (shaded area). The joint variance  $\Delta S_{qr}$  now shrinks to the area of  $\Delta S_{qr1} + \Delta S_{qr2} + \Delta S_{qr3}$ . If  $\Delta Q_3$  and  $\Delta R_3$  are further divided into three smaller intervals, more of the joint variances are converted into single-effect variances (darkly shaded area). The joint variance  $\Delta S_{qr3}$  is further reduced to the area of  $A+B+C$ . The trend is that as more intervals are used, more of the joint variance is converted into single-effect variances. As the number of intervals approaches infinity, the joint variances approach 0, and the activity and the rate variances become the sum of the single-effect variance for all intervals:

$$\left\{ \begin{array}{l} \text{Activity variance: } S_q = \sum_{i=1}^n \Delta S_{qi} \text{ when } n \rightarrow \infty, \text{ and} \\ \text{Rate variance: } S_r = \sum_{i=1}^n \Delta S_{ri} \text{ when } n \rightarrow \infty. \end{array} \right. \tag{1}$$

In a two-variable model, after  $\Delta R$  and  $\Delta Q$  are divided into three intervals, a significant amount of the joint variances is converted into single-effect variances (the shaded area). Dividing  $\Delta Q_3$  ( $\Delta R_3$ ) into three even smaller intervals converts more joint variances (the darker area). The joint variance remaining on each interval reduces as more intervals are used.



where:  $R_3$  ( $R_0$ ): actual (target) rate;  
 $Q_3$  ( $Q_0$ ): actual (target) activity;  
 $\Delta R$ : total deviation of  $R$  from its target level or  $\Delta R=R_3-R_0$ ;  
 $\Delta R$  is divided into three intervals  $\Delta R=\Delta R_1+\Delta R_2+\Delta R_3$ ;  
 $\Delta Q$ : total deviation of  $Q$  from its target level or  $\Delta Q=Q_3-Q_0$ ;  
 $\Delta Q$  is divided into three intervals  $\Delta Q=\Delta Q_1+\Delta Q_2+\Delta Q_3$ ;  
 $\Delta R_i$  ( $\Delta Q_i$ ): deviation of  $R$  ( $Q$ ) on the  $i$ th interval,  $\Delta R_i=R_i-R_{i-1}$  ( $\Delta Q_i=Q_i-Q_{i-1}$ ), where  $i=1,2,3$ ;  
 $\Delta S_{ri}$  ( $\Delta S_{qi}$ ): single-effect component attributable to changes in  $R$  ( $Q$ ) on the  $i$ th interval, or  
 $\Delta S_{ri}=\Delta R_i*Q_{i-1}$  and  $\Delta S_{qi}=\Delta Q_i*R_{i-1}$ , where  $i=1,2,3$ ; and  
 $\Delta S_{qri}$ : joint variance on the  $i$ th interval,  $\Delta S_{qri}=\Delta R_i*\Delta Q_i$ , where  $i=1,2,3$ .

Figure 3. Effect of Dividing the Intervals in  $S=Q*R$

The conversion effect is produced in the same fashion, the three-variable model  $V=Q*M*C$ . By dividing the variances into a large number of tiny intervals, we can effectively convert the two-factor joint variances ( $\Delta V_{cq}$ ,  $\Delta V_{cm}$ , and  $\Delta V_{mq}$ ) and the three-factor joint variance ( $\Delta V_l$ ) into single-effect variances. Then the individual effect of each causing variable equals the sum of single-effect components over all intervals:

$$\left\{ \begin{array}{l} \text{Quantity Variance: } V_q = \sum_{i=1}^n \Delta V_{qi} \text{ when } n \rightarrow \infty, \\ \text{Input Variance: } V_m = \sum_{i=1}^n \Delta V_{mi} \text{ when } n \rightarrow \infty, \text{ and} \\ \text{Rate Variance: } V_c = \sum_{i=1}^n \Delta V_{ci} \text{ when } n \rightarrow \infty. \end{array} \right. \quad (2)$$

### PARTITIONING THE JOINT VARIANCES WHEN VARIABLES CHANGE AT A CONSTANT RATE

If each variable changes at a constant rate,<sup>2</sup> the individual effect of each causing variable in the joint variances is an even split.<sup>3</sup> This means that: (1) In a two-variable model, if both variables have a constant rate of change, the individual effect of each variable on the joint-variances equals one half of the joint variances; (2) In a three-variable model, if a pair of variables has a constant rate of change and the other remains unchanged, the individual effect of each of the changing variable included in the two-factor joint variances equals one half of the joint variances; and (3) In a three-variable model, if all of the variables have a constant rate of change, the individual effect of each variable in the three-factor joint variance equals one third of the three-factor joint variance.

Thus, assuming a constant change rate, the activity and the rate variances in the two-variable model equal the sum of single-effect variances and one half of the joint variance:

$$\left\{ \begin{array}{l} \text{Activity variance: } S_q = \Delta S_q + \frac{1}{2} \Delta S_{qr}, \\ \text{Rate variance: } S_r = \Delta S_r + \frac{1}{2} \Delta S_{qr}. \end{array} \right. \quad (3)$$

For the three-variable model, the individual effect of each variable is the sum of: (1) its single-effect variance; (2) its equal share in the related two-factor joint variances; and (3) one third of the three-factor joint variance:

$$\left\{ \begin{array}{l} \text{Quantity Variance: } V_q = \Delta V_q + \frac{1}{2} \Delta V_{cq} + \frac{1}{2} \Delta V_{mq} + \frac{1}{3} \Delta V_t, \\ \text{Input Variance: } V_m = \Delta V_m + \frac{1}{2} \Delta V_{cm} + \frac{1}{2} \Delta V_{mq} + \frac{1}{3} \Delta V_t, \\ \text{Rate Variance: } V_c = \Delta V_c + \frac{1}{2} \Delta V_{cm} + \frac{1}{2} \Delta V_{cq} + \frac{1}{3} \Delta V_t. \end{array} \right. \quad (4)$$

### THE INTEGRATIVE APPROACH

Each of the above approaches can properly partition the joint variances. Each, however, has limitations. The first approach requires dividing changes in variables into an infinite number of intervals, which is not practical. The second approach assumes that all variables change at a constant speed, which is unrealistic for a relatively long-term analysis such as a year or a quarter.

The integrative approach combines both methods. First, it divides the changes in each variable into  $n$  number of small intervals. This converts joint variances into the single-effect variances and reduces the size of remaining joint variances.<sup>4</sup> Since each interval now is short in time span, the constant change rate assumption becomes appropriate. In the second step it thus allocates the remaining joint variances on each interval equally among causing variables. For a two-variable model, the individual effects of each causing variable become:

$$\left\{ \begin{array}{l} \text{Activity variances: } S_q = \sum_{i=1}^n (\Delta S_{qi} + \frac{1}{2} \Delta S_{qri}), \\ \text{Rate variance: } S_r = \sum_{i=1}^n (\Delta S_{ri} + \frac{1}{2} \Delta S_{qri}), \end{array} \right. \quad (5)$$

where  $n$  represents total number of intervals.

For the three-variable model, the individual effect of each causing variable becomes:

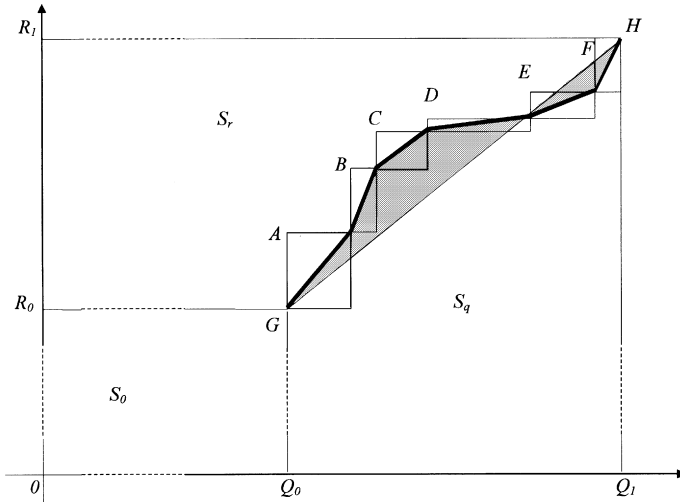
$$\left\{ \begin{array}{l} \text{Quantity variance: } V_q = \sum_{i=1}^n (\Delta V_{qi} + \frac{1}{2} \Delta V_{cqi} + \frac{1}{2} \Delta V_{mqi} + \frac{1}{3} \Delta V_{ii}), \\ \text{Input variance: } V_m = \sum_{i=1}^n (\Delta V_{mi} + \frac{1}{2} \Delta V_{cmi} + \frac{1}{2} \Delta V_{mqi} + \frac{1}{3} \Delta V_{ii}), \\ \text{Rate variance: } V_c = \sum_{i=1}^n (\Delta V_{ci} + \frac{1}{2} \Delta V_{cmi} + \frac{1}{2} \Delta V_{cqi} + \frac{1}{3} \Delta V_{ii}), \end{array} \right. \quad (6)$$

where  $n$  represents total number of intervals.

By integrating the two methods, the accuracy of the analysis is improved. Fig. 4 shows this graphically. When analyzing variances in a two-variable model, the integrative approach uses the highlighted line that links the diagonals of rectangles  $A, B, C, D, E,$  and  $F$  to partition the individual effect of the causing variables. When only the first method is used, the remaining joint variances on each interval (area represented by the small rectangles  $A, B, C, D, E,$  and  $F$ ) would be ignored. The second method uses the straight line  $GH$  as the partition curve and produces an error represented by the area bounded



This graph compares the computation errors of the three different approaches: conversion of joint variances by using intervals, assuming constant change rate and equally allocating joint variances, and the integrative approach. When joint variances are converted using six intervals, a significant amount of joint variance remains on each interval. Summing up only the single-effect variances will miss out these joint variances (i.e., small boxes marked *A, B, C, D, E, and F*). If the joint variances are simply allocated equally between independent variables without using intervals, the partition curve for the variances is the straight line *GH*. This causes a computational error shown in the shaded area where the constant change rate assumption is violated. The integrative approach first divides variables into, say, six, time intervals and converts the most significant portion of the joint variance into the single-effect variances. Since each interval represents a short period of time where the constant change rate assumption is appropriate and the joint variance on each interval is downsized, the integrative approach allocates the remaining joint variances equally between variables. The separation curve of the integrative approach is the line (highlighted in the graph) linking the diagonals of all the small boxes (*A, B, C, D, E, and F*).



where:  $S_1 (S_0)$ : actual (target) costs, and  $S_1=Q_1 * R_1 (S_0=Q_0 * R_0)$ ;  
 $R_1 (R_0)$ : actual (target) rate;  
 $Q_1 (Q_0)$ : actual (target) activity; and  
 $S_q (S_r)$ : activity (rate) variance.

Fig. 4. Partition Curve and Calculation Errors for  $S=Q * R$ .

by the straight line *GH* and the curve linking the diagonals of the small rectangles (the shaded area). Since the true partitioning curve must pass through the linked corners of the small rectangles, the partitioning curve of the integrative approach (the highlighted line) virtually coincides with the true partitioning curve. In each interval, the true partition curve fluctuates within the boundary of small rectangles and around their diagonals. The negative and positive errors

can offset each other. As long as the intervals are sufficiently small, the partition curve is sufficiently close to the true one, and the calculation errors can be reduced to any desired tolerance limit.

## FURTHER IMPLICATIONS

### DIRECT APPLICATION OF THE INTEGRATIVE APPROACH

Decomposing variances over intervals requires more detailed record-keeping. For example, the analysis of annual cost variances requires quarterly, monthly, or even weekly records on output, activity input, and cost rate. More time intervals improve the accuracy of analysis, but increase record-keeping costs. There is a trade off between costs and benefits. For an annual analysis of two variables, monthly data is usually sufficient to achieve desired accuracy.<sup>5</sup>

### EXTENSION TO THE MODELS WITH MORE THAN THREE VARIABLES

Budget variance analyses usually employ models with two or three independent variables. Models with more than three variables are rarely used and are viewed as a compounding form of several models. For example, a model with five variables, e.g.,  $W = A*B*C*D*E$ , is a compounding form of the following two models:

$$W = V*D*E,$$

and

$$V = A*B*C.$$

Thus, to compute the effect of each of the five independent variables (i.e.,  $A$ ,  $B$ ,  $C$ ,  $D$ , and  $E$ ) on the dependent variable  $W$ , one can apply the integrative approach in the following three steps:<sup>6</sup>

- (1) Apply equation 6 to model  $W = V*D*E$  to compute the individual effect of  $V$ ,  $D$ , and  $E$  on variable  $W$  and name them as  $W_v$ ,  $W_d$ , and  $W_e$ , respectively;
- (2) Apply equation 6 to model  $V = A*B*C$  to compute the individual effect of  $A$ ,  $B$  and  $C$  on variable  $V$  and name them as  $V_a$ ,  $V_b$ , and  $V_c$ , respectively.
- (3) Prorate the effect of variable  $A$ ,  $B$ , and  $C$  on  $W$  using the proportion of their effect on variable  $V$  as follows:

$$W_a = \frac{V_a}{\Delta V} * W_v,$$

$$W_b = \frac{V_b}{\Delta V} * W_v,$$

$$W_c = \frac{V_c}{\Delta V} * W_v,$$

where  $\Delta V$  denotes the total variance of variable  $V$ , and  $\Delta V = V_a + V_b + V_c$ .

## SUMMARY AND CONCLUSIONS

This study shows that the substitution sequence under the step-wise substitution approach of cost variance analysis is arbitrary and produces a systematic bias. The step-wise substitution approach treats each relevant variable in isolation and distorts the interaction between those variables. It improperly attributes the joint variances to a single (or only a few) causing variable(s), and ignores the effect of the other relevant variables. Furthermore, it systematically understates (overstates) the effect of the variables that are computed earlier (later) in the sequence, regardless of the sequence used.

The integrative approach developed in this paper improves variance analysis. It tracks and approximates the true curve that separates the individual effects of causing variables. It is thus able to provide unbiased and objective results. Since it does not impose any arbitrary "substitution sequences," it is not subject to problem of obtaining different result for an identical case. With a set of ready to use mathematic formulas, it makes a direct and intuitive application of variance analysis possible.

## NOTES

1. The "single effect" may not be "single" if the compounding functional relationship exists in the system. For example, if  $R$  and  $Q$  are interrelated, then, any change in  $Q$  affects both  $S$  and  $R$ . Any change in  $R$  resulting from changes in  $Q$  will in turn affect  $S$ . In budget variance analysis, however, all independent variables are assumed to be independent from each other.

2. Our assumption does not preclude that the rate of change can be different for each variable. Assuming that a variable changes at a constant rate is equivalent to use an average rate to represent the behavior of the variable. For example, if actual labor hours exceed the budgeted hours by 30 hours in a month, a constant rate assumption means the 30 hours of excess usage takes place at a rate of 1 hour per day. The assumption is valid as long as the excess usage of labor takes place in the production process evenly over a time period.

3. At the request of the editors, the mathematical proves are omitted. Author will provide proves to interested readers at their requests.

4. The assumption of constant change rate for each variable can help examine the relationship between the amount of the single-effect variances converted from the joint variance and the number of intervals taken. The ratio of the single-effect components produced by the conversion to the original total joint variances  $\Delta S_{qr}$  can be expressed as  $\frac{n-1}{n}$  where  $n$  is the number of intervals taken. For example, 12 intervals will convert

11 over 12, or 92%, of the joint variances into single-effect variances.

5. See the discussion in footnote 4.

6. Alternatively, one can derive equations for models with more than three variables in multi-dimensional spaces. It is theoretically possible, but too complex to have any practical value.

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# EFFICIENT CEO COMPENSATION: A DATA ENVELOPMENT ANALYSIS APPROACH

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## ABSTRACT

*This paper measures the relative efficiency of CEO compensation packages with respect to corporate performance using Data Envelopment Analysis (DEA). DEA links theoretically optimal solutions with observed practice by empirically measuring efficient performance in comparison to other firms. We found that firms with higher proportions of salary, and lower proportions of long term compensation were more efficient. This result indicates that the increased costs which result from manager's increasing risk aversion at higher levels of long term incentive compensation may be more costly than the increased incentives provided.*

## 1. INTRODUCTION

Efficient CEO compensation packages are those that provide most incentives and resulting firm performance for the lowest compensation costs. This study is an initial step in empirically establishing the characteristics of efficient CEO

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compensation packages. This empirical analysis provides a linkage between theoretical agency modeling of compensation packages and practice.

In theoretical agency models, managers are presumed to be effort averse. Researchers in this area have established that elements of salary, as well as short term and long term incentive compensation are necessary to motivate managers and establish optimal compensation contracts (Banker & Datar, 1989; Bushman & Indjejikian, 1993; Kim & Suh, 1993; Lev, 1993). Optimal compensation contracts are those which align the manager's and firm's interests at the lowest cost.

Prior research has further established that the optimal levels of each of these components of compensation vary due to ownership structure (Jensen & Meckling, 1976), firm performance, managements' risk aversion, the market for managers, and firm risk (Banker & Datar, 1989; Jensen & Meckling, 1976; Lambert, 1993; Sloan, 1993). Ownership structure affects how much of an agency problem exists. Firm performance sets each agent's managerial labor market while the overall market for managers sets minimal pay standards. The agent's risk aversion interacting with firm risk affects the structure of optimal contracts.<sup>1</sup>

Association between these mathematically derived optimal performance measures and compensation has been observed in the market (Sloan, 1993; Mehran, 1995). However, the observation of association does not provide information about how much of each component is efficient.

These studies are limited because they use regression analysis to examine an optimization problem. Regression analysis examines associations, not optimality. Data Envelopment Analysis (DEA) is an optimization tool which allows empirical evaluation of observed observations. While DEA does not identify true optimality, it does identify efficiency, the most optimal solutions found in practice.

In this study we used DEA to establish an efficient frontier which discriminates between firms with efficient versus inefficient compensation packages. The DEA efficiency results were verified against subsequent firm performance. For the DEA model firm performance was used as the evaluation criteria. The market for managers form the optimization constraints. Firm risk and the manager's risk aversion are implicitly incorporated by the DEA model.

Our research indicates that firms with higher proportions of fixed salaries to total compensation and lower proportions of long term stock based incentive plans tend to be more efficient. These results provide evidence that the trade-off demanded by a risk averse agent of higher levels of incentive compensation to compensate for reduced levels of fixed compensation may be more costly to the firm than the benefits received (Holmstrom, 1979). Additionally, we find that on average firms identified as efficient have a significantly larger proportion of their stock held by the CEO. The ownership results are consistent with increases in

agency costs associated with the separation between ownership and management (Jenson & Meckling, 1976).

The remainder of this work proceeds as follows. Section 2 discusses the overview of research issues and hypotheses. Section 3 discusses the efficiency evaluation (DEA model). Section 4 presents the sample and data sources. The results are presented in Section 5. Conclusions are presented in the final section.

## **2. OVERVIEW OF RESEARCH ISSUES AND HYPOTHESES**

Recent years have shown a rapid increase in compensation paid to executives, primarily through the use of stock options or other stock based incentive plans (Bloedorn, 1994; Sloan, 1993). Some argue that stock based incentives do not really cost the company money because they only need to be paid out if the company's performance is good. Others argue that CEOs are vastly overpaid and do not deserve their high compensation because the CEO's firms are only performing well because the overall market is doing well. A large body of researchers have examined this issue, primarily through the principal agent paradigm.

In the principal/agent paradigm, the principal (owner) maximizes firm cash flows (return) subject to the agent's (manager's) required minimum welfare (compensation), risk and effort aversion. The principal maximizes the return by creating a contract which compels the agent to choose the action that the principal prefers. In the case where the agent's action is observable by the principal, the first best solution is attainable and the risk neutral principal pays the manager a set salary.

Since in reality the principal cannot directly observe and control the manager's action, the principal bases some of the agent's compensation on a performance measure that is assumed to be a result of both the manager's action and a state of nature. The performance measure most often cited is the increase in the value of the firm, or the owner's return. In order to compensate the risk averse manager for the risk imposed by the state of nature, the principal pays the manager a risk premium, deviating from optimal risk sharing rules (Holmstrom, 1979).

The principal also recognizes that the manager's performance cannot always be accurately measured by the stock return since industry shocks, market shocks and other external factors affect stock prices in addition to the manager's actions. Accounting based measures of performance are less subject to external shocks, however, they are expected to be biased by conservatism in accounting measurements and management manipulation. Therefore, in addition to a fixed component, compensation packages usually include both market and accounting based performance measures.



A risk averse agent would prefer to have his entire compensation fixed so that he would not have to produce effort or incur any risk (Holmstrom, 1979). Therefore an agent demands higher levels of stock and bonus compensation, when compared to fixed salary, to compensate for the risk incurred.

Efficient compensation packages provide the most optimal tradeoff between the risk premium paid to managers and the informativeness of the performance measures. Our first hypothesis, in the null form, follows from the arguments above.

HN1: The composition of the CEO's compensation package has no effect on compensation efficiency.

Jensen and Meckling (1976) posit that Agency costs increase as the separation between ownership and management increases. Therefore firms with higher percentages of CEO ownership are expected to have lower agency costs, and lower incentive problems (Fama & Jensen, 1983; Morck, Shleifer & Vishny, 1988). The compensation packages of these firms are expected to reflect this reduction and therefore be more efficient. This discussion leads to the second hypothesis, stated below in the null form.

HN2: CEO's ownership of a firm has no effect on compensation efficiency

In addition to the theoretical agency modeling, empirical research on management compensation has increasingly found relationships between company performance and the use of long term incentives provided through compensation schemes. However, the results are often weak and inter-temporally inconsistent. The changing findings of empirical research are due, at least in part, to: (1) inadequate measurement of the components of compensation (Lambert, 1993), (2) time series instability due to an increased use of long term incentive packages over the years (Bloedorn, 1994), (3) an inability of financial measures to capture the current performance of managers (Ittner & Larker, 1997), (4) an inability to extract the cause and effect relationship between long term incentives based on stock returns and the returns themselves (Mehran, 1995), and (5) an inability of researchers to determine the true weights placed on the performance measures by the compensation committees (Lambert, 1993; Sloan, 1993).

Recent empirical research has also attempted to measure the efficiency aspects of compensation. Sloan (1993) determined that performance pay should be based on both returns and earnings. The optimal tradeoff of performance pay based on earnings versus pay based on returns is established as an increasing function of the noise in stock returns, relative to earnings, and a decreasing function of the correlation between earnings and returns. Sloan found evidence of optimal

behavior in the market. However he did not address which firms or the characteristics of which firms exhibited this trait most strongly.

Mehran (1995) attempted to measure the relative efficiency of companies with long term equity based compensation against other firms by regressing the amount of long term incentive compensation against firm performance. Mehran found that firms with large equity based incentive contracts had a higher association with returns than other firms. However there is no evidence to suggest the high association was caused by the large proportion of stock based incentives, rather than the other way around.

In his 1957 seminal work, Farrell defined the problem of using incorrect models to capture efficiency. He states that:

a number of attempts have been made to solve [empirical optimization problems], but, although they usually produced careful measurements of some or all of the inputs and outputs . . . , they failed to combine these measurements into any satisfactory measure of efficiency. This failure was partly due to a pure neglect of the theoretical side of the problem (p. 253).

Theoretical works propose numerous optimal solutions to the problems however empirical testing has not used efficient frontiers to test the models. Except for a few auditing, governmental or healthcare areas (Banker, 1989; Banker et al., 1989; Charnes et al., 1989; Mensah & Li, 1993; Callen, 1991; Callen & Falk, 1993; etc.), DEA has been largely ignored by main stream accounting literature.

DEA is proposed in this paper as a way to test the optimal solutions derived in theoretical research. Optimal incentives are defined as the ‘best’ solution possible. Efficient solutions are the solutions exhibited in the market which most closely resemble the optimal.

### **3. EFFICIENCY EVALUATION (DEA MODEL)**

The recent empirical work examining the efficiency of compensation packages using regression analysis is not designed to capture efficiency (Charnes et al., 1989). Regression analysis is designed to determine linear relationships, and deviations therefrom. The line of fit is not intended to portray the efficient frontier.

The Data Envelopment Analysis (DEA) model used in this study is designed to evaluate relative efficiency. DEA determines whether the observation in question is more or less efficient than other comparable observations. Therefore this model is far more appropriate for integrating the theoretically optimal solutions with an evaluation of practice (Banker, 1989; Banker et al., 1989; Callen, 1991). In its simplest form, the principal/agent compensation problem is to maximize the principal’s residual claim subject to the agent’s compensation and the agent’s minimum welfare which is determined by the market for managers. The principal in the problem is assumed to be risk neutral and the agent is assumed to

be both risk and effort averse. When the agent's action is observable, the first best solution to the optimal compensation contract is the contract that solves the following optimization problem.

Maximize:

Principal's welfare (firm performance)

Subject to:

The agent's minimum welfare (market for managers)

The first best solution to this problem is a fixed salary (Holmstrom, 1979). However, the agent is usually not the owner and the agent's action is not generally observable. Therefore constraints must be added to address accurate reporting, agent's risk aversion, effort aversion and the agent's performance incentives. The second best solution is a solution to the following problem:

Maximize:

Principal's welfare (firm performance)

Subject to:

The agent's minimum welfare (market for managers)

Agent's reporting incentive

Agent's effort aversion

Agent's performance incentive

Agent's risk aversion

Compensation packages have evolved to address these problems. These packages generally consist of a fixed salary, a bonus, and some combination of restricted stock, stock options and long term incentive plans (Sloan, 1993; Bloedorn, 1994). However, the optimal composition of the compensation packages is not known. Performance measures cover both accounting and market measures to address reporting requirements and managers' risk aversion.

Salary is generally based on past performance. The bonus portion of the compensation generally compensates the manager for annual accounting based performance measures and is assumed to motivate managers towards short term performance goals. The long term portion of the compensation plan generally consists of some combination of restricted stock, long term incentive plans and stock options. These plans are generally stock based and payable over a number of years and are assumed to motivate managers towards long term performance goals.

The large number of different types of compensation schemes exist because of the lack of any truly objective performance measure, and the information asymmetry between owners and managers. Earnings and returns are both composite measures of a firm's performance. However they are both subject to noise from accounting principles, reporting practices, market and industry driven

factors. Additionally while earnings and returns are closely associated over the long run, the association is much smaller in the short run (Easton, Harris & Ohlson, 1992).

Stock returns are driven by both firm performance and industry and market wide factors such as actions of competitors and suppliers, regulatory actions, etc. (Lambert, 1993; Janakiraman, Lambert & Larcker, 1992). Earnings filter out many of the industry and market shocks that make it difficult to accurately evaluate the manager’s action, however earnings may be inaccurate due to both manipulation and the estimated nature of many accrual accounting numbers (Lambert, 1993).

The principal’s tradeoff between using accounting based and stock based performance measures is expected to be based on the relative informativeness of these measures (Banker & Datar, 1989; Bushman & Indjejikian, 1993; Kim & Suh, 1993; Sloan, 1993) and manager’s risk aversion (Lambert, 1993; Lambert, Larker & Verecchia, 1991). In order to most accurately capture current practice we use both accounting and market based performance measures in the DEA evaluation.

The DEA model reduces the multiple outputs and inputs into a virtual output and input where the ratio of virtual outputs to virtual inputs for the most efficient units are rated as one, and the less efficient units are rated as less than one. The definitions from the preceding paragraphs lead to the following model:

$$\text{Maximize: } \alpha_1 \text{RET}_i + \alpha_2 \text{EPS}_i$$

$$\text{Minimize: } \beta_1 \text{SALARY}_i + \beta_2 \text{BONUS}_i + \beta_3 \text{LTComp}_i$$

Subject to:

$$\alpha_1 \text{RET}_j + \alpha_2 \text{EPS}_j + \beta_1 \text{SALARY}_j + \beta_2 \text{BONUS}_j + \beta_3 \text{LTComp}_j \leq 0$$

Where:

RET= Stock Return

EPS = Change in Earnings Per Share

SALARY = The fixed portion of the CEO’s compensation

BONUS = The short term bonus portion of the CEO’s compensation

LTComp = Long term incentive pay outs, stock options or restricted stock

$\alpha$  = the performance measure weight

$\beta$  = the weight given by the agent to compensation

$i$  = the firm in question

$j = 1$  to  $n$  firms in sample where  $j \neq i$

$n$  = number of firms in the population

For the DEA evaluation all variables are measured as averages from 1993 to 1995.<sup>2</sup> Salary, Bonus, and LTCComp are measured in dollars. RET is measured as the firm's annual stock return. EPS is measured as the change in earnings per share deflated by lagged stock price to remove the effects of size. All variables are scaled to fall between 1 and 99 to facilitate the DEA evaluation.

The  $\alpha$ s represent the weights that are given to each of the performance measures by the principal. The weights are determined in part by the presumed effort aversion of the manager and the presumed ability of the different components of compensation to reduce this effort aversion. The  $\beta$ s represent manager's risk aversion to each of the components of compensation.

Theoretical optimization models have attempted to determine the optimal values of  $\alpha$  and  $\beta$ . However, without a greater understanding of agent's risk and effort aversion, it is not possible to determine the optimal values. The DEA model does not require that the functional form (the  $\alpha$ s,  $\beta$ s) is specified. DEA extracts the functional form individually for each firm in the sample which makes that firm appear in the most favorable light, and allows variation between firms in both owner's and manager's preferences.

The final constraints are formed by all other firms' performance and compensation levels which proxies for the market for managers. These constraints force the model to evaluate firms in the context of feasible performance levels given the performance levels achieved by other firms. Indicator variables representing industry affiliation further constrains the model to evaluate firms within industry groupings (Banker & Morey, 1989).

#### 4. SAMPLE SELECTION AND DATA SOURCES

##### *Sample Selection*

The sample consists of all the domestic manufacturing firms listed on Lexis/Nexis for 1993 to 1995 in four digit SIC codes that were represented by at least 15 firms on both CRSP and Compustat data tapes. The sample is limited to manufacturing firms since it is possible that differences in regulatory and production environments can affect the compensation/performance relationship

(Ely, 1991; Ittner & Larker, 1997; Smith & Watts, 1982). We also excluded all firms that had CEO changes in 1993 to 1995 since it is also possible that compensation packages differ in the initial or final year of service (Coughlan & Schmidt, 1985). Since DEA cannot process missing observations, we also eliminated each of the firms that was missing any item of required information, leaving 64 observations with complete information for all three years and 55 firms with subsequent return data.

### *Variable Measurement and Data Sources*

EPS were measured as the change in EPS deflated by lagged stock price. Returns were measured as the change in stock price plus dividends, deflated by lagged stock price. The data were obtained from the Compustat primary, supplementary and industrial tape.

Each component of compensation was measured as the amount awarded to the CEO in 1993, 1994 and 1995. We used the award concept (as opposed to the earned or received concept) because we are testing the agency concept of incentives put into place rather than an accounting concept of earnings or cash flows (Healy & Cole, Forthcoming).

Salary was measured as the salary and other compensation<sup>3</sup> paid to the CEO. Bonus was measured as the annual bonus payments. Long Term Compensation (LTComp) was measured as the sum of the present value of long term incentives awarded, options and restricted stock granted.<sup>4</sup> Compensation data were gathered from the firms' proxy statements.

We measured CEO stock ownership (CEOOW) to determine if the efficiency results were due to ownership structure. CEOOW includes all shares owned by the CEO, the CEO's immediate family, any trust in which the CEO is named trustee, or stock options exercisable within 60 days. Ownership information was obtained from the firm's proxy statement.

The market for managers is further constrained by industry expertise. Industry is measured as the firm's primary four digit SIC code. For the DEA computations the DEA variables were scaled between 1 and 99.

DEA efficiency results are not by nature strictly ordered.<sup>5</sup> Therefore we measured efficiency as a dummy variable of one for efficient firms (EDUM = 1), and zero for inefficient firms (EDUM = 0). Slack variables were measured to further order the efficiency results. The input slack (SLIN) measures the amount of improvement necessary to reach input efficiency (Salary, Bonus, LTComp). The output slack (SLOUT) measures the amount of improvement necessary to reach output efficiency (RET, EPS).

## 5. RESULTS

### *Efficiency Evaluation (DEA Model)*

The DEA efficiency results for the ten most efficient and ten least efficient firms measured are shown in Table 1. The average total compensation for the efficient firms (1676) is lower than the average total compensation for the inefficient firms (2558). Additionally, many of the efficient firms received a very small or negligible bonus or long term compensation. The efficient firms also appear to be smaller than the inefficient firms (total assets 3067 to 3321) and have higher performance as measured by net income (256 compared to 171) and returns (0.17 compared to 0.11).

Six of the 10 efficient firms are owner managed ( $CEOOW > 0.05$ ). These firms do not need to further align their CEO's interests with the company by the use of expensive incentive compensation. Their pay is lower relative to performance than the other companies; however, they are compensated by the return they receive on their ownership of the company. Only 1 of the 10 inefficient firms has high CEO ownership. The CEO of Superior Industries is the exception of the owner managed firms. His average compensation is extremely high relative to his company's performance, and therefore the efficiency score is low. Therefore it appears that while CEO ownership affects efficiency, it does not control it.

Evaluation of each firm's discussion of CEO compensation practices in their proxy statements yields further insight into differences in pay packages for efficient vs. inefficient firms.

Inefficient firms often evaluate performance subjectively and set low performance goals. For example, Boise Cascade paid incentive compensation if a return on equity of 2.9% was met with 100% of incentive compensation being paid if a return on equity exceeded 20.2%. Superior industries CEO receives a bonus of up to 2% of net income if within 90% of a (undisclosed) target net income. This percentage is reduced to as low as 1% of net income. In this case the CEO is rewarded with performance pay as long as net income is positive.

Efficient firms, on the other hand, have higher performance goals, and less subjective evaluation. Kimberly Clark pays a bonus if return on equity exceeds a targeted sustainable 20%. Johnson & Johnson and AMOCO base performance pay relative to other firms that are similar in industry and past financial performance.

### *Inter-Industry Comparisons*

The DEA evaluations were performed within industry groupings. The following paragraphs discuss the industry groupings where industry competitors appear

**Table 1.** Panel A: Inefficient Companies. Comparison of the 10 Most Efficient and Inefficient Firms

Company	Efficiency	CEOOW	Salary <sup>a</sup>	Bonus <sup>a</sup>	LTCComp <sup>a</sup>	Total <sup>a</sup>	Assets <sup>b</sup>	Net <sup>b</sup>	Return <sup>b</sup>	RET	BktoM	SIC
Pennzoil	0.273	0.001	626	196	859	1703	4637	-143	101	0.04	2.16	2911
Bowater	0.271	0.037	555	320	790	1665	2829	63	193	0.19	2.76	2621
Smith (A.O.)	0.266	0.049	508	723	624	1912	874	54	26	0.01	1.65	3714
Boise Cascade	0.256	0.011	608	396	1065	2090	4488	71	307	0.27	4.02	2621
Superior Industries	0.247	0.372	726	1521	5522	7769	337	52	72	0.14	0.38	3714
Tandem Computers	0.217	0.008	638	149	634	1421	1767	-84	-139	-0.008	1.25	3571
Federal-Mogul	0.21	0.007	539	283	1385	2241	1501	31	124	0.31	2.04	3714
Dana Corp	0.205	0.003	840	1042	1044	2986	5145	215	353	0.2	1.89	3714
Sun Co.	0.204	0.002	621	320	1185	2138	5849	202	-146	-0.09	2.18	2911
Bethlehem Steel	0.126	0.001	558	114	930	1659	5786	-2	29	0.04	3.26	3312
Average	0.2275	0.0491	621.9	506.4	1403.8	2558.4	3321.3	45.9	92	0.1102	2.159	



**Table 1.** Panel B: Efficient Companies. Comparison of the 10 Most Efficient and Inefficient Firms

Company	Efficiency	CEOOW	Salary <sup>a</sup>	Bonus <sup>a</sup>	LTComp <sup>a</sup>	Total <sup>a</sup>	Assets <sup>b</sup>	Net <sup>b</sup>	Return <sup>b</sup>	RET	BktoMK	SIC
Amoco	1	0.001	846	0	1614	2508	29215	1824	4893	0.18	0.975	2911
Bayou Steel	1	0.628	447	0	0	447	164	3	1	0.04	3.18	3312
Carter Wallace	1	0.36	892	635	49	1649	676	-7.37	-377	-0.29	1.044	2834
Intergraph	1	0.067	300	0	4	306	840	-78.04	35.96	0.16	1.73	7373
Johnson & Johnson	1	0.002	757	611	1994	3364	15261	2065	8164	0.24	0.397	2834
Kimberly Clark	1	0.011	743	536	4798	6081	8178	360	4863	0.33	0.696	2621
Masco	1	0.124	367	190	98	672	1586	-35	-22	0.22	1.84	3714
Natural Alternatives	1	0.319	146	104	50	318	17	2	6	0.53	0.49	2834
Oregon Steel	1	0.005	430	30	3	465	674	13	-63	-0.14	2.1	3312
Sun Microsystems	1	0.023	467	1155	1653	3275	3070	236	1875	0.55	0.73	3571
Average	1	0.2139	469.8	326.1	868.6	1676.3	3067	256.3	1448.6	0.171	1.5357	

Efficiency indicates the firms' DEA efficiency score. CEOOW indicates the proportion of stock owned by the CEO. Salary indicates the CEO's average salary from 1993 to 1995, Bonus indicates the CEO's average Bonus from 1993 to 1995, LTComp indicates the CEO's average long term compensation awarded from 1993 to 1995. Total is the sum of salary, bonus and LTComp. Assets indicates the average total assets of the firm. Net indicates the average net income for the firm. Return indicates the firms' overall market return, and RET indicates the return on \$1. BktoMK indicates the ratio of the book value of the firm to the market value of the firm. SIC indicates the four digit industry classification. <sup>a</sup> Dollars are shown in thousands. <sup>b</sup> Dollars are shown in millions.

in Table 1 and where the ownership type is not owner managed. Owner managed firms are excluded from this discussion because efficiency for these firms may be attributed to the lower compensation due to the benefits derived from ownership in the company.

In SIC code 2911 (Oil and Gas), AMOCO, a manager controlled firm is evaluated as most efficient, even though its competitors (Pennzoil and Sun Co.) had lower compensation. Both Pennzoil and Sun are smaller than AMOCO and have lower net income and overall returns to shareholders. Additionally, the return on AMOCO stock of 18 cents on the dollar was far higher than the 4 cent return on Pennzoil stock and the negative return on Sun Company stock. The book to market ratio of 0.975 is less than half the book to market ratio of Pennzoil and Sun Co. indicating that the longer term corporate performance is superior.

In SIC code 2621, Kimberly Clark, the efficient firm, also had higher compensation than the inefficient competitors, Boise Cascade and Bowater. Once again the efficient firm is larger (twice the size of the inefficient firms). The net income for Kimberly Clark is 4 times that of inefficient firms, and the total return is 10 times the size. The return on \$1 invested is only slightly higher for the efficient firms than for the inefficient firms. Like the Oil and Gas companies the lower book to market ratio for the efficient firm than for the inefficient firms also indicates a sustained long term company performance.

In SIC code 3312 (Steel), both Oregon Steel and Bayou Steel were evaluated as efficient with Bethlehem Steel evaluated as inefficient. All three of the firms performed poorly during the period studied, however the two efficient firms had compensation packages that are one quarter the size of Bethlehem Steel's package. The lower book to market ratios of the efficient firms also indicate a longer term corporate value added than for Bethlehem Steel.

Finally in SIC 3571 (computers), the compensation for the inefficient firm Tandem is half that of the efficient firm Sun Microsystems. However, the performance for Sun Microsystems is extremely strong while Tandem is very weak (average income and returns are negative). The book to market value ratio for Sun Microsystems is also half that of Tandem Computers indicating sustained performance.

Overall, the individual examination of the inefficient firms yields the following results. In general the efficient firms are smaller and have lower compensation and higher performance than inefficient firms. However, this is not always the case. A firm may be ranked as efficient with relatively poor performance if the compensation is also low (Oregon and Bayou Steel vs. Bethlehem Steel), and also a firm with high compensation may be evaluated as efficient if its performance is also high relative to its comparison group (AMOCO vs. Sun Co. and Pennzoil, Kimberly Clark vs. Boise Cascade and Bowater, Tandem vs. Sun Microsystems). The main conclusion from this analysis is that efficiency evaluations are not

dependant upon low compensation or high performance, it is dependant on the compensation relative to performance.

### *Efficiency Results*

Table 2 shows simple correlations between the proportion of salary bonus and long term compensation to total compensation (PROSAL, PROBON, PROLT), the log of the CEO's ownership percentage (LCEOOW), the firm's stock return (RET), total compensation (Total), and the log of total assets (LASSET). There is a negative correlation between PROSAL, PROBON and RET, and a positive correlation between PROLT and RET. There is also a positive correlation between Total and LASSET and RET. These results are consistent with earlier research which indicates that larger firms have economies of scale and higher performance, and that long term stock based pay provides incentives to CEO's.

**Table 2.** Simple Correlations

	PROBON	PROLT	LCEOOW	RET	Total	LASSET
PROSAL	-0.236 (0.033)	-0.793 (0.000)	0.432 (0.000)	-0.258 (0.003)	-0.0607 (0.000)	-0.347 (0.004)
PROBON		-0.376 (0.001)	-0.152 (0.173)	-0.013 (0.880)	0.050 (0.526)	0.029 (0.796)
PROLT			-0.288 (0.009)	0.0246 (0.005)	0.056 (0.000)	0.332 (0.002)
LCEOOW				-0.140 (0.115)	-0.219 (0.005)	-0.310 (0.005)
RET					0.383 (0.000)	0.348 (0.000)
Total						0.406 (0.000)

The table shows Pearson correlation coefficients for the indicated variables. PROSAL indicates the proportion of salary to total compensation. PROBON indicates the proportion of bonus to total compensation. PROLT indicates the proportion of long term compensation to total compensation. LCEOOW indicates the log of the proportion of stock beneficially owned by the CEO. RET indicates the return on \$1 of stock. Total indicates the CEO's total compensation. Total sample  $n = 164$ .

Table 3 shows the correlations when the firms have been subdivided into efficient vs. inefficient DMUs by EDUM. The shaded values represent the inefficient firms and the non-shaded values represent the efficient firms. The correlations for the inefficient firms are generally the same as the overall correlations. The correlations for the efficient firms tend to be higher than the overall correlations. The correlation between PROLT and RET is much higher for the efficient firms (0.56) than for the overall (0.02), as are many of the other correlations between Total and the components of compensation. The efficient firms have a positive correlation between PROBON and PROSAL and PROBON and PROLT while the inefficient firms have a negative correlation. These correlations indicate that the efficient firms have more methodical compensation plans than the inefficient firms.

**Table 3.** Correlations by Efficient vs. Inefficient DMUs  
(Inefficient Firms Shaded)

	PROSAL	PROBON	PROLT	LCEOOW	RET	Total	LASSET
PROSAL		-0.148 (0.079)	-0.811 (0.000)	0.232 (0.006)	-0.030 (0.001)	-0.599 (0.000)	-0.38316 (0.000)
PROBON	0.534 (0.010)		-0.458 (0.000)	0.006 (0.940)	0.005 (0.961)	0.016 (0.085)	-0.072 (0.445)
PROLT	-0.884 (0.000)	0.078 (0.073)		-0.212 (0.011)	0.267 (0.004)	0.529 (0.000)	0.383 (0.000)
LCEOOW	0.539 (0.009)	-0.121 (0.593)	-0.569 (0.006)		-0.100 (0.289)	-0.154 (0.067)	-0.272 (0.003)
RET	-0.608 (0.021)	0.069 (0.813)	0.559 (0.037)	-0.422 (0.133)		0.467 (0.000)	0.0273 (0.003)
Total	-0.746 (0.000)	0.232 (0.299)	0.752 (0.000)	-0.444 (0.038)	0.753 (0.002)		0.412 (0.000)
LASSET	-0.839 (0.000)	-0.001 (0.999)	0.819 (0.000)	-0.757 (0.001)	0.599 (0.023)	0.521 (0.056)	

The table shows Pearson correlation coefficients for the indicated variables. PROSAL indicates the proportion of salary to total compensation. PROBON indicates the proportion of bonus to total compensation. PROLT indicates the proportion of long term compensation to total compensation. LCEOOW indicates the log of the proportion of stock beneficially owned by the CEO. RET indicates the return on \$1 of stock. Total indicates the CEO's total compensation. Efficient firms  $n = 22$ , inefficient firms  $n = 142$ .

Table 4 shows the means of compensation and firm characteristics for firms which have been evaluated as efficient versus firms which were evaluated as not efficient. The average levels of salary, bonus, long term and total compensation were always lower for the firms which were evaluated as efficient; however, the differences are not significant.

The proportion of compensation represented by salary is significantly higher ( $p = 0.00$ ) for efficient firms (61%) than for inefficient firms (39%). The propor-

**Table 4.** Means of Compensation and Firm Characteristics by Efficient/Not Efficient Firms

Variable	Efficient Mean (N=22)	Inefficient Mean (N=142)	ANOVA F-Value ( <i>p</i> -value)
Salary <sup>a</sup>	574 (367)	701 (307)	3.05 (0.08)
Bonus <sup>a</sup>	351 (568)	561 (685)	1.87 (0.17)
LTCComp <sup>a</sup>	850 (1750)	1522 (2459)	1.52 (0.22)
Total <sup>a</sup>	1776 (2227)	2784 (2948)	2.36 (0.13)
PROSAL <sup>b</sup>	0.61 (0.32)	0.39 (0.22)	16.22 (0.00)
PROBON <sup>b</sup>	0.15 (0.15)	0.20 (0.15)	1.67 (0.19)
PROLT <sup>b</sup>	0.23 (0.28)	0.41 (0.25)	9.37 (0.00)
LCEOOW	0.16 (0.18)	0.05 (0.10)	17.84 (0.00)
RET	63.72 (125.73)	13.12 (37.49)	11.04 (0.00)
LASSET	7.74 (1.75)	7.46 (1.36)	0.50 (0.48)

The table shows Pearson correlation coefficients for the indicated variables. Salary indicates the CEO's salary, Bonus indicates the Bonus, LTCComp indicates the CEO's long term compensation awarded from 1993 to 1995. Total is the sum of salary, bonus and LTCComp. PROSAL indicates the proportion of salary to total compensation. PROBON indicates the proportion of bonus to total compensation. PROLT indicates the proportion of long term compensation to total compensation. LCEOOW indicates the log of the proportion of stock beneficially owned by the CEO. RET indicates the return on \$1 of stock. Assets indicates the average total assets of the firm.

<sup>a</sup> Dollars in thousands. <sup>b</sup> Proportions may not add up to 1 due to rounding.

tion of compensation represented by bonus compensation is lower and the proportion represented by long term compensation is significantly lower ( $p = 0.00$ ) for efficient firms (23%) than for inefficient firms (41%). The CEO ownership and stock returns are significantly higher for efficient firms.

These results indicate that, on average, the most efficient way to motivate CEOs is to pay 61% of compensation in a fixed salary, 15% of compensation in a short term bonus plan, and 23% of compensation in a long term incentive plan. Trading off more than 40% of fixed compensation for incentive compensation costs the principal more in risk premium than the performance benefits received.

### *Verification*

Efficiency results were verified by regressing efficiency scores against the firm's subsequent (1996) stock return. Since the DEA efficiency results are not by nature strictly ordered,<sup>6</sup> we included the slack variables for each firm to improve the ordering. The OLS regression results are presented in Table 5.

Model 1, shows the regression where only the efficiency score is included in the regression (EFFIC). Efficiency scores alone account for 7% of the the variation in the following years returns.

Model 2 reports the results where the input slack (SLIN) and output slack (SLOUT) are included. The slack variables help to order the efficiency results. The SLIN variable has a significantly positive relationship with returns in addition to the efficiency variable. This indicates that the firms which were rated as inefficient because of excess compensation had a tendency to increase performance the following year; however, the efficiency score is still significant on its own.

Model 3 reports the results with the control variables. LCEOOW controls for CEO ownership effects, Earnings Per Share (EPS) controls for a firms accounting performance, and the number of firms in the industry (NDNUM) controls for the competition within the industry. CEOOW has a significantly negative relationship with the following years returns indicating that owner managed firms have lower performance in the year following the evaluation. NDNUM has a significantly positive relationship indicating that firms with intense competition are performing well. EPS has a slightly significant positive relationship indicating that the change in EPS has a slightly positive effect on returns, as expected.

Model 4 reports the results when all of the independent variables are included. All of the variables keep their original relationships; however, EPS is no longer significant. This result indicates that either the efficiency score or the slack variables contain the information provided by EPS.

**Table 5.** Regression Results of DEA Efficiency on Stock Returns

Model	(1)	(2)	(3)	(4)
Intercept	-3.61 (0.77)	-11.31 (-1.04)	-20.82 (-0.95)	-57.48*** (2.99)
LEFFIC	52.14** (2.46)	36.20** (1.97)		40.35** (2.09)
LCEOOW			-115.53* (-1.86)	-101.32* (-1.96)
NDNUM			2.38** (2.06)	2.76*** (2.74)
EPS			3.15* (1.82)	1.95 (1.34)
SLIN		1.01*** (3.66)		1.24*** (4.59)
SLOUT		0.25 (0.353)		-1.03 (-1.35)
F	6.06	11.25	3.75	8.76
<i>p</i> -value	0.02	0.00	0.02	0.01
Adj. R sq.	0.07	0.33	0.13	0.46

The table shows regression coefficients with *t* statistics in parenthesis. LEFFIC = natural log of the DEA efficiency score. LCEOOW indicates the log of the proportion of stock beneficially owned by the CEO. NDNUM indicates the number of firms in the four digit industry classification. EPS indicates the earnings per share. SLIN indicates the input slack. SLOUT indicates output slack. RET the dependant variable, is the return on \$1 of stock for 1996, the year following the DEA evaluation period. Total sample  $n = 55$ . Parenthesis indicate *t* statistics.

Overall the verification results confirm that the DEA efficiency evaluations capture compensation efficiency. The efficient firms performed better than their inefficient competitors in the year following the evaluation. There is also some evidence that the firms that were evaluated as inefficient due to excessive compensation may have provided incentives for better performance in the year following the evaluation. However, this result does not invalidate the efficiency results.

## 6. CONCLUSIONS

Recent research and public opinion supports the assertion that reliance on long term incentive packages and bonus plans will reduce CEO incentive problems. However, in this work we use a model designed to evaluate efficiency and our results show that lower total compensation and higher fixed salary as a proportion of compensation are indicative of corporations that are presently operating with CEO pay efficiency.

From the individual analysis of the most efficient and least efficient firms we found that efficiency evaluations are not solely dependant upon low compensation or high performance, efficiency evaluations are dependant on the compensation relative to performance. Additionally from individual examination of compensation plans and from correlation analysis we found that the efficient firms have more methodical compensation plans than the inefficient firms.

From the descriptive results we found that, on average, the most efficient way to motivate CEOs is to pay 61% of compensation in a fixed salary, 15% of compensation in a short term bonus plan, and 23% of compensation in a long term incentive plan. This result indicates that trading off much more than 40% of fixed compensation for incentive compensation may cost the principal more in risk premium than the performance benefits received.

The above results were verified against subsequent firm performance. Overall the verification results confirm that the DEA efficiency evaluations capture compensation efficiency. The efficient firms performed better than their inefficient competitors in the year following the evaluation. There is also some evidence that the firms that were evaluated as inefficient due to excessive compensation may have provided incentives for better performance in the year following the evaluation. However, this result does not invalidate the efficiency results.

This research pinpoints one of the major problems in current compensation research. There seems to be a fixation upon components of compensation and returns. The high tradeoff that is often necessary to make a risk averse CEO accept a long term incentive package in lieu of fixed compensation may in fact cause the corporation to spend more on this compensation package than the value of the increased incentive.

A major limitation of this study is that this model, like any model, is only as good as the variables used in the model. In particular since the DEA model forms an efficiency plane it is very sensitive to outliers. Temporary setbacks which may be reflected in the companies' performance but do not necessarily reflect the CEO's performance, such as corporate restructuring, may affect the model. We attempted to control for this by using market returns and averaging over a three year period, however some of these factors may still be influencing the results.



Another limitation is that this study evaluates only pay efficiency. The question asked is which firm's CEOs are being paid appropriately for their performance level. While efficiency scores are positively correlated with performance (by research design) and also positively correlated with the following year's performance, performance is not the only factor. Some companies (such as Masco in Table 1) are evaluated as efficient not because they perform better but because their compensation is so much lower than their competitors. This research does not address the question about whether it is possible to motivate these CEO's to higher performance given a different compensation package, which is unlikely because these firms are primarily owner managed, or if a change in CEO might increase performance and overall returns. We leave this question for future research.

## NOTES

1. A manager might be willing to trade off perhaps \$1 in salary for \$1.50 for in short term bonus or perhaps \$2.00 for the riskier long term stock based compensation. The same manager would require perhaps \$1.75 in bonus pay and possibly \$2.50 in long term compensation for the next dollar in salary, due to the increased risk. The exact tradeoff is not known; however, it is known that the tradeoff increases with risk aversion, firm risk and the amount of salary being traded off.

2. The DEA analysis is performed over three year averages because DEA is extremely sensitive to outliers and compensation plans are often constructed over three year cycles.

3. Other compensation generally includes items such as the value of a company vehicle, payments to employee pension plans, medical or life insurance.

4. Long term incentives and restricted stock were measured at their present values. Options granted were valued at present value using the Black-Scholes option pricing formula.

5. Each firm's efficiency score is developed by comparison to similar firms. Firms with different comparison groups will not have comparable efficiency scores.

6. Each firm's efficiency score is developed by comparison to similar firms. Firms with different comparison groups will not have comparable efficiency scores. The slack of the inputs (SLIN), as well as the slack on outputs (SLOUT) (slack is the dollar amount of improvement necessary to achieve the efficient plane) is included in the model to improve comparability.

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