

Accounting Control and Financial Strategy

Teachers' Manual

Andrew M. McCosh
Manchester Business School

and

Michael J. Earl
Oxford Centre for Management Studies



Accounting Control and Financial Strategy

ACCOUNTING CONTROL AND FINANCIAL STRATEGY

By the same authors

ACCOUNTING CONTROL AND FINANCIAL STRATEGY: A CASEBOOK

Also by Andrew M. McCosh

PRACTICAL CONTROLLERSHIP (*with D.R. Anderson and L.A. Schmidt*)

MANAGEMENT DECISION SUPPORT SYSTEMS (*with Michael S. Scott Morton*)

Accounting Control and Financial Strategy

Teachers' Manual

Andrew M. McCosh
Manchester Business School

and

Michael J. Earl
Oxford Centre for Management Studies



© Andrew M. McCosh and Michael J. Earl 1979

All rights reserved. No part of this publication may be reproduced or transmitted, in any form or by any means, without permission

First published 1979 by
THE MACMILLAN PRESS LTD
London and Basingstoke
Associated companies in Delhi
Dublin Hong Kong Johannesburg Lagos
Melbourne New York Singapore Tokyo

Typeset by
CAMBRIAN TYPESETTERS

British Library Cataloguing in Publication Data

Accounting control and financial strategy:

Teachers' manual

1. Corporation – Finance – Case studies

I. McCosh, Andrew M. II. Earl, Michael J.

658.1'5'0722

HG4026

ISBN 978-1-349-04020-9

ISBN 978-1-349-04018-6 (eBook)

DOI 10.1007/978-1-349-04018-6

*This book is sold subject
to the standard conditions
of the Net Book Agreement*

Contents

	<i>Page</i>
<i>Preface</i>	vii
<i>Broad Topic Index</i>	viii
Associated Biscuit Manufacturers Ltd	1
B.C.M. (Industrial Holdings) Ltd	6
Bultman Automobiles Inc	10
Burmah Oil Company	13
Cresta Plating Company Ltd	17
The Dalgety Group	27
Elliot Products Ltd	31
Engineering Products Ltd	35
Fudge Creations Ltd	44
Hanson Manufacturing Company	49
James & Breasley Ltd	53
Manaus Woodpulp Corporation	65
Merrydale Ltd	70
Newcastle Investment Co. Ltd	75
Prendergarth Shipping Company	85
T.A.C. Construction Materials Ltd	89

Preface

This teachers' manual accompanies the casebook of the same title. The selection of cases in financial control and strategy is designed for advanced students, for use as part of an M.B.A. curriculum, in executive courses and in third-year accounting courses. Each of the thoroughly realistic cases is designed to meet a particular need, and is studied as a whole, so that issues of organisational behaviour, or business policy, may be as relevant as financial techniques. In every case numerical analysis is helpful in approaching a solution to the problem involved, and few of them can be answered intuitively without thorough investigation.

Topics covered include relevant costing, cost control systems, capital investment appraisal, financial analysis and management control systems. The cases have been extensively classroom tested, and the teaching notes and solutions offered in this manual have evolved out of that experience.

Each teaching note contains guidance on the case objective, proven teaching strategy and a solution to the problem at hand. Recommended questions are provided, if the case itself does not contain any, and further questions which aid discussion are suggested. Finally, any recommended further reading is appended where this has proved valuable.

These teaching notes have been written by ourselves (unless otherwise indicated) and not by any of the other authors or supervisors who wrote some of the cases. The responsibility for these notes therefore is our own and we would welcome any comments or guidance which subsequent users find helpful.

1978

ANDREW M. McCOSH
MICHAEL J. EARL

Broad Topic Index

<i>TOPIC</i>	<i>CHAPTER</i>
Basic and Cost Accounting	18
Behavioural Issues	3, 7, 12
Product Profitability	3, 10, 14
Transfer Pricing	3, 5
Relevant Cost Analysis	10, 14, 17
Control Systems	1, 2, 4, 6
Capital Investment Appraisal	1, 7, 9, 13, 15, 16
Corporate Pathology	4, 8
International Issues	6, 13
Strategy	4

Associated Biscuit Manufacturers Ltd

CASE OBJECTIVES

This case describes one company's (ABM) approach to financial planning. By describing the process of strategy formulation, financial strategy-making, financial planning and ultimately financial control, the case illustrates the tasks involved, their complexity and their interrelationships. There is scope for critical assessment and discussion within a real and practical context.

Students can be asked to consider the following four questions in preparing the case:

1. Evaluate the strategic condition of ABM in mid-1971.
2. Evaluate the procedure used to determine the divisional targets on both profit and return on capital employed.
3. Evaluate the capital budgeting procedures, in particular the cut-off rates of return required, the determination of cost of capital and the organisational process for project appraisal. Suggest why projects continue to be approved, even if below the target rate, and recommend how this may be overcome.
4. Suggest any other improvements that should be made to the financial planning and control system at ABM.

CASE ANALYSIS

Strategic Condition

Examining the key indicators in mid-1971, the following picture emerges:

• Return on capital employed	= 8.4%
• Profit Margin	= 4.1%
• Market Share	= 18%
• Recent average sales growth	= 5.27%
• Recent average PBT growth	= 0.42% (erratic)
• Recent average PAT growth	= 4.89% (erratic)
• Gearing (Long-Term)	= 0.28
• Gearing (Debentures + Preference Capital)	= 0.43
• Gearing (Total)	= 0.50
• Times Interest Earned	= 4.37
• Dividend Cover	= 1.31
• Acid Test	= 1.34

ABM's turnover growth has been slow but stable in tune with the industry, but profit growth has been insignificant and erratic, partly due to the increased debt burden. Gearing as an absolute figure is not excessive, but (a) is apparently constrained by debenture deeds and the articles of association and (b) perhaps should not rise in view of ABM's poor and erratic profit record and thus exposure to the interest burden.

Liquidity is not an immediate problem, but Barber, probably wisely, prefers only to raise the overdraft limit in emergency (Fig. 1). However, the engineering division is proving a drain on resources, having already diverted funds planned for modernisation in ABL. To replace these funds with new equity seems to be ruled out by (a) a poor P/E ratio and (b) the need to convert loan stock in two years time.

In mid-1971 the picture of ABM is of a stolid, middle-of-the-road performer with constraints on capital structure. Looking ahead, the prospects seem grim.

ABM are in a low-growth industry and feel that attempts to boost market share would be expensive.

	£000s
Funds from Operations	2, 961
Other Income	205
Funds from Asset Disposals	251
Funds from New Financing	0
Decrease in Working Capital	<u>351</u>
	<u>3, 768</u>
Dividends	642
Funds Used for New Assets	2, 908
Retirement of Capital	<u>218</u>
	<u>3, 768</u>

FIG 1 ABM funds flow analysis 1970

Unfortunately cost and market pressures are building up. Besides wage and overhead increases, raw material costs are rising, accelerated by EEC entry, equal pay pressures exist and retailing chains are squeezing margins. To diversify requires either new finance or growth by acquisition, both of which appear to be ruled out by the current P/e rating. For P/e improvement, either industry growth (unlikely), market share growth (probably requiring investment first) or internal improvements in performance are required. The last mentioned route seems the most feasible in the short term, and so the planning initiatives seem timely.

Three potential areas for action stand out. Firstly if the engineering division continues to be a drain on resources, the possibility of sale or closure could be examined, thereby releasing funds (or stopping the drain) for modernisation elsewhere, for expansion or diversification. Secondly the dividend payment ratio (16%) is high, probably due to family pressures. Perhaps retained earnings could be increased to boost growth; this need not necessarily impair the P/e ratio, for growth as well as income are important to the market.

Thirdly only £1.6m of the £4m overdraft facility is being used – and the limit might be increased, albeit for contingencies. The gearing constraints only apply to long-term debt, and so the only considerations in increasing the overdraft are (a) effect on the balance sheet and (b) ability to meet increased interest payments. Thus if profitable investment opportunities exist which show a return in excess of the cost of borrowing (a short-term view of the cost of capital because concern is over short-term ability to pay) perhaps capital up to £1.5m could be used. This still leaves £1m, plus any renegotiated tranche, available for working capital and emergencies. This short-term debt could be replaced by debentures after 1973.

Finally ABM have been concerned about being taken over. Their recent performances and immediate outlook would seem to provide insurance against such attack! Another firm in the industry might be interested if they felt they could improve ABM's performance or believed there was strong synergy. More than likely any such bidder would be better seeking its own diversification out of the industry, and might be deterred by Monopolies Commission or similar threats.

Divisional Goal-Setting

The above strategic analysis supports the rationale for adopting growth in EPS as a corporate goal. However the selection of 8% as a growth target is not so rational. The initial notion of 10% was arbitrary as discovered when comparative firms were examined, and of course when compared with past results. 8% was supported by a 'City' adviser, but on what grounds? Normative planning is often required in major initiatives, but surely the feasibility of such a target could have been analysed in more depth? Any bottom-up goal-setting would have provided such a test. If top-down approaches are preferred, at least the implications and alternative strategies for attainment should be explored by projections, models, Delphi techniques or whatever – especially given the market and cost pressures and the financial constraints. In particular alternative dividend policies and financing decisions could have been examined.

Whatever EPS growth rate was selected, operationalisation into profit targets was essential. Given the top-down approach, the 'long-range plan' of Exhibit 5 is a valid framework. However, detailed criticisms exist. For example why should ABL be charged with the debt, and subsequent conversion, which has been diverted to the engineering division? More significantly of course the feasibility of

these 'plans' has not been tested. Even in 1971, doubts would be raised since 1969 and 1970 EPS had already been below target, reflecting the irrelevance of 1968 as the base-year and the wishful thinking of such top-down approaches.

Scarcity of capital led to the idea of ROCE targets, a sensible idea for in the short-term profits would have to be earned from near-1970 levels of capital employed. However ROCE controls are notoriously dysfunctional (see below) and perhaps profits targets would have sufficed, and been simpler, with a policy of capital rationing made explicit. After all, by establishing that a 9% (industry average) return on existing capital employed in 1975 would achieve the required EPS target, the planners had tested the plan's feasibility to some degree.

Further feasibility testing could have been provided by some bottom-up financial planning. If divisional managers had been involved, the following benefits might have arisen:

- understanding by the managers who had to achieve this growth of why such targets were required
- consideration of how to achieve this growth, perhaps constructing component plans and targets to help
- development of strategic thinking in the firm
- improved motivation through participation

Doubtless an iterative process between top-down directives and bottom-up planning would have ensued, but possibly producing a more robust and action-oriented plan.

Such involvement might also have avoided the perils of ROCE target-setting. Reference to a chemical company is clearly irrelevant, for the businesses, managements, environments and historical performances are different. Furthermore, definitions of ROCE are rarely uniform. The overseas business was given a higher target, but were all UK divisions and factories alike? Circumstances must have differed (indeed the corporate strategy probably was based on diversifying risk) so that not only was 9% arbitrary but also unfair. Indeed profit opportunities would be missed in promising areas – including overseas. Nor was any attempt made to define what elements of profit and investment were controllable in each unit; behaviourally these targets would be dysfunctional.

The definition of ROCE was considered in detail. We know today such specification is fraught, with suboptimisation likely whatever definitions of asset value, working capital base or valuation method are adopted. Short-term ROCE maximisation at the expense of the long-term, or of other unit's performance, or of corporate profits is all too probable. It is especially difficult to reconcile ROCE control with discounted cash flow techniques of capital budgeting – although perhaps with ABM's capital scarcity, such problems are incidental.

Mr Barber was concerned about the planning gap. The top-down approach made a gap inevitable. Yet even bottom-up approaches, especially adopting targets agreed by bilateral negotiation typical of financial control systems, produce conflicts between planning and control. ABM already practised four-year profit planning and short-term budgeting. It would seem essential that this be integrated into the new financial plan so that:

- divisions are forced to reexamine and redesign their long-range plans, focusing especially on product-market strategies and their strengths and weaknesses
- subobjectives are set, such as market share, productivity and product development
- the group objectives do not become exercises in arithmetic
- the group objectives are reviewed and performance is monitored in a meaningful manner

Comparison of aggregate divisional four-year plans and the corporate EPS targets may then still highlight a gap. Probably the corporate goal of 8% growth in EPS should remain, and joint efforts (including re-examination of financial structure and policy) be directed to closing the gap. Meanwhile the control system goals should be attainable; any remaining gaps become planned variances to be continuously worked on at the corporate level. Meanwhile the divisions pursue, and are measured against, agreed profit goals together with the sub goals their revised four year plans have specified.

Capital Budgeting

ABM's capital budgeting system is conventional. Proposals are generated by management at any level,

and submitted to a planning committee for appraisal, DCF methods being employed. Originally the discount rate had been set at 8%, similar to that in use elsewhere – a common approach. With scarcity of funds, the rate was ‘tightened’ to 10%, on expert advice. However, risk categories had been specified using different discount rates for different risk classes. Again this is not unusual, although the 5% increments are somewhat arbitrary. Also risk is perhaps better handled by more explicit methods such as:

- sensitivity analysis
- certainty equivalents
- deterministic models
- probabilistic models
- probability distribution measures

Furthermore, independent risk is not the only concern. Interdependent risk between projects may exist so that – following portfolio theory – coefficients of variation between projects may be measured.

Why do low-return projects continue to be approved? Clearly if finance is scarce, managers will attempt to justify projects on grounds of urgency or being essential. Also it is not uncommon for managers to ‘play the system’, proposing difficult projects in stages so that later phases have to be approved. Rigorous analysis and examination of all proposals is essential, so that such ruses are minimised. Furthermore replacement and maintenance expenditures could be perhaps forecast and appraised in advance, so that deeper analysis and consideration of alternatives are possible before urgency sets in. Finally capital investment expenditure should be monitored ex-post, to (a) ensure plans are met or (b) improve investment appraisal and planning procedures.

Is the expert advice, to use 10% as a discount rate, valid? Certainly to maximise shareholder value, the discount rate should be set at ABM’s real cost of capital. This is generally calculated as the weighted average cost of capital, which the expert has computed. However the expert’s initial computation only remains valid if:

- business risk is unaltered; perhaps ABM’s risk will not grow in the medium term
- a constant dividend payout ratio is maintained: this could be reduced, if the family agree, for longer term benefits
- if the existing capital structure is maintained; immediate constraints suggest it will, at least until the convertible loan stock is converted
- if financial risk remains stable; with cost and market pressures perhaps eroding earnings reliability and possible increases in short-term debt, financial risk would increase

Given the peculiarity of ABM’s dividend policy and its possible modification, the expert’s historical market perspective on equity costs seems sensible. He has grossed up this 9% expectation at an assumed average personal tax rate of 25%, but overlooked the corporation tax rate. Thus the cost of equity might be:

<u>Expected yield after tax</u>	<u>Grossed up for 25% tax rate</u>	<u>Grossed up for corporation tax of 50%</u>
9%	12%	24%

Since we do not have market data on the preference shares, we can only assume similar expectations of yield. The expert also adds a risk premium to the expected rate of return. This also seems valid. Thus if we expect 15% yield after tax, the equity cost to ABM becomes 30% after corporation tax. The adjusted weighted average cost of capital then becomes 20% (Fig. 2) and should be the discount rate applied to before-tax cash flows on investment proposals.

If ABM were not rationed on capital, any project with a pre-tax internal rate of return of 20% should be approved. However the reality is different. Thus ABM perhaps should also examine each viable project in terms of its impact on external profit reporting and EPS – albeit a short-term view. However this should only be examined at corporate level; otherwise units and divisions may reject projects with positive NPV’s because their own performance measurement, as reflected in divisional profit reporting or ROCE controls, might be impaired in the short run – a common example of

	Amount	%Funds	Pre-tax lost	Weighted lost
Ordinary Shares + Reserves	5, 724	34.8	30.0	10.44
4½% Preference	3, 655	22.2	30.0	6.66
7% Preference	275	1.6	30.0	0.49
6% Debentures	3, 680	22.4	6.0	1.34
7¾% Debentures	1, 500	9.1	7.75	0.71
7¼ C.L. Stock	1,635	9.9	7.75	<u>0.77</u>
				<u>20.41</u>

FiG 2 Weighted average cost of capital

suboptimisation. DCF appraisal and ROCE measurement can be reconciled through compound interest depreciation procedures, but the complexities involved tend to be a deterrent. Thus perhaps ABM's financial control system could have been based on profit planning and profit measurement, with an explicit policy of capital rationing effected by the capital budgeting administrative procedures, especially tight vetting at the corporate level – at least until the financial situation improved.

Improvements

Possible improvements to ABM's financial planning and control system have been suggested in the previous three sections. Integration of a corporate financial planning and control system is a considerable challenge, in ABM's case accentuated by their current strategic condition. Any turn-round of performance within these constraints has probably to be led in a top-down normative manner with the inevitable stresses on control systems and behavioural consequences. Thus ABM's overall approach is difficult to criticise; it is the detail which needs attention to ensure that stress and suboptimisation is minimised, and above all to create a climate where more freedom can be introduced when (or if) performance has improved and the constraints are less severe.

Particular worthwhile improvements include:

- more realistic top-down goal-setting
- financial analysis (e.g. modelling) to test feasibility – and alternatives – of goals
- fairer allocation of assets and liabilities to divisions, e.g. the HBS debt
- bottom-up planning processes within the framework of normative goal-setting, to aid motivation, improve the action plans and stimulate strategic thinking
- either individual ROCE targets for each division, or divisional profit planning and control, within the top-down guidelines
- integration of profit planning with the bottom-up long-range planning to fill the 'planning gap'
- risk analysis of capital investment proposals
- rigorous corporate vetting, including profit reporting impact, of capital investment proposals
- post-audit of capital investment decisions
- recomputation of the cost of capital as suggested above (20% before tax)

It is interesting, with hindsight, to examine ABM's performance at the end of 1975. Between 1971 and 1975 convertible loan stock had been converted, and equity also had been issued for an acquisition and in a later rights issue. 1975 turnover was £135.7m, profit before tax was £10.2m earnings per share was 10.5p, highest P/e was 7.1, and net funds flow was £7.3m plus £6.4m raised by equity and debt.

FURTHER READING

1. Brigham E.F., *Financial Management: Theory and Practice* (Holt, Rinehart and Winston, 1977)
2. Tomkins C., *Financial Planning in Divisionalised Companies* (Accountancy Age Books, 1973)

BCM (Industrial Holdings) Ltd

The BCM case can be used to deal with a large number of issues on performance measurement, each of them rather lightly. As such it is of more use as an introduction to the topic. It has also proved effective as a basic examination, because students are usually able to find something in the case about which they can display their knowledge, or otherwise.

The issues for which the case can be used are as follows:

1. Is a ratio a good measure of performance?
2. Is the ratio system used in the company a good one? In particular is the use of three different ratios, one for each for divisions, domestic units, and foreign units, sensible?
3. A detailed analysis may be undertaken of the ratio contents. Should the assets be in gross or net? Should the profit be shown pretax or after? Should there be a cost of finance charge?
4. Some time may be spent on the controllability, by the operating units, of the various factors making up the ratios. Some will argue for 'controllable only' ratios, with rigid adherence, while others will advocate general return on investment methods from a shareholders viewpoint, with a more relaxed enforcement of attainment.
5. A discussion on how to use the performance measures can be useful. With what should the ratios or other measures be compared? Contracts among the economic environments in the various countries and among the competition levels can be pursued briefly.

The main point of the case is, however, the use or misuse of the ratios and their relationships to the objectives of the firm. The following discussion, written by Mr A.W. Stark, is indicative of the issues.

There are three methods of financial performance assessment in operation at the company, one an assessment of divisional performance by headquarters and the others assessments of operations within a division by the division itself. Roughly speaking, these are:

1. A division's performance is appraised by means of a ratio of the division's after-tax profits for a year divided by NBV of its assets at the beginning of the year. Financing costs, headquarter's expenses are not charged against profits and cash and short-term investments of cash are not included in the asset base.
2. A subsidiary of the cement division can have its performance appraised in two ways – firstly, if it is home-based then the ratio with which it is assessed is net profit (after provision for tax and charging divisional overheads) divided by the NBV of investments in fixed assets plus inventories and receiveables – secondly, a foreign subsidiary is assessed by a ratio, the denominator of which is NBV assets less cash and short-term investments of cash and the numerator of which is the net profit to BCM Limited, i.e. net profit after local taxation plus management and technical fees due to BCM Limited, interest on loans due to BCM Limited and interest on local borrowing minus tax effects on these three quantities.

The method of capital budgeting used by the company is the net present value method. From this it can be safely deduced that the goal of the company is to maximise the net present value of all the projects with which it is involved and hence maximise the NPV of the wealth of the shareholders. Also, BCM (Holdings) use as a financial objective a worldwide rate of return on capital employed of 10% and 10% was used as the discount rate for the capital budgeting process.

One of the most important factors to take into account when looking at a system of performance appraisal in a firm is to ensure that the methods used are congruent with the goals of the company (and if there is more than one method in use that they should be congruent with each other) and also that they should be, and seen to be, fair to all who are concerned with them. But looking at the congruence

of the methods in use at BCM with the goals of the company, it would seem that if the goal of the company is, as stated earlier, the maximisation of the NPV of shareholders' wealth then, as has been shown in many articles (e.g. 'Measurement of divisional performance' by J.F. Flower). The use of ratios such as are in use at BCM is inconsistent with this objective.

Possibly then the objective of the company is a different one – that of achieving a 10% worldwide rate of return. This will give a greater degree of fit between the methods used and the objectives. This is not to say that the objective of the company should be the achievement of a 10% worldwide rate of return, as it has been shown many times before that this does not make economic sense (or perhaps that it should not) and that the only true financial objective for a company should be the one stated above – that of maximisation of the NPV of shareholders' wealth.

Looking at the ratios used, for divisional performance and for evaluating the subsidiaries, the first thing that one notices is that in both cases financing costs are not included. There are two aspects to this:

1. Exclusion of financing costs is an incentive to invest.
2. Conversely, inclusion of these costs is a mechanism to guard against over-risky proposals and thus acts as a constraint on divisional managers.

Perhaps the company is in a position where it has an excess of surplus cash and wishes to encourage the managers to come forward with project proposals to use up this excess. The company already has central control over the implementation of all capital expenditure which is probably regarded as safeguard enough against any 'pie in the sky' proposals being put into operation. A question which has to be asked in this context, however, is whether the system is fair to all concerned. In both the cases of divisional performance and subsidiary performance, it is reasonable to look at the difference between those who do get proposals put in and accepted and those who do not. At this point it should be pointed out that because headquarters controls the financial affairs of the company at a divisional level, it is impossible to distinguish between loans, share issues and retained earnings for a source of capital for projects. Thus at a divisional level the cost of financing is the same for all divisions, whatever the way in which it has been raised. This must be because of the question of fairness.

If one does include cost of finance greater than same in divisional profits, then this acts as a greater risk element for the divisional managers to concern themselves with and hence is a disincentive to come up with expansion or diversification proposals. If the cost of finance is put at zero (as is effectively done at present) then there is no penalty attached to added capital expenditure.

From this it can be deduced that if the company is in a position of shortage of funds then in its appraisal of divisional performance it should include a cost of finance charge as effectively it wants tight control over capital expenditure and to have only the highest quality projects coming through from the divisions. If on the other hand the company has cash, or more generally surplus of funds, available for investment then it is in a position where a zero cost of finance charge should be included at divisional level.

The second point which is important is the inconsistency between the cement division's way of appraising its domestic operations and its way for the foreign subsidiaries. The method in the latter case amounts to the same method that headquarters use to assess the divisional performance, i.e. one which does not include any central overheads or a cost of finance charge. For the domestic operation, overheads were included against profits and also the denominator includes such quantities as inventories and receivables. There is nothing intrinsically incorrect in these differences as long as due cognisance is taken of them. If BCM (Holdings) use as a financial objective a rate of return on capital employed of 10% and this then applies to the ratios as above, there follows immediately the conclusion that this is an unfair procedure. If, on the other hand, this is not the case and management look at each subsidiary on an individual basis, then this is nearer towards what is fair. It is not even enough to treat all the foreign subsidiaries the same, not just because of tax laws, but because of differing economic environments. For example, in Italy and Colombia, and to a certain extent, France, there are high levels of inflation present in the economy. It seems logical in the case of the foreign subsidiary to treat them on an individual basis with due allowance made for the differing environments within which they operate, but certainly one way of simplifying the problem would be to switch from after-tax quantities to before-tax quantities, but this should not be allowed to blunt the argument for individual treatment for the foreign subsidiaries.

To look at the domestic operation it seems illogical that they should have divisional overhead

expenses included in their ratio. There seems to be little reason for it especially as, for example, the benefit from product development is all the units in the division. Possibly marketing services are not used by the foreign subsidiaries but including a quantity such as this only serves to complicate the question of financial performance measurement. Also uniformity of assessment should be strived for.

The company has as its goal then a worldwide 10% rate of return on capital employed rather than carrying this objective down globally to all the parts of the organisation. A better idea would be to use a planning process to see how to achieve this goal with respect to the different opportunities and capabilities relating to all the different operations. Thus from this could be constructed a complete plan detailing targets and constraints for each part of the organisation.

This would involve comparisons with other companies in similar fields and similar environments to each part of the organisation to arrive at fair and meaningful targets. If the 10% were applied to all parts of the organisation then the company runs the risk of missing out on a meaningful way of management assessment in areas where with the above scheme they have a much better chance of being able to identify those with management potential successfully.

It is possible in the context of this case to look at a lot of the more detailed technical aspects of the use of ratios, such as whether the asset base should be measured in terms of GBV or NBV, and what should be included in the asset base plan depreciation (in a financial sense) but I have preferred to look at some of the broader, and I consider more relevant, aspects of the case. Many articles have been written upon the use of ratios and rather than repeat them I think it is useful to say that the article by Dearden called 'Problems in Decentralised Profit Responsibility' from *Harvard Business Review* (1960) is very good in the context of a discussion on this sort of question. He discusses in detail the questions of how to value the assets of a division and also how to depreciate them. In particular he recommends the use of (1) valuing divisional facilities at current economic value – normally (replacement cost – accum. deprec.) where depreciation is not in the accounting sense but arrived at by taking the estimated replacement value (cost) of the facility and multiplied by fractions of its life already used (life = estimated *actual* life). And (2) obsolete or idle equipment valued not at replacement cost but at its worth by the company – even though this may be a somewhat rough and ready process. (3) adjusting where there is a significant difference between the equipment in use and the equipment that would be purchased if the equipment were to be replaced.

This he thinks will produce a greater degree of fit between divisional aims and company aims.

BCM (INDUSTRIAL HOLDINGS) LTD

Return on domestic cement operations

$$= \frac{\text{Operating profit} - \text{division overhead} - \text{tax}}{\text{Plant} + \text{property} + \text{equipment} + \text{stock} + \text{debtors}}$$

Return ratio, overseas cement units

$$= \frac{(\text{Local profit} + \text{interest}) (1 - t) + (\text{payments to group}) (1 - t)}{\text{Plant} + \text{property} + \text{equipment} + \text{stock} + \text{debtors}}$$

$$= \frac{(570000 + 15000) (1 - 0.5) + (165000 + 12500) (1 - 0.39)}{3,320,000}$$

$$= 12\frac{1}{2}\%$$

BCM (INDUSTRIAL HOLDINGS) LTD

Rate of return on divisional assets

$$= \frac{(\text{Division net profit} + \text{finance charge} + \text{HQ charge}) (1 - t)}{\text{Assets employed} - (\text{Cash} + \text{near cash})}$$

BCM (INDUSTRIAL HOLDINGS) LTD

	HQ	Division	Operation
Property Plant & Equipment	Dispose	Endorse	Propose
Stock & Debtors			Dispose
Division Overhead		Dispose	
Operating Profit			Dispose
Taxation			
Intragroup transfer	Dispose		
Financing costs	Dispose		Local
Group Overhead	Dispose		

BCM (INDUSTRIAL HOLDINGS) LTD

Is a ratio a reasonable means of control over a division?
Or over a unit?

- * With what should it be compared?
- * Trading pretax profit to trading assets?
- * How do you decide to include/exclude finance costs?
- * Consider a project with a high net present value but a low early return
- * Would a capital charge be any better?

Bultman Automobiles Inc

This case is designed to allow a discussion of transfer pricing, departmentalisation and profit centre management in an environment with which almost every participant in the class can be expected to have had some experience. Some of the problems arising from decentralised management procedures are encapsulated in the case in a very simple form but they are nonetheless complex in implication.

It is always useful to start the discussion by asking the question which Mr Bultman himself asked at the end of the case. How much did we really make on this whole deal? Obviously, the deal is incomplete because the used vehicle is still in the inventory of the firm. But agreement can usually be reached very early that a loss of \$ 487 has been incurred so far and that this is offset by the value of the vehicle as reconditioned. This figure is arrived at by taking the cash received for the new car \$2400 and subtracting the cost of the new car \$ 2500, the cost of the original reconditioning work \$ 180, and the cost of fixing the axle \$207.

This leads naturally to a discussion of the appropriate figure at which the books should show the asset, the used car. The figures likely to be mentioned by discussants for this will be either \$ 625, \$ 800, \$ 900 or \$ 1050. The first and last of these can be readily discounted. The \$ 625 is after all 'as is' auction price on a pre-reconditioning basis. The \$1050 price is the retail price at which the vehicle could now expect to be sold. It is inappropriate to value the vehicle for inventory purposes at a retail price and thereby to take the profit on a sale which has not yet been made. The discussion between the other prices will, however, be less clearcut. The \$900 price is the amount which Mr Ziegel could expect to have to pay for the vehicle if he bought it in the wholesale market. The \$800 price is the cash he would expect to lay out to obtain such a car from a customer in his own showroom. There is room for dispute between these two figures, but on balance the \$800 figure is more appropriate. The \$900 price would involve the incurrance of expenses in moving the vehicle to the auction and in collecting the sale price. It is therefore not a net figure and therefore perhaps inappropriate for stock valuation purposes. The \$800 figure is one which might seem more appropriate therefore. In any case, the inventory valuation point is one of the least important of the whole case, and it is advisable to get over this discussion as rapidly as possible so that one can move on to the more important items. After a brief discussion it is probably as well to decide upon a figure for holding the car in stock and for using this number throughout the subsequent calculations. In this teaching note, the price of \$800 will be used for this purpose. The profit on the entire deal so far is therefore \$313.

At this stage in the discussion it is worthwhile taking a student submission on the basis for transferring the asset from one department to another. There are two transfers to be considered. First of all there is the transfer of the used vehicle from the new car department to the used car department (perhaps via the service department). Secondly there is the problem of charging for the services done by the service department on the vehicle and there is a subsidiary question of who should pay for these services and, obviously, at what price.

The student who elects to start the discussion (or is chosen to do so) should be pushed as hard as may be necessary to obtain figures for the profit of each department on the sale, ignoring overheads. As there are at least eleven possible bases upon which transfer prices can be computed for the vehicle and at least six bases upon which the transfer prices for the repairs can be computed, there are obviously a large number of possible ways in which the student may have decided to go. After his solution has been presented, it is highly likely that other members of the class will wish to contribute alternatives. Sometimes these will be modest changes, other times fairly drastic ones. The occasional student will wish to reorganise the entire dealership, but should be restrained at this stage in the discussion. After 20% of the class has been spent on the discussion of this matter, it is worthwhile displaying transparency B and concentrating our discussion on the possible transfer prices for the vehicle. If, of course, these options have already been displayed and are therefore on a blackboard the transparency may be unnecessary. The discussion can then concentrate on deleting as many of these options as possible. Objections can be raised to each of the options shown in transparency B. They are listed below.

1. The \$1050 price is on the assumption that the reconditioning has already happened and at the time the transfer is being made this has not occurred. In addition, this figure is the retail used price for which the new car manager can never be responsible.
2. The sale price after reconditioning at wholesale is a possible candidate. After all, this is the figure at which Mr Ward will have to dispose of the vehicle if Ziegel refuses to take it on. But this will imply that Ward must take responsibility for the reconditioning work and he has shown no signs of being willing to do that.
3. The blue-book cash price is a strong candidate for the appropriate transfer figure. But it has the defect that it assumes the vehicle to be in good condition. Accordingly, a deduction may be sensible.
4. The auction price of \$625 is a figure of considerable relevance. The chances are that this is the amount which Mr Ward will actually get for the car if he chooses not to transfer it to Mr Ziegel's department. It is therefore the opportunity cost of a decision in Mr Ward's terms. It has the defect that it is an estimate made by Mr Ziegel and may or may not have any bearing on the actual prices to be realised, although it must be said that most used car managers have a very acute sense of pricing.
5. The trade-in allowance is obviously nonsensical as a basis for transfer pricing. It merely serves as a fictional discount from an equally fictional list price.
6. The blue book less the estimated reconditioning cost (\$600) is a possible figure. The wholesale price less the reconditioning estimate is analogous here. It assumes, of course, that the new car department is responsible for the reconditioning of the vehicle and that the new car department can obtain these services at cost. It is unclear why Mr Ward should bother with the reconditioning of the vehicle if all he can get is \$600 on this basis, whereas he can get \$625 by wheeling the vehicle down to the auction in its present condition. The higher price of the wholesale less reconditioning (\$900 minus \$200 = \$700) is not subject to this objection. But it does have the defect of assuming that Mr Ziegel's estimate of the repair cost should be binding on both Mr Ward and Mr Lasson. This is an unfortunate practice as it may induce carelessness in estimating on Mr Ziegel's part.
7. The use of the retail value of the reconditioning as originally foreseen instead of the cost is a reasonable amendment in the light of the requirement of the service department that it make a profit. But if this is the case, it is more appropriate for the service department manager to estimate the repairs than for the used car department manager to make that estimate.
8. The use of the actual cost of the reconditioning, whether that reconditioning was foreseen or not, as a transfer price basis, has some difficulties. It is not practicable in general to carry out a complete and thorough inspection of a potential used car. The best that can be done is to examine it superficially but competently. Cracked axles cannot always be spotted. The idea of charging the cost of the reconditioning as it actually turns out as the transfer price is also impracticable because of the delay between the arrival of the vehicle and the date on which the details are known of the actual costs incurred. This will often amount to a week or more and this delay is far too great before the transfer price has to be recorded.

After a prolonged discussion of each of these items, it is worth asking the students what basis they should like to decide on among these options. Someone will almost certainly suggest that the basis for the decision ought to be the organisational responsibilities of the various managers. The assertion is likely to be made that Mr Lasson for example should not be making a profit at all, on internal work. The suggestion is also likely that Mr Ziegel having estimated the repair work should carry the responsibility for what actually turns out.

The interaction between the organisation structure and the individual responsibilities of the managers and the system of management control, including the transfer pricing system, is a complex one and needs to be discussed carefully. However, the conclusion that one normally reaches is that the control system must be consistent with whatever organisational decision is taken. For example, if Mr Ward is responsible for profit of his department and must get rid of all cars which he does not sell to Ziegel at valuation, it is entirely reasonable that he should be credited with Mr Ziegel's valuation as the transfer price. Mr Lasson's role is a function of the organisational design also. If Mr Bultman wishes to have the service department distribute its activities evenly among internal and external work, then the existing practice of making a profit on both kinds is entirely reasonable. However, if Mr Lasson wishes the service department to concentrate on external jobs and to give only marginal attention with

spare capacity to internal renovations, then the practice of charging a transfer price close to cost is more sensible. However, there are arguments against that also, in the sense that if Mr Lassen defers work on a used car while working on repair customers, the amount of investment in used cars will necessarily be much larger.

BULTMAN AUTOMOBILES – (A)

	Objective	Ward	Ziegel	Lassen
List	3600			
Reconditioning			200	
Retail			1050	
Wholesale			900	
Blue book	800			
'As is'			625	
Allowance		1200		
Purchase	2500			
Axle				150
Retail record				450
Actual record	180?			
Actual axle	207?			
Cash	2400			

BULTMAN AUTOMOBILES – (B)

Possible Transfer Prices – Vehicle

- (1) Sale after reconditioning at retail – \$1050
- (2) Sale after reconditioning at wholesale – \$900
- (3) Blue-book cash \$800
- (4) 'As-is' auction price \$625
- (5) Trade-in allowance \$1200
- (6) Blue book less estimated cost of reconditioning $\$800 - \$200 = \$600$
- (7) Blue book less estimated retail of reconditioning $\$800 - 270 = \530
- (8) Blue book less actual reconditioning $\$800 - 180 - 207 = \413
etc. etc., etc.

BULTMAN AUTOMOBILES – (C)

Possible Transfer Prices – Repair

- (1) Original estimate \$200
- (2) Retail of originally estimated repair work \$270
- (3) Estimated cost of both original work and axle \$350
- (4) Retail of both \$450, estimated
- (5) Retail of original estimate plus cost of axle, $270 + 207 = \$477$
- (6) 135% of cost of both \$472

Burmah Oil Company

The case can be used for a variety of purposes, each of them represented by one of the four questions at the end of the case text. In some editions, only two questions are given, so the four questions are reproduced in full below, for handing out in advance of group discussion periods.

The Burmah case was very prominently reported, so most student groups and virtually all management course groups will have relevant external knowledge, notably of the recovery of the firm in 1976 and 1977. However the analysis of the 1974 crisis is not normally hindered in class discussions by such hindsight.

TEACHING OBJECTIVE

To assist participants in understanding the evolution of a financial crisis from its origins in strategic errors through to its denouement. Also to assist them in developing skills relating to liquidity appraisal and to the analysis of the enterprise as a cash flow system.

QUESTIONS FOR DISCUSSION

1. Analyse the events that led to the 1974 liquidity crisis. Were they strategic errors, or financing errors, or just plain bad luck? How, if at all, could the crisis have been avoided?
2. Could a shareholder have predicted the problems at any time prior to December 1974? If so, how?
3. What should Mr Downs do next?
4. Comment on the company's disclosure practices, taking into account the letter describing the Signal Oil purchase. Do the 1973 accounts show a 'true and fair view' of the enterprise? Exhibit 2 is the five-year summary section of the 1973 report, while Exhibit 3 is a transcript of two notes to those accounts. Exhibit 1 summarises the 1973/4 financial results.

Question One – Discussion

Some 40 per cent of the available class time can be spent usefully on this question. A general consensus will normally be rapidly reached that a number of errors were made by the old board, but a small group of participants will usually hold the view that sheer bad luck, particularly with respect to tankers, was the most important problem. A lengthy list of errors can be written up on the board as participants identify them. These are likely to include the following:

1. The decision to diversify by purchasing the market leader in those industries in which the firm already had a holding, even if that holding was small and had been obtained by an accident of inheritance.
2. The decision to expand by acquisition before the previous acquisitions had been digested and made to produce a decent return.
3. The 'decision' to sell the BP shares to the government in January 1975. Little time should be spent on this one, as it is unrelated to the main issues.
4. The apparent absence of any kind of controls on operations, as at Ellesmere Port.
5. The overextension of financial credit had been present for years.
6. 1% income gain on 136% sales gain is awful. 1967-71 was a prosperous period.
7. They were very unlucky with timing on the tanker issue, but the fact remains that they were the only major oil company in the spot charter market.
8. The Signal Oil purchase brought them an asset earning 13% pretax on the acquisition price, and costing a weighted average of 10% in interest. It committed them to a £13 million additional investment in the North Sea. And nearly all its assets were fixed, and therefore hard to realise. Signal is a good, solid company, but the price was very high.

It would be possible to go on listing errors for some time, but these will serve to illustrate.

At this juncture, after 30 per cent of the class time has gone, it may be worthwhile to ask the class to move to the subquestion on avoidance. After a few moments listing the negatives of the errors just discussed, someone will almost certainly draw the class's attention to the benefits of hindsight, and say that it is unfair to criticise the board for errors if many other people made the same errors.

In due course the need for a planning system, for an overall financial control system, and for a better method for appraising new investments, especially acquisitions, will be brought out. There is not enough in the case to give details of how such systems should be designed, internally, but the need can easily be established.

Question Two

The identification of the need for planning and control systems inside the business leads quite naturally into discussion of the second question, to which 40 per cent of the class time should also be given.

The shareholders of Burmah could have obtained an early warning of the problem, by reading the 1973 annual report. In fact they could have got a very useful warning by reading any of the last four or five. The problem, of course, was cash flow control and overextension. But very few shareholders seem to have done anything to measure this. The dominance of the BP holding over the rest of the balance sheet seems to have obscured a very clear long term and dangerous trend.

Some of the discussion on this issue will centre upon ratios such as the quick (0.81) and current (1.22) ratios. But as one of these has gone up and the other down from the 1972 values of 0.66 and 1.03, this discussion is likely to be a bit inconclusive.

At this point, I draw their attention to the five year funds statement which forms a part of exhibit 2, and also introduce the idea of the internal financing ratio, which is a dynamic measure of liquidity balance. Annually, the IFR is the ratio of net investment in fixed assets and working capital (excluding cash) to the operating cash flow minus dividends. The two funds charts are reconstructions of the funds statement to show the derivation of the ratio for each year. The first chart, covering the years 1969-73, is taken directly from the Burmah funds statement, using the conversion analysis chart for 1973 which is also attached to this note.

The internal financing ratio takes the expenditure on fixed assets plus that on working capital minus the cash realised from asset sales as the numerator. The denominator is the cash flow from operations minus the amounts distributed to the shareholders. The ratio numbers are slightly out from the division of the numbers on the charts as the latter have been rounded.

The individual values of the internal financing ratio are not too important. Every firm has peaks and troughs in its expenditure patterns, so a value of 1.0 must be seen as a rarity. But persistent large deviations from one, all in the same direction, are signals that the enterprise may be out of control. As a means of testing this, it is useful to multiply five successive values of the IFR together, assuming all are positive. A resultant of one would indicate a firm that was absolutely stable in money terms, which implies a real decline. Stability in real terms during a period of 20% inflation required a product of 2.5 approximately. A growing company, expanding steadily and rapidly, might have an IFR product of twenty. Above this level, one begins to wonder whether the operating cash flows are capable of supporting all the new investment that the company is making.

As the end of 1973, Burmah had an IFR product of 535. This is ridiculously high. But by the end of 1974 it had gone up to 4785. And they were virtually bankrupt.

A shareholder could have taken warning from the persistence with which the internal financing ratio remained above three. That is a clear danger signal, though an isolated three in a sequence of ones would be nothing to worry about.

If the IFR falls below one, the firm is in a state of disinvestment and liquidation of assets. It is most unusual for the IFR to go negative, but the Burmah accounts for 1975 and 1976, especially the latter, provide an example. This, of course, implies very rapid asset realisation.

The treatment of a negative IFR in arriving at an IFR product is rather arbitrary. I have simply subtracted the negative IFR(s) from the largest positive one(s) and multiplied the residue to get the five year average.

Question Three

There can be few companies in which the discretion available to top management was less than that available in Burmah in 1975. The firm was under a sentence of death – Downs had no real choice but to sell assets or companies to cut into the massive debt burden. This is not to say that his job was

easy – quite the opposite. But he had no alternatives, so he very reasonably spent little time in debating them. He had to sell assets and do so in a market which was well aware of his need to sell. And he had to keep all his companies in good enough condition so that they could be attractive to a potential buyer, which was a very costly matter, especially in those cases such as Signal, Ninian and Thistle, which involved exploration. Strategically, therefore, Mr. Downs' job was very simple. Managerially, it was Herculean.

Question Four

The disclosure practices of Burmah can be discussed in a few minutes at the end of the class if appropriate. Three main points can be made.

Firstly, the Source and Use of Funds Statement, which is now required of major firms, has been of far greater use in analysing the company than the other statements. But even this use has been hampered by the completeness of the statement. It has been necessary to go through the conversion procedure to condense the numerous details of the statement given down into a meaningful and explicit analytical statement. All the data are given, but the very completeness of the statement has obscured its essential message. The company disclosed the facts, but obscured their meaning in the process.

Secondly, the two notes shown in exhibit 3 of the case may be considered. Note (d) of the Commitments note tells the reader that the firm is liable for about £50 million a year for thirty years, though it is necessary to do a present value calculation to derive this. The company was under no legal obligation to disclose this, although the amount is clearly material, especially when compared with a total operating cash flow of about the same amount. The truth of the disclosure is unquestionable. But some discussion may be pertinent as to its 'fairness'.

The third issue relates to the £174 millions of capital expenditure committed, also shown in exhibit 3. This is said to be additional to the \$420 million committed for Signal Oil. The disclosure of the firm cannot be faulted here. The wisdom of the board can be questioned, of course, and the importance of reading the small print in annual reports is underlined by the size of these items in relation to the group's operating income.

CONVERSION ANALYSIS BURMAH 1973

	Investment fixed assets	Sold fixed	Working capital	Operations	Distributions	New debt	Retired	New equity	Cash
Earnings attributable				44.2					
Retained by associate				(0.8)					
Depreciation				15.9					
Deferred tax				3.6					
Asset sales		5.6							
Investment sales		14.4							
Extraordinary and prior				1.4					
Misc.				1.1					
Share capital								5.1	
Loans						53.4			
Grants								0.6	
Minority capital								24.2	
Dividends					15.8				
Fixed assets	93.6								
Additions to investments	5.1								
Goodwill	9.1								
Loan repayments							0.6		
Misc.				0.2					
Increase in WC			53.5						
Increase in cash									9.0
Rounded totals	108	20	53	65	16	53	1	30	9

BURMAH OIL COMPANY – FUNDS STATEMENT

Millions rounded	1974	1975	1976
New investment	329	228	213
Sold, fixed	(9)	(284)	(553)
Working capital	21	31	(23)
	<u>341</u>	<u>(25)</u>	<u>(363)</u>
Operations	30	28	15
Distributions	(18)	(9)	(1)
	<u>11</u>	<u>20</u>	<u>14</u>
New funds wanted	<u>330</u>	<u>(45)</u>	<u>(377)</u>
New debt	308	19	78
Retired	(10)	(59)	(337)
	<u>298</u>	<u>(41)</u>	<u>(258)</u>
New equity	0	6	4
Cash depletion	32	(10)	(123)
	<u>330</u>	<u>(45)</u>	<u>(377)</u>
Internal financing ratio	30.38	-1.26	-25.9
5 year cumulative	4785	125.7	34.14

Burmah Oil Co. Funds Statement

Millions, rounded	1969	1970	1971	1972	1973
Investment, fixed assets	38	52	56	126	108
Sold, fixed	(6)	(5)	(15)	(10)	(20)
Working capital	10	5	12	5	53
	<u>42</u>	<u>52</u>	<u>52</u>	<u>121</u>	<u>141</u>
Operations	34	36	35	46	65
Distributions	(21)	(22)	(22)	(14)	(16)
	<u>12</u>	<u>14</u>	<u>13</u>	<u>33</u>	<u>49</u>
New funds wanted	<u>30</u>	<u>37</u>	<u>39</u>	<u>88</u>	<u>92</u>
New debt	49	5	—	14	53
Retired	(1)	(2)	(1)	(2)	(1)
	<u>48</u>	<u>4</u>	<u>(1)</u>	<u>12</u>	<u>53</u>
New equity	7	11	17	45	30
Cash depletion	(25)	23	23	31	9
	<u>30</u>	<u>37</u>	<u>39</u>	<u>88</u>	<u>92</u>
Internal financing ratio	3.4	3.65	4.07	3.72	2.85

Cresta Plating Company Ltd

CASE OBJECTIVE

This case focuses on the design of a management control system in a company, 'Cresta', where 'control by observation' is no longer appropriate, where 'better financial controls' are needed, and where management by objectives is being implemented. The case allows exploration of the concepts, components and techniques of management control.

The student is asked to consider four sets of questions:

1. The relative profitability of internal and external work and in particular the problem of transfer pricing.
2. The determination of return-on-investment targets and their application.
3. The problem of evaluating managerial performance.
4. The implications of the Profit Centre Analyses.

First however, the concepts of decentralisation and responsibility accounting can be discussed. Finally the question of control system design and implementation may be explored, deriving general conclusions on management control.

If the student is given a written assignment, he can be asked to appraise the job which the company secretary/chief accountant has done since his appointment in 1968, in particular examining the issues raised by the type of reporting he has instituted and discussing the consequent results.

CASE ANALYSIS

1. *Decentralisation and Responsibility Accounting*

Cresta's accountant seeks improved financial control by designing a departmental accounts system around profit centres. This simple act embodies two concepts which he has failed to comprehend. Firstly formal control is not just a matter of accounting design; it also depends on organisational design. Secondly a continuum of control exists, where certain controls suit certain circumstances; the accountant has failed to analyse Cresta's particular situation and design the control system to fit.

Profit centre accounting implies decentralisation. Organisations decentralise so as to:

1. Delegate to those who have closer knowledge of operations.
2. Cope with complexity and size by factoring into simpler units.
3. Bring subordinates into direct contact with firm's profit objectives.
4. Provide integrated training for future top managers.

Did the accountant consciously make these decisions and who should make them anyway – surely top corporate management?

Profit decentralisation demands the following conditions:

1. Clear definition of boundaries of autonomy. Joel Dean (see reading 6.1 in Reference 1 of 'Further Reading') suggests that operational independence, access to sources and markets, and separable costs and revenues are essential. Clearly Cresta itself might satisfy these criteria, but do the constituent departments which also are being treated as profit centres?
2. Clear definition of relationships between autonomous bodies. Transfer pricing is the obvious problem and in Cresta was not tackled at the outset.
3. Clear definition of the profit centre manager's responsibility and authority, profit being the

intention, also specifying relationships with top management. Were these clear at Cresta? It is doubtful whether even the profit intention was internalised, especially at the departmental level.

4. Definition of criteria that profit centre managers should use for decision-making. The return on investment targets at Cresta are still undecided never mind other criteria such as DCF targets.

5. Definition of measures to be used for evaluating performance of profit centres. The arguments about allocations at Cresta suggest such definitions were ill-considered.

6. Definition of measures to be used for evaluating managerial performance. The retribution amongst Cresta managers suggests these were not distinguished from business performance measures. This confusion was further aggravated by treating both Cresta as a whole, and its constituent departments, as profit centres.

The Cresta case demonstrates that profit decentralisation is not just a matter of 'departmentalisation of figures'. Performance measurement needs to be consistent with assigned responsibility at each level. Not every manager is responsible for profit, at least in any meaningful sense. Profit should be used as a measure of financial responsibility only when it is possible to calculate it in a way that a manager's profit increases as the result of actions for which he is responsible, and which he has taken in the best interests of the company.

Thus a management control system which is based on profit decentralisation must:

1. Promote goal congruence: that is help ensure that maximisation of unit profit will also maximise corporate profits.
2. Allow fair and meaningful performance measurement.
3. Allow full unit autonomy.

At Cresta so far, the system fails the first criterion because their initiative within the holding group is unilateral, because controls are not in tune with the group's management by objectives programme and because system development is piecemeal. Already the second criterion is in peril, whilst unit autonomy is threatened by ad hoc transfer pricing. Attention to these issues might then enable Cresta to be a decentralised profit centre; what sort of responsibility centres the departments should be is another matter.

Profit centres are only one form of management control in a continuum of control. At one extreme, tight automatic controls such as mechanical or ritual devices are available. At the other extreme, the freedom of investment centres is available. Where complexity and uncertainty exist then looser controls are more appropriate, devolving detailed control to unit managers, and measuring and monitoring these units through aggregate devices. The form of such responsibility centres will depend on the nature of the key decisions to be made and the way decision-making authority is delegated. This analysis was absent at Cresta.

The range of responsibility centres, and the accounting around them (responsibility accounting) includes:

1. Cost centres where inputs can be measured and controlled, but less so the outputs.
2. Revenue centres where revenues are the key factors, such as in sales divisions.
3. Profit centres where both costs and revenues can be controlled and measured.
4. Investment centres where both profit and investment responsibility are clearly delineated and measurable. (Appendix B implies that Cresta departments might even have been classified as investment centres.)
5. Service centres where outputs are more significant than inputs, and they are perhaps better measured in non-financial terms.

At Cresta, the area of discretion, the problems of transfer pricing (see below), the delineation of responsibility, the jointness of costs and investment and the nature of the jobbing task would suggest that departments might be cost centres, with Cresta itself perhaps an investment or profit centre (subject to qualifications) within its division.

However, the design of the management control system is not just dependent upon the amenability of the situation to tight or loose control. Certainly task, technology and ability to measure are significant variables, but so also are environmental and strategic considerations. (Fig. 1) Often functionally-oriented organisation structures and control systems are efficient but fail to respond adequately to

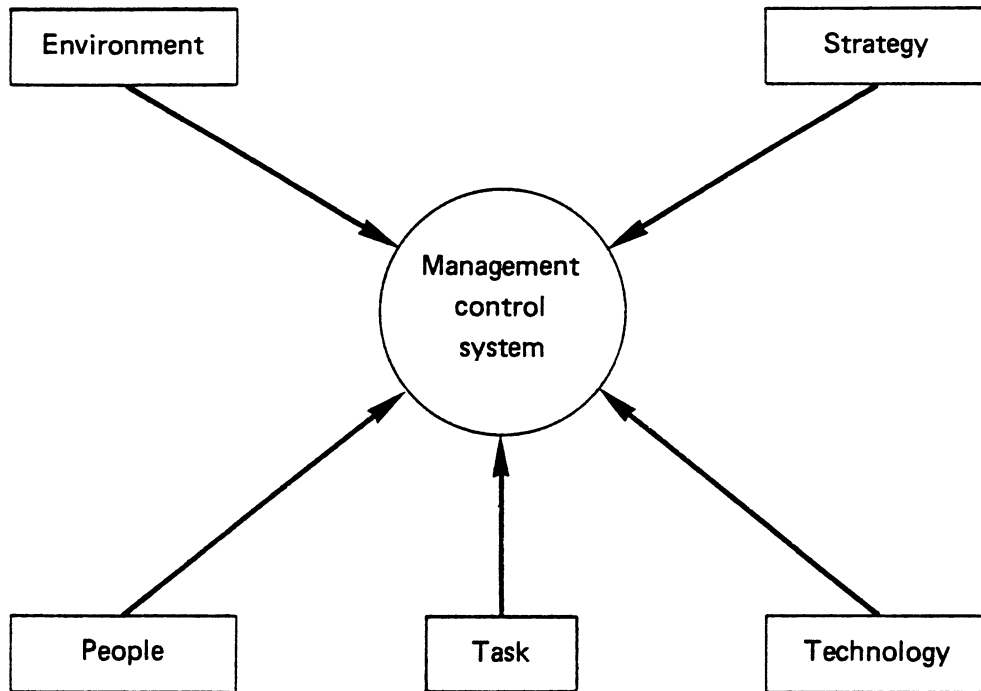


Fig 1. Influences on management control system design

competitive and other environmental pressures. Often because corporate thinking is lacking, they are deficient in strategy-making. Thus decentralisation may be required to foster corporate and strategic thinking and to tackle forward-looking planning as well as control. Maybe then product, geographical market or functional decentralisation is still too insular and flexible; integrative mechanisms such as matrix organisations may be required with consequent demands on control and information system design. The case study is deficient in such contextual fact, but certainly Cresta's financial control system cannot be designed in isolation from its divisional and corporate context.

Finally the management control system must fit the management style and organisation climate. It is doubtful at Cresta whether any corporate image exists; certainly profit-responsibility would have to be 'cultivated'. Decentralisation is as much a question of attitude as of control system design. The situational or contingent factors upon which control system design – and with it organisational design – may depend, are illustrated in Fig. 1. Cresta's accountant failed to analyse these and to realise that the controls which fit the circumstances today may have to change tomorrow. Perhaps an evolutionary approach was required. Was responsibility accounting and decentralisation the immediate requirement – if at all? Did the accountant confuse the levels of control?

2. Transfer Pricing

About 50% of Cresta's work is for group companies. Transfer pricing is thus a critical issue and hitherto the managing director has been a 'successful' negotiator. However there are pressures to reduce transfer prices, and the attractive profits currently derived from internal work (see Barrel Plating Automatic's figures in Appendix B2) indicate why.

The case demonstrates how transfer pricing influences an organisation in at least three ways. If Cresta were forced to reduce transfer prices then:

- (a) Internal demand might increase thereby raising Cresta's activity level or forcing them to reject external work. Thus activity levels, and therefore perhaps resource allocation decisions, are affected.
- (b) Cresta's profits would probably fall unless they can increase volume. Thus performance measurement is affected.
- (c) Other group companies might increase sales volume or profit margins. Thus overall corporate profitability is affected.

The inherent conflicts of transfer pricing are apparent. For maximisation of corporate profits, a unit may have to sacrifice its own profits. Thus the concept of *goal congruence* would suggest that a transfer price should ensure that unit managements make the same decision that corporate management would make if it had the time to study the problem and apply all the data available to the transfer parties. However decentralisation implies unit autonomy and unit performance measurement, both of which might suffer under such optimal transfer pricing. Thus under decentralisation some *suboptimisation* is inevitable. Cresta has to decide on the balance it seeks, a balance between economic and behavioural theories of the firm.

Economic theory (see reference 4 below) suggests that a supplying and a buying division seeking to optimise overall firm profits must operate at the same level of output. The optimal output and price will be where firm marginal equals marginal revenue. The firm marginal cost will comprise the supplying division marginal cost (MC^S) plus the receiving division marginal cost (MC^T). Thus the optimal transfer price is MC^S . Apart from the assumptions of the economist, in particular about perfect or monopolistic competition and about demand measurement, such analysis fails to consider the behavioural actions that profit-oriented managers are likely to pursue.

Thus the more likely transfer price system – and the direction which Cresta would probably follow – is one which most closely satisfies the 3 criteria defined above for decentralised organisations, namely of goal congruence, performance measurement and autonomy. The transfer price system will be the outcome of a corporate bargaining process, reflecting the particular demands of Cresta and its parent group.

Where an intermediate market exists and can be regarded for practical purposes as perfectly competitive, the transfer price can be equated with market price, less perhaps any cost savings. In this way congruence is achieved, for the buying division cannot improve profits for itself or the firm by buying externally. If it could, it is free to do so, for presumably the selling division can sell externally. Thus independence is preserved. Market price is also simple, credible and fair.

However at Cresta, the market picture is not clear. All departments sell both internally and externally, but is competition perfect, and are the products and service comparable? For example if Barrel Plating lost their internal sales could they be replaced externally without lowering prices? And if internal work flows steadily, is it for all practical purposes a separate product range from the 48-hour turnaround products in the open market? More than likely the Cresta situation, as in most firms, is messy. The alternatives are negotiated transfer prices or cost-based transfer prices.

Negotiated prices are attractive, for in reality many market transactions are not made at published quoted prices, but are negotiated around a list price. Thus a negotiated transfer price will be an approximate market price but also allow bargaining between autonomous managers. This might meet the jobbing context of Cresta, *but* already we see possible dysfunctional consequences because of the managing director's persuasive, yet ad hoc, negotiating practice.

For successful negotiated pricing four conditions are necessary:

1. Some form of intermediate market;
2. free access to market information by both parties;
3. freedom of both parties to deal outside;
4. top management support for negotiation;

otherwise excessive 'centralised umpiring' results.

Clearly such analysis must be made by the group, not solely by Cresta. A key question is the strategic role of Cresta in the group. If it is seen as an essential sourcing division, then free negotiations are not really feasible. Were a negotiating solution to be adopted, it would be weighted more towards decentralisation and less towards corporate goal congruence.

Where market-based transfer prices are not feasible, the three criteria of goal congruence, performance evaluation and autonomy cannot all be satisfied. If however an optimal economic decision is sought, the transfer price should be the additional outlay costs incurred to the point of transfer plus the opportunity costs for the firm as a whole. In practice the opportunity costs are difficult to obtain. For example corporate-wide information is required to derive opportunity cost and clearly this demands continuous and complex analysis. Cresta, like most firms, would thus reject this approach and select a simpler procedure – and one which retains the credibility of decentralisation.

Transfer pricing at full cost is widespread, probably because it is simple. There are however many defects. Firstly full cost is a poor guide to decision-making, because it fails to incorporate the concepts

of relevant and opportunity costs. It is also incompatible with the concept of decentralisation.

If cost-based transfer pricing is the only feasible solution, then standard costing is generally preferred so that (a) buying divisions do not import the supplier's inefficiencies; (b) the supplier division is motivated (hopefully) to be efficient. Clearly, however, such an approach implies that the supplying unit is a cost centre, not a profit centre. Indeed if cost-based transfer pricing seems most appropriate – particularly between highly interdependent divisions or units, where intermediate markets are lacking or unreliable – then probably profit decentralisation is out of place, and supplying units should be controlled through flexible cost budgets.

Once supplying divisions are accepted as cost centres, then marginal cost transfer pricing becomes both more desirable and more credible. It will lead to corporate goal-congruent decisions and may be accepted by managers because performance measurement is no longer profit-oriented, and because autonomy takes on a narrower definition. Cresta should perhaps adopt this approach – with all its implications – at least for those departments whose *raison d'être* is primarily to serve the group. It would provide a schedule of marginal costs for different output levels and the buying divisions would compute composite marginal costs and agree on output levels which equate composite marginal cost with their approximation of marginal revenue. Any departure from such agreements would be treated as 'allowable variances' in Cresta's budget. Linear programming solutions to the output/transfer price decision using marginal analysis can be employed, but evidence of their adoption is limited.

Thus transfer pricing is a key component of the management control system and cannot be designed in isolation from it. Cresta's solution will be a trade-off between the desire for economic optimality and the perceived motivational benefits of profit decentralisation. Economic rationale would suggest use of marginal or standard cost transfer prices, those departments whose major business is internal becoming cost centres, and thus perhaps Cresta as a whole likewise. The cost accounting system might have to be improved to support such an approach.

If however top management, like others, believe that long-run corporate optimisation is more likely through profit decentralisation – the behavioural rationale – then negotiated market-oriented transfer prices could be adopted. These might suit the uncertainty of the jobbing environment and best satisfy all the criteria – but can a suitable negotiating context be constructed? If not, a compromise is to operate a *dual system*, where receiving units buy at marginal or standard cost (satisfying economic rules) but supplying units are credited at the agreed cost plus a profit subsidy to satisfy motivational needs. After all like costs in general, we may need different transfer prices for different purposes – if the benefits justify it.

Finally, if the transfer pricing system is oriented towards decentralisation, suboptimisation is inevitable. To avoid major conflicts, some arbitration or conflict resolution procedure at a higher level may be necessary, with an admitted loss of autonomy. The eventual solution must incorporate some element of balance.

3. Return on Investment

The aim of return on investment (ROI) as a performance measure, or control, is to promote goal congruence. Yet the concepts of goal congruence and decentralisation are incompatible. Thus use of ROI as a control must aim to minimise such suboptimisation; experience suggests that this is not easy.

To ensure motivation, ROI targets should be fair and credible, and thus preferably set according to each division's or unit's circumstances. The group seems to demand a 20% return. If it sets fairer but lower targets, will corporate profits suffer? Or if 20% is too slack (as may be the case at Cresta, especially with their favourable transfer prices), will demotivation set in? This is the conflict.

However, matching profit maximisation and motivation is not entirely impossible. Portfolio theory suggests that a holding group will possess different companies of different risk and return. Thus setting different ROI targets may be compatible with overall strategy and also be motivationally valid. Cresta should be set a target which is 'right' for its own circumstances. How?

Companies seem to use cost of capital as a guide, or average corporate ROI for their sector, or the corporate average plus a premium reflecting local risk and expected return. For Cresta the third method would seem sensible; the resultant target will possibly be unique within the company. But is ROI the preferred performance measure?

ROI is a ratio and thereby can be easily manipulated. For example, if profits are waning, Cresta managements can divest. Thus ROI also implies that Cresta is an investment centre, but do they control the assets – especially if headquarters sees them strategically as a feeder plant? If investment decisions are not the responsibility of Cresta management, ROI is an inappropriate measure.

Then how is ROI defined? Is the numerator defined as profit before or after tax? Is it total or controllable profit? How is it affected by transfer prices? Is it before or after depreciation, for this may influence investment decisions? Is profit inflation-adjusted?

There are as many questions about the denominator. What is 'investment'? Is it gross or net of depreciation? – again consider the consequences. Does it include working capital and thus perhaps encourage short-run dysfunctional decisions such as running down stocks or manipulating credit with possible repercussions for other companies in the group? Who controls the cash, the group or Cresta? How is inflation handled? What about joint or apportioned assets? etc. etc.

Thus ROI is riddled with measurement problems, many of which are potentially dysfunctional. It can encourage short-term actions and is only one of the key result areas which managers should pursue – not only in the interests of shareholders, but for all 'stakeholders'. Furthermore ROI target-setting is not simple. Unfortunately ROI appeals to unit managers because it appears to be the sine qua non and synthesis of business activity. Indeed ROI control had been held up as best practice, not least because of the publicity given to the Du Pont ROI system (Fig. 2). What is overlooked in the Du Pont case is that their system was built up from the components of ROI which themselves were used as supporting (and therefore balancing) controls.

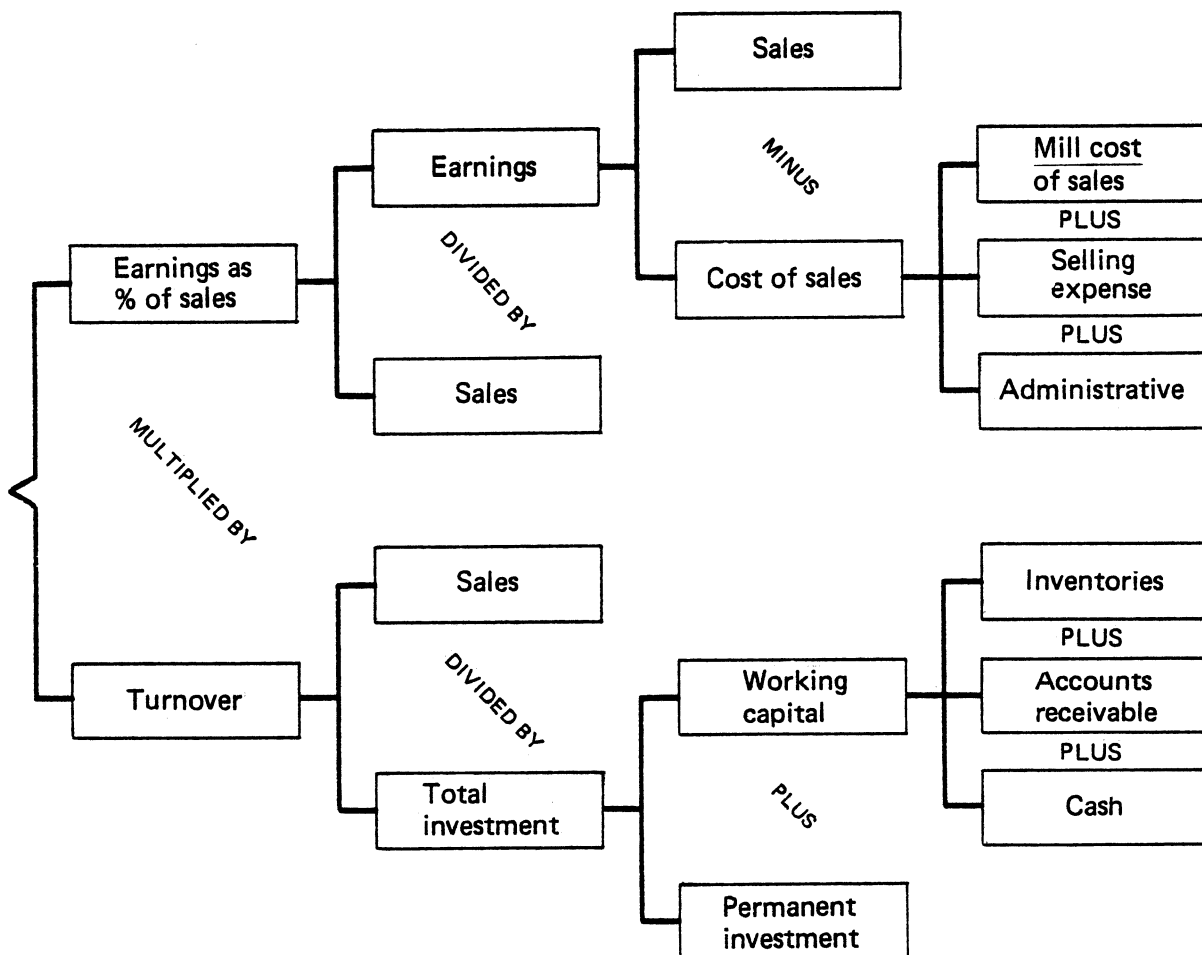


Fig. 2. The Du Pont ROI chart

One alternative is to use *Residual Income*, that is profit less a capital charge for use of assets (the charge generally equating to cost of capital) (Fig. 3). Its alleged attraction is that whilst with ROI profitable projects may be rejected if they do not sustain or improve current ROI (Fig. 4), with Residual Income such projects may be approved since divisional performance is rewarded with the resultant profits, only minus the capital charge on the investment outlay.

	Venture A	Venture B
Capital	£1000	£5000
Net annual return	£200	£750
Rate of return	20%	15%
Excess return over capital charge at		
12%	80	150
14%	60	50
17.5%	25	125

Fig. 3. Residual Income

$$\text{ROI} = \frac{E}{I} = \frac{\text{Sales} - \text{Production} - \text{Selling} - \text{Admin.}}{\text{Fixed} + \text{Stock} + \text{Other Investment}}$$

$$\text{Initial State} \quad \frac{EO}{I_0} = \frac{50}{200} = 25\%$$

$$\text{Proposed Project} \quad \frac{E}{I} = \frac{10}{50} = 20\%$$

$$\text{Together} \quad \frac{E^1}{I_1} = \frac{60}{250} = 24\%$$

ROI MAY THUS CAUSE SUBOPTIMISATION

Fig. 4. ROI and Suboptimisation

With residual income, measurement problems are less severe. 'Investment' definition is not so critical for it no longer is the influential denominator of a ratio. However divisions may still manipulate assets in order to minimise the capital charge of residual income. Furthermore profit definition problems still remain. Above all residual income has less appeal to managers than ROI.

Thus preference for straightforward profit measures is today apparent. Profit is equally attractive as ROI, is less prone to manipulation, and still fits the concept of decentralisation. Furthermore profit standards or budgets are easier to set, through conventional profit planning. Investment then has to be controlled through capital budgeting procedures and subsequent capital monitoring. Thus profit becomes only one of a set of controls, albeit often the prime measure. In Cresta, if profit centres are to be retained, profit targets from normal budgeting should perhaps replace ROI targets in the MBO programme. If some departments become cost centres, then budget performance should become integrated into MBO.

The case poses another problem. How is capital budgeting reconciled with performance measurement? Ideally the decision model used to make a capital investment decision and the model used to judge subsequent performance would be consistent. In practice however DCF methods are used for the former and accrual-accounting procedures for the latter. Managers then become reluctant to make capital investments if performance measurement is likely to suffer in the first year or two after the outlay. Any accelerated depreciation method would only accentuate this effect. Thus compound interest depreciation methods have been proposed, since these are compatible with the assumption of DCF. Here depreciation increases over the life of the asset and ROI is 'protected'. If residual income is adopted, then if the capital charge and DCF rate are equal, any cash flows in excess of the desired return produce positive residual income.

Whilst compound interest depreciation offers a solution to the problem of reconciling ROI and capital spending posed in the case, Cresta like most of industry would probably reject it because (a) managers are averse to depreciation increasing over asset life; (b) it is confusing if projected cash flows are irregular; and (c) asset valuation is unrealistic especially in the early years of use. However, if

Cresta adopt profit planning instead of ROI targets, reconciliation is less vital. Capital investment projects can then be appraised by DCF methods and also examined for their likely impact on profit performance. Once approved, ex-post monitoring can be confined to conventional profit reporting.

Finally the discount rate used in DCF appraisal is likely to reflect the cost of capital to the group company and the individual risk of individual Cresta projects.

4. *Evaluating Managerial Performance*

The recriminations which followed the introduction of the new profit centre analysis at Cresta demonstrate how important it is to separate measurement of managerial performance from measurement of economic performance. 'We always felt that Bert was efficient, but look how much money he's losing us' typifies the confusion.

Responsibility accounting assumes (perhaps naively) that responsibility motivates. By measuring managerial performance, the manager will be motivated to achieve targets – of ROI, profit or MBO objectives. The concept of controllability however suggests that he only be measured by, and thus be responsible for, those items he can influence. Furthermore behavioural considerations suggest targets should reflect theories of motivation, aspiration and so on and also of course be fair. Clearly therefore the financial measures used in managerial evaluation should differ from those which economic conclusions may be derived.

1. TO MEASURE MANAGERIAL PERFORMANCE

CONTROLLABLE PROFIT BEFORE TAX

CONTROLLABLE INVESTMENT

or

CONTROLLABLE RESIDUAL INCOME BEFORE TAX

or

CONTROLLABLE PROFIT BEFORE TAX

2. TO MEASURE DIVISIONAL USE OF RESOURCES

either

NET PROFIT AFTER TAX

TOTAL INVESTMENT

or

NET RESIDUAL INCOME AFTER TAX

or

NET PROFIT AFTER TAX

Fig. 5. Profit performance measurement

For example different approaches using ROI residual income and profit are suggested in Fig. 5. Such distinctions recognise that, say, Cresta might produce a much lower ROI than another company in the group and could be divested in the future, but that does not necessarily reflect on Cresta Management who may have a difficult market, antiquated assets or less freedom on transfer pricing. Thus different finance standards are required for (a) measuring business performance, (b) measuring managerial performance and (c) as a guide to decisions, e.g. the DCF discount rate.

The move to MBO in Cresta suggests that profitability is only one of the objectives the group wishes to pursue and measure. Clearly for long-term survival, for satisfying all the stakeholders' goals and for balance, wider measures are relevant. Pursuit of profit alone can be dysfunctional and whilst all managers may recognise this, emphasis on profit measurement can nevertheless bring about imbalance.

Companies today often employ wider measures. Du Pont disaggregated ROI to help diagnosis and bring balance. General Electric devised the measures displayed in Fig 6. Cresta and its parent have the opportunity to integrate profit measurement with MBO by designing a management control system to monitor key result areas. An MBO programme might be a useful vehicle for encouraging management participation in the design and operation of a new management control system.

- * PROFITABILITY (NPAT – 6%)
- * MARKET POSITION (Share %)
- * PRODUCTIVITY (VA/Labour and Dep.)
- * PRODUCT LEADERSHIP ('Which' Type Comparison)
(Who Was First?)
- * PERSONNEL (Programme Quality Review)
(Projected Manpower Stock)
(Promoted/Promotable)
- * EMPLOYEE ATTITUDES (18 Monthly Standard Questionnaire)
- * PUBLIC RESPONSIBILITY (Surveys of the Department's 'Publics')
- * SHORT/LONG GOAL BALANCE

Fig. 6. Key Result Measures – G.E. (U.S.A.)

It will be essential to seek integration between MBO and financial control, for if one is dominant, the other inevitably will weaken and fail, or perhaps neither will be effective. Profit targets through profit planning could be incorporated in annual MBO-setting, and all targets could be monitored periodically. Where departments become cost centres, then cost performance against standard or budget would be incorporated.

5. The Profit Centre Analysis

Appendix B raises many of the issues already covered, perhaps these are best summarised for Cresta in the following questions:

1. What is the effect of Cresta's transfer pricing?
2. How controllable are the items presented?
3. Is it sensible to report fixed costs? If so are any improvements required?
4. Should these responsibility centres be investment centres as implied by the reports?
5. How is 'assets employed' defined?
6. How meaningful is ROI?
7. Is Cresta best treated as an investment centre and its departments as cost centres?

Finally of course improvements can be discussed. Planned or budgeted comparisons would clearly be of value. However, any change to such analysis and reporting is secondary to the overall redesign of the management control system and the recommendations on transfer pricing.

6. Conclusions

In discussing the redesign of the management control system and its subsequent operation, two issues stand out. Firstly the questions of decentralisation and responsibility accounting must be answered. The recommendations must be based on analysis on the group's strategy and style as well as on the characteristics of the unit companies such as Cresta. Fig. 1 displays the major contingent variables to be analysed.

Secondly the major design questions are the responsibility of corporate top management. They must ensure the management control system meets the strategy and organisation structure of the business. It is likely that in a diversified holding group, to ensure responsiveness to particular markets and

environments and to ensure those who know each business can act, responsibility accounting – probably profit decentralisation – is necessary. Equally more attention to long-range planning is appropriate. Responsibility accounting and long-range planning are the major functions of a management control system, and need a facilitative organisational structure to succeed. Thus information, control and organisation design are interdependent. Transfer prices are one manifestation of this interdependence and the transfer price system must also be specified by corporate management.

Once this fabric of management control is laid down by top management, perhaps defining Cresta as an investment or profit centre, and specifying transfer pricing procedures, the local detail can be specified by Cresta management. Some of the arguments and recriminations – which may create too much conflict – might be avoided at Cresta in the future with more participative design.

The conclusions on management control which can be drawn from the case include:

1. There is no universally applicable management control system. The system which fits Cresta's requirements may well be unique.
2. A management control system comprises information, feedback and organisation, each of which cannot be designed in isolation.
3. Management control seeks goal congruence. Responsibility accounting seeks autonomy and depends on performance measurement. These three criteria can rarely be fully satisfied in combination. Suboptimisation cannot be avoided; we seek to minimise it.
4. Transfer prices are a source of potential conflict under decentralisation. The solution will be a balance between the needs of economic decision-making and the requirements of decentralisation, namely evaluation of performance and unit autonomy.
5. Controls do not guarantee control. Controls can distort, be too narrow, be manipulated or generate conflict. For example, ROI may emphasise the short-term, overlook wider responsibilities, be manipulated or cause inter-unit sub-optimisation.
6. Management control is achieved through line management. Thus motivation may be more important than economic rationality.
7. Financial controls such as ROI, Residual Income or Profit benefit from supporting controls such as component ratios, management by objectives or other key result variables.
8. There is a continuum and hierarchy of financial controls. Cresta for example might be an investment or profit centre with one set of controls, and its departments be cost centres with another set.
9. Management control is expensive. A costly solution, for example to transfer pricing, is nearly always available to complex problems. The benefits may not be so certain.

FURTHER READING

1. Anthony R.N., Dearden J. and Vancil R.F., *Management Control Systems* (Irwin, 1965). Readings 5.1, 6.1, 6.3, 6.3, 7.1, 7.2, 7.3.
2. Dearden J., 'The Case Against ROI Control', *Harvard Business Review*, May-June 1969.
3. Gilbert X.F., 'Does Your Control System Fit Your Firm?', *European Business*, Spring 1973.
4. Hirschleifer J., 'On the Economics of Transfer Pricing,' *Journal of Business*, July 1956.
5. Humble J., *Improving Business Results* (McGraw-Hill).
6. Solomons D., *Divisional Performance: Measurement and Control* (Irwin, 1965).
7. Tomkins C., *Financial Planning in Divisionalised Companies* (Accountancy Age Books, 1973).
8. Vancil R.F., 'What kind of Management Control Do You Need?', *Harvard Business Review*, March-April 1973.

The Dalgety Group

This case is a complex one, because there are several dimensions of analysis possible.

1. Did Mr Bingley make a reasonable job of the estimates he tried to make?
2. Were the estimates he was trying to make appropriate, whether or not he did them correctly?
3. What purposes do we want to fulfil in performing an analysis of profits? Which approach fulfils which purpose, at least in part?

THE MEANING OF THE EXHIBITS

The first step to take in class, or in discussion groups, is to sort out what all the methods of presentation mean, without at this stage considering whether they have been carried out correctly.

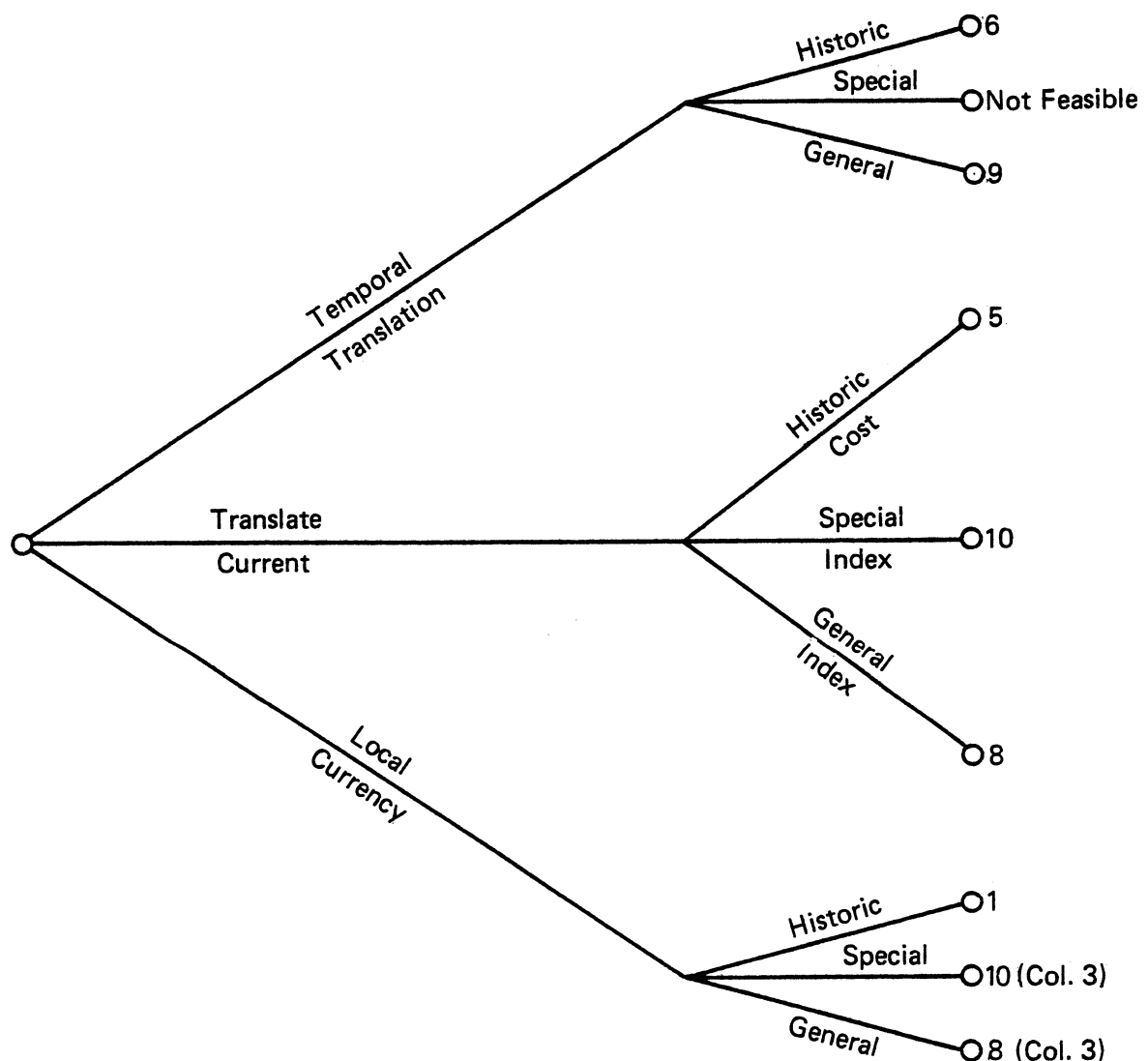


Fig. 1. The translation alternatives

The 'decision tree' shown has proved a useful transparency in making sure that the group understand what each exhibit is meant to contain. The letters at the branch ends denote the exhibits in which each combination is shown; thus the simple historic cost accounts in local currencies are given in exhibit 1 and so on.

I have found it worth while spending a bit of time on the 'not feasible' branch. It helps people understand what 'temporal translation' and 'special index' mean. Temporal translation means that the assets are shown in the parent consolidated accounts at historic cost translated from local to sterling at the rate prevailing when the asset was purchased. A special index is one designed to deal with price variations relating to a specific class of asset. As such, there are few specific indices of worldwide applicability. Most are local to, or even within, a single nation. This is why the option is marked infeasible. To translate an asset into sterling at its exchange rate on purchase, and then to adjust it by the British special index for the asset class, would be very hard indeed for most asset types, which will behave differently in different lands. The cost of wool-clipping machinery in the UK is not indexed at all – in New Zealand this is a big industry, and I have been advised that an index does exist there.

Further, to use the *local* specific index after temporal translation would be clearly wrong. This would be double counting. The exchange rate has evolved, at least in part, because of differential rates of inflation among countries. Translating temporally and then applying the local index means you are applying the foreign inflation rate to a British price, which is meaningless.

In class, it is worth spending a long time, perhaps as much as 30% of the class, on giving the participants a clear understanding of the differences.

DID MR BINGLEY DO A GOOD JOB?

The short answer to this question is – not very. He was admittedly faced with a serious shortage of data, it seems, but his exhibits can still be criticised. I do not spend time on this with management groups, only with accountants and financial people.

Exhibit 1 is fine, of course, except perhaps for its brevity. Exhibit 5 is a perfectly adequate application of the current translation method, so no faults are present there either.

His approximation of the temporal translation in Exhibit 6 is a bit unclear. He appears to have assumed that the average ages of the assets flowing into expense are different as between countries. He has used exchange rates dated 4/72 for Australia, 1/73 for New Zealand, 2/73 for USA and 2½/73 for Canada. There are no data given to refute or endorse the validity of the assumption, which is stated in the note to the exhibit and repeated in the text. It is certainly true that the firm has been invested in Australasia much longer than in the northern hemisphere, so at least the sequence is fair.

On the sales side, he has translated at average rates, which happen to equal the ending rate except in Canada. This is reasonable. In a normal situation, of course, an accountant working for the firm would be able to apply the correct exchange rates for each asset, and might therefore easily get a different result.

For Exhibit 8 Mr Bingley has employed the consumer price indices in each country to deflate the local accounts. His index for sales was the average of the last four quarterly values of the relevant consumer price index. For expenses, he has used a similar average, with a six-month delay. The facts of the situation may or may not justify this assumption.

He has next divided the assets into 'new' and 'old' and has deflated these items by reference to the consumer price indices, using the average for the year and the 4/72 figure respectively. He is certainly piling assumptions rather high in doing this.

But a major criticism can be made of his next step, which was to inflate the 'equity' by using the year's change in the consumer price index, and to call the balancing figure of the resulting trial balance an 'inflation adjustment'. In Australia, this is a gain. But the group is heavily borrowed, with debt at 31% of capital employed. A good deal of this debt is in local currency in the operating countries, so an attempt ought to have been made to estimate the monetary gain arising. If the Australian debt/equity is proportionate to the rest of the group, then \$4.8 million of the inflation adjustment is accounted for thus. He has chosen to ignore this point entirely, evidently on the grounds that the group did not supply regional balance sheets in 1974. They did so in the 1975 accounts. Liabilities were isolated by currency in the 1974 accounts, though these are not shown in the case.

In Exhibit 9, Mr Bingley has translated temporally, using similar logic to that in Exhibit 6 and then used the British consumer indices to deflate. The same comment about monetary liabilities can be made here as was made for Exhibit 8.

Exhibit 10 is the same in principle as Exhibit 9, except that he has used the industry index for local deflation. The index he ought to have used, of course, is the one (or the series) relating to the assets in use in the business, not the one relating to its output. There may be a relationship between the two sets of indices, of course, but he has made an error of principle.

APPLICATION OF THE ACCOUNTS FOR MANAGEMENT

Accepting Mr Bingley's figures, it is now appropriate to consider which of them is 'right'. The case questions ask for several different kinds of evaluation to be made. I find it helpful to use a transparency for this discussion, of the form shown with the decisions listed down the side and the exhibits along the top. The question may then be asked, which goes with which? More properly, the class can be asked 'if an accounting report on current operations is seen as one of the many factors to be taken into account in approaching this decision, upon which of the various bases shown in the case ought such a report to be founded?'

DALGETY GROUP

EXHIBIT

	1	5	6	8	9	10	Nil
<u>DECISION</u>							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

The merits of a manager ought to be assessed by comparing his return on capital with those of his competitors or with a planned level of performance. Such a comparison must be made on controllable terms, and therefore in local currency, Exhibit 1.

The performance of a subsidiary may be seen from the viewpoint of group headquarters. As such it involves a cash flow to or from the centre, perhaps augmented or offset by local currency cash flows. The parent is interested in the consolidated results, from the UK, compared to the investment in the subsidiary. The earnings in current pounds (exhibit 5) would be the next measure of this in a situation of mild inflation. But if inflation is serious the inflation adjusted version, (exhibit 8) would make more sense. If the groups sees itself as committed to the industry it is now in, and is also subject to serious inflation, then the industry specific inflation system of Exhibit 10 would be better.

The decision to invest in a country, without specifying an industry, would be made on a conventional differential cash flow basis as seen from London. The current operations of the subsidiaries in that country would normally be a marginal factor only. A tick in the 'nil' box might be appropriate for decision 3. An argument can be put forward for the use of exhibit 8, if the current operation in the country under study is felt to have any bearing.

Decision 4 to invest in an industry, is clearly one in which specific price indices ought to be taken into consideration. A comparison of the consolidated returns on an 'exhibit 10' basis for each industry should be compared with every other industry to give partial guidance on this point.

The decisions 5 and 6, to change the total home capital of the firm, would rationally be made by judging the group's financial return potential in comparison with other investments, mainly in the UK and mainly in sterling. Insofar as past performance bears on this potential, it will be the industry-specific inflation adjusted figures of exhibit 10 that would count. The company, as all do, has an image of location and of industry combined, and exhibit 10 portrays this slightly less badly than the others.

The decision to alter capital at the subsidiary level should be taken on the basis of local inflation-adjusted results, inter alia. Third column figures from exhibits 8 and 9 are relevant, the choice being between CPP and 'Sandilands' adjustments. I suppose that 8 is relevant if the firm is highly diversified, 10 if it is not.

The shareholder would decide to buy, hold, or sell on a group accounts basis. He probably uses exhibit 5, since that is what the firm produces. Exhibit 9 is actually a better report on the firm's stewardship of his invested funds.

The decisions to lend are basically similar, whether the lending is at group or subsidiary level. The banker wants to be sure the earnings can repay his money. As historic accounts overstate the results during inflation, the banker might prefer inflation adjusted records, if he understood them, which a surprising number seem not to. The foreign banker would want exhibit 1 or 8 Column 3 while the British one would want either 5 or 10.

Elliot Products Ltd

CASE OBJECTIVES

This case describes the history and justification of a capital investment project. It is typical of how many investment proposals evolve in organisations. Consequently it is more illuminating in terms of the strategic, control and organisational context of capital budgeting than of the techniques of appraisal per se.

Students should be asked whether they agree with Mr Hunt in supporting the proposal, and why. Discussion can then centre on:

- The strategic context
- The information context
- The investment appraisal
- The organisational context

CASE DISCUSSION

The Strategic Context

A capital investment project of this nature cannot be appraised in isolation from the company's strategy. It has major product/ market implications and should be examined to see if it is consistent with Elliot and APC strategy. It may be a financially viable project, yet acceptance would in turn rule out another project more central to the firm's strategy. Secondly the data upon which the investment proposal is based, contains strategic assumptions which should be examined more deeply. For example is the market forecast reliable, what might be the competitive reaction and so on?

Firstly, the strategic context, which is both confused and uninspiring. On the one hand in 1966 the corporate objective was to manufacture and sell paper products where growth areas exist. Conversely in 1963 Elliot was seen not as a paper company, but as a company strong in distribution, quality and experience with a sound brand name, just happening traditionally to have used paper-base materials. In particular Syme stressed 'the importance of staying closely attuned to his customers' needs . . .'.

Thus the APC product/market strategy is confused. In truth the firm appears to be product-oriented rather than market-conscious. The result has been missed opportunities. For example Hadley – with its promising plastic cup development – was not acquired when Elliot was bought. Later Cairn bought Hadley, presumably for its plastic cup expertise. Indeed Elliot, already stagnating, was bought to secure sales of a problematic mill, as was another company, emphasising a product rather than market outlook. Meanwhile development of Elliot's polythene laminating has been slow and halting.

Yet occasional market orientations emerge, such as the hint that the new vacuum-forming process could produce convenience food containers, an apparently profitable activity. Nevertheless the focus continues on existing markets.

In short any conventional product/market analysis seems to be lacking. A simple strengths and weaknesses and threats and opportunities profile of products and markets would be invaluable. Then the myths of strength in selling and distribution would be exploded. In particular it is likely that growth and paper manufacture would be shown to be incompatible objectives.

Had such fundamental analysis been attempted, the acquisition history might have been less dismal, alternatives might have been examined when each strategic decision was made (including the one under consideration), and APC and Elliot might have sought 'stars' rather than the 'dogs' they have taken on. The strategic condition by 1968 is thus grim, producing dated products in an over-supplied market, yielding negative funds flow (when investment and working capital are taken into account) in two of the last three years. Mysteriously Anderson has been sought by two other groups recently. Perhaps they should accept the next offer.

The strategic analysis of the plastic cup project can now be addressed. Again the product/market appraisal is inadequate. Elliot are trying to enter the plastic cup market already dominated by two strong competitors. A partial investment in selling and distribution will probably only win the marginal and thus fluctuating business, despite the Regal brand-name. Elliot's plastic cup sales are already declining (although this may be due to their supply problems) and the market appears to have surplus capacity with price wars in progress.

Then Elliot seem confused about the nature of their business. They are the only important firm with no distribution organisation in a sector increasingly vertically integrated. Thus profits seem to be in distribution, but perhaps guaranteed delivery and quality also need a manufacturing facility. Has this analysis been done and are Elliot clear about conclusions? And how will the competition react?

Where also are the alternative strategies? After all Elliot have no experience in plastic cup manufacture, so they could with equanimity go into convenience packaging or some other market. The need for recovering sales and profits is too critical for such partial analysis to go uncorrected. All these strategic issues need examination before Mr Hunt recommends the plastic cup project.

The Information Context

The decline in sales and profits, the lack of response to market change and pressures, the inadequacy of the data upon which this proposal is based and probably the firm's poor strategic thinking all arise in part from deficient information systems. Top management may have caused many of the failures to respond to market imperatives, but information flows and processing have been inadequate.

Four types of information are required:

- Trends and indicators on markets, including prices, volumes, competition, margins etc.
- Performance measurement on manufacturing, distribution and marketing, including disaggregated budget and actual figures, monitoring of contribution from each activity and occasional audits such as distribution cost analysis.
- Predictive information processing such as forecasting, what-if modelling and the like.
- Strategic information flows such as consumer trends, technological developments and the like.

Some of these requirements may be met by informal, as much as formal, information systems but certainly attention to information processing is essential. Currently Elliot are not 'closely attuned to customer needs', the Sales Director appears to derive market estimates by guesswork, and the company as a whole seems to ignore small and timely signals and wait for the large and late messages of disaster. Furthermore the inaccuracy of budgets suggests that predictive information is lacking.

The Investment Appraisal

Whatever appraisal technique is adopted – ROI, Payback, DCF etc. – the quality of the decision is ultimately dependent upon the quality of the input data (and of course is dependent upon the decision's context). It is difficult to believe the data estimates. The recent budget estimates do not inspire confidence, the Sales Director's estimate of 10% market penetration seems to be based on wishful thinking and the cost data is sketchy and no allowance is made for inflation. As many organisations have discovered, figures can be contrived to meet any target rate of return; thus rigorous management examination is essential, contrary to Mr Hunt's attitude.

Then have all alternatives been appraised, not only different produce/market options, but say comparison of different manufacturing sources? Mr Hunt has tried to apply his own commercial judgement by assessing the risks inherent in renewing the Cairn agreement. There are however the technical risks involved in the Melville agreement – and also commercial risks, for why is the know-how and machinery contract so attractive?

Despite the fact that apparently Anderson required capital budgeting to be based on DCF techniques, Elliot, supported by Hunt, adopted the ROI method. The imperfections of ROI compared with the DCF method are well known, in particular failure to concentrate on economic cash flows, failure to recognise the time value of money, problems of defining ROI and difficulties of computing an average return. It is by no means the case that 'if you get a return of 40% or more then the DCF is alright'. Fig. 1 shows the net present value of the project at 11% discount rate, based on data from the case. Clearly this data is suspect; disregarding such suspicions, the project is by no means a winner, if it takes five years to break even on a consumer product of uncertain life cycle.

Such a DCF appraisal of course does not address risk and uncertainty. In particular the estimates of market size and share are uncertain, the costs not guaranteed, and external factors such as inflation not

<i>Item</i>	<i>Year</i>	<i>Cash flow</i>	<i>11% Discount factor</i>	<i>Net present value</i>
Capital outlay	1968	80500	1	80500 –
Working capital ²	1969	56400	0.901	50816 –
Working capital	1970	37700	0.812	30612 –
Capital outlay	1970	76400	0.812	62037 –
Factory profit ³	1969	53600	0.901	48293 +
” ”	1970	60000	0.812	48720 +
” ”	1971	66700	0.732	48824 +
” ”	1972	83650	0.660	55209 +
” ”	1973	100600	0.594	59756 +
Other Expenses	1969	7900	0.907	7118 –
	1970	1400	0.812	11368 –
	1971	16866	0.732	12346 –
	1972	19732	0.6000	13023 –
	1973	22600	0.594	13424 –
TOTAL				20442 –⁵

- Notes*
1. 11% is weighted average cost of capital using data from Exhibit 2.
 2. If the project is assessed over 5 years, working capital should be released in 1973.
 3. Derived from Exhibits 5 and 6
 4. Derived from Exhibit 5
 5. Although negative, with the investment grants due in 1968 and 1970 (seemingly about £15000 in each year), the net present value goes positive in 1973.

considered. At least some sensitivity analysis is required, and perhaps some deterministic or probability modelling. Then alternative and possible outcomes could be assessed.

Out of such assessment of risk and uncertainty, Elliot may have established the possible ‘downside’. Any such appraisal would probably establish that the likely outcome of the project was skewed to the downside. Given that likelihood, an investment of £170,000 could easily be a hazard to the company. Loss-makers can easily drain funds through inertia, as APC learned through their Scottish paper mill. APC and Eliot cannot afford such a drain; furthermore investment in the plastic cup project could preclude profitable investment elsewhere.

Thus a more rigorous appraisal would have probably confirmed the doubts about the project, which any strategic assessment would yield. There was however still the organisational, especially political, context.

The Organisational Context

The organisational context of capital budgeting is potentially very political, as this case suggests. There are two issues here. How should Hunt ‘manipulate’ the system if he wishes to ensure the plastic cup project is approved? Secondly will the politics of organisational decision-making help or hinder approval of this project?

Hunt seems committed to the project; presumably he should therefore strive to ensure approval. Why therefore ignore APC’s capital budgeting procedures, and fail to provide a DCF analysis? Furthermore is the current sketchy and inadequate analysis convincing? We are told the project has been proposed before and apparently rejected. Thus it will doubtless require a threshold amount of new and sustained supporting analysis to overcome previous scepticism. Indeed since approval of the plastic cup project would indirectly represent acknowledgement by top management that Hadley should have been bought earlier, it will not only be solid supporting analysis but arguable evidence. Hunt does not, it seems, appreciate this.

However, the social and political behaviour of organisations can easily influence the rational approach to decision-making. Hunt is keen to adopt a new project and to become involved in executive action for motivational reasons. A climate for investment can be created by such thirsts, epitomised by

'wouldn't it be a good idea.?', and such climatic influences can overcome the doubts which obviously existed before about this project.

Indeed, as the case illustrates, an unlikely proposal can gather momentum by enthusiastic, if ill-judged, support and analysis, Bower (see Further Reading) discovered that 'although the project definition may not have changed at all from the conception of the originator "down in the organisation", the request justifying the project has been screened, revised and politically disinfected so that it now tells an attractive story in professional tones'. Thus managers' (Hunt's, Syme's and Foster's) aspirations and reputations influence the quality of the forecasts and the individual and organisational implications of the proposal must be segregated from the economic justification. Such bias to be eliminated or corrected by astute senior management judgement and careful organisational procedures.

Unfortunately Hunt is in a situation of role conflict, and bias will not be corrected at the crucial level. His interests as Chairman of Elliot will outweigh (or be confused with) those as member of the main board. Thus the board may support him to show confidence in a new member, so that as other research shows, (Morgan, J.R. and Luck, M., *The Investment System in the Firm*, Institute for Operational Research, 1968) once the proposal is approved at a crucial level (in this case by Hunt) it is likely to be approved without question further up the hierarchy. Indeed as Bower again observed, once the project emerges from its initial stages, it becomes very difficult to change or reject it. Too much time has been invested, too many organisational stakes are involved and at top management or board level there is insufficient expertise to justify critical, sceptical or even cynical doubts.

Elliot's paper project thus could be approved, not because of its economic potential or strategic necessity, but because the internal political environment allows and reinforces it.

CONCLUSION

In teaching this case, it is beneficial to conclude by emphasising that capital budgeting is not solely about techniques. It is a process acted out in a behavioural setting. Rational analysis and decision tools can be employed, but the base data is often a complex web of measurement, estimation and anticipation. The actors are motivated by diverse forces and impart different significances and biases to the figures. The organisational/administrative procedures of capital budgeting are therefore just as important as the analytical techniques. This is not to say the latter are irrelevant, for they do shed light on investment proposals, do allow risk and uncertainty to be assessed, and, handled sensitively, provide a necessary vehicle for management alternative generation and appraisal. These techniques may also fulfil a more fundamental role, namely satisfying managements' desire and concern that major outlays are closely examined and are only accepted if seemingly viable – even though we may recognise how imperfect, and sometimes illusory, these techniques can be.

FURTHER READING

Bower, J., 'Managing the Resource Allocation Process', Division of Research, Graduate School of Business Administration. (Harvard University, 1970).

Pettigrew, A., *The Politics of Organisational Decision-making* (Tavistock, 1973).

Engineering Products Ltd

CASE OBJECTIVE

EPL is a case in corporate financial analysis. The student is asked to address three questions:

1. Evaluate the recent performance of EPL
2. Consider the future prospects of EPL
3. Value EPL

The case thus provides an opportunity for:

1. Conventional trend, ratio and funds flow analysis
2. Profit and loss and funds flow forecasting
3. Company valuation

EPL has proved to be a successful case at both the postgraduate and post-experience level. It demands considerable analysis – a strength of the case, for once mastered, it provides a firm and realistic foundation for corporate analysis of companies in general.

Its major value is that it demonstrates the limitation of historical analysis, demanding examination of future profitability *and* liquidity. A pen picture of the company can be constructed from trend and ratio analysis, followed by examination of future profits and funds flow (hopefully through sensitivity analysis) leading to ultimate valuation of EPL's prospects.

Whilst the case is not primarily intended to demonstrate the effect of inflation on profitability and liquidity, nevertheless it is a component problem. Finally the case is not designed explicitly to examine some of the issues of finance theory which arise, for example alternative models of valuation. However, it can be used to point out the contribution (and limitations) that finance concepts, such as the capital asset pricing model, provide, and can be used to demonstrate the interface between financial accounting, financial analysis and finance theory.

A SOLUTION

1. *Recent Performance*

EPL during its past four years has demonstrated profit, turnover and asset growth. After-tax profits on average have grown by 57%, turnover by 20% and net assets by over 16%. Since these figures are not inflation-adjusted, they must be matched against a current 25% inflation rate. In 1974-75 before tax profits grew by 37%, turnover by 27% and net assets by 32%. Such performance exceeds that of most companies, but clearly inflation may dampen growth. Return on shareholders investment is relatively high primarily as a result of the high gearing which the company is using in its capital structure.

Recently EPL has been investing amounts in fixed assets substantially in excess of the annual provision for depreciation. Thus net fixed assets have increased rapidly:

	1975	1974	1973	1972
Net fixed assets	16,488	11,649	7,335	5,826
Growth in year	4,839	4,314	1,509	1,105
% growth	41.5	59.0	26.0	23.5

The growth has been particularly rapid in the past two years and the Board plan capital expenditure of about £8,000, 000 in both 1976 and 1977. (Financial constraints may necessitate less ambitious investment – see later.)

Sales growth has not been as rapid as growth in net fixed assets:

	1975	1974	1973	1972
Turnover	22,448	17,670	13,377	11,909
Growth in year	4,778	4,293	1,468	1,572
% growth	27.0	32.1	12.3	15.3

This trend is also demonstrated by the decline in net asset turnover from 1.31 in 1971 to 0.91 in 1975. Apparently EPL is requiring a greater investment in assets each year to produce each £1 of sales. Three factors might be causing this:

1. New investment in fixed assets may not be producing a commensurate growth in sales in the year of investment. There may be a lag in capital productivity of at least a year.
2. EPL may to some extent be integrating its operations vertically, which would mean that the company is adding more value to its end products rather than increasing turnover. If this is so, we would expect a higher profit margin (which is in fact the case in the past two years). Moreover we would expect a larger investment in inventory because of a longer throughput time (also the case).
3. Inflation is making itself felt in the higher cost of capital equipment and in pressure on margins (counteracting the effect in 2 above) so that asset turnover declines.

The profitability and investment trends suggest that EPL's management appears to be successful in foreseeing opportunities, and seems very competent to compete in specialised technical markets. As we shall see however, management may lack strength in internal, especially financial management.

The declining asset turnover ratio is also caused by deteriorating inventory and receivables turnover, partly offset by taking greater credit. Whilst these adverse trends are explained to some extent by trading-up and by inflation, they could benefit from managerial attention. It may be that EPL's growth in its physical operations is outstripping its management capacity to control the increased activity. Hitherto growth has been by internal development, so that experienced management is not being acquired along with new assets. On the other hand cost of sales and selling have declined in relation to sales.

The liquidity ratios do suggest a tightening cash situation (acid test = 0.6) whilst with increased gearing (0.5), times interest earned has declined to 3.8. However historical data is of limited use in liquidity analysis and inflation has exploded conventional yardsticks. Only financial projections give any picture at all; however the worth of using the ratios initially is to seek 'red lights' – as is clear with EPL.

Funds flow in the past two years has been supplied by operations (£4.89 million) plus tax relief (£3.16 million) plus £6.31 million long-term debt. In addition unused tax allowances are available (which can be deducted) but are not shown in the accounts; £2.35 million has gone to increase working capital (necessary to support higher sales and to accommodate inflation) and £0.188 million to pay dividends. The remainder has been spent on new fixed assets.

From these analyses qualitative inferences may be drawn. Already it is suggested that EPL's management is entrepreneurial and optimism is evident in the Chairman's statement. However, a test may come if inflation continues and demand slackens. Perhaps EPL's resources are being stretched in 1975 with little to spare if adversities set in.

EPL's assets should be of high technical quality and at least represent the value shown in the balance sheet – especially since they are relatively new. They may of course be rather specialised being tied to specialist markets and products.

EPL is clearly a competent company in its sector demonstrating competitive ability and considerable innovation. Such strengths presumably should persist. However many of their markets appear to be tied to government spending and should national inflation be attacked through decreased public expenditure their markets may become more competitive.

EPL's business is perhaps in a commercially and technically high-risk category. A mix of high gearing and inflation may also increase financial risk. However the recent growth record, the entrepreneurial management and perhaps the financial attentions of the insurance company may well indicate ability to cope with the chosen growth areas and economic uncertainty. If so the potential rewards – in due course – for shareholders could be large.

Question two, addressing the future, now with warnings to examine the financial structure and liquidity management, should help assess such claims.

2. Future Prospects

Objective analysis of EPL's prospects must be based on financial projections. Apart from forecasting likely profitability, it is clear from question 1 that the following issues must be assessed:

1. Will working capital be strained in the face of growth and inflation?
2. Is finance available for the planned capital expenditure in the light of (a) lags in profitability from investments, (b) working capital needs, and (c) possibly slower growth as inflation or national anti-inflationary measures bring pressure on margins and perhaps reduced demand.
3. In addition the debt structure and repayment profile must be analysed.

Projections of the debt position, profitability and funds flow are attached. Clearly, a host of assumptions have been made particularly about growth, inflation and taxation. 'A middle-of-the-road' growth and inflation progression is assumed, namely 25%. One would expect students to provide a pessimistic, optimistic and middle projection. Such sensitivity analysis is essential in order to test assumptions and ask 'What if' questions. Computer simulations would be valuable. It is assumed that capital allowances and stock appreciation relief will continue and that unused tax relief can be carried forward.

The debt projection assumes all available debt capacity (£5 million) is used. The necessary repayments are then included in the funds flow projection whilst interest on the insurance company debt is assumed to be 10%.

With a 25% annual growth in turnover, the profitability outlook is strong if cost of sales and selling do not escalate. Of course if inflation continues, that assumption could be false and so sensitivity analyses on cost behaviour would also be useful.

Such profitability with continuing tax relief brings solid funds flow and there is little danger of breaking the working capital constraint in the debt agreement. (Students could be asked why such a constraint is applied.) Indeed short-term debt will be replaced by longer-term facilities, thus helping working capital and perhaps offsetting any likely rise in interest costs.

However, in the next two years there is a serious question as to whether the company can survive in its present state – at least without additional financing. Crucial to this problem is that the company must develop greater efficiency in the use of its working capital. Inventory and receivable turnover is low, especially the former. Overall working capital turnover seems satisfactory but this is in part helped by a substantial proportion of short-term debt. Much of this is bridging finance and will soon be replaced by longer-term debt and thus should not really be viewed as working capital.

The funds available in the next two years from long-term debt amount to £5 million, of which £3.4 million is required to repay current debt, mainly the short-term bridging finance. The remaining £1.6 million, together with operating cash flow and deferred tax amounting to £13.9 million are available for capital expenditure and working capital.

Thus in 1976 and 1977 it would seem unlikely that EPL will be able to spend the planned £8 million on fixed assets. The funds flow will not allow it, debt cannot be increased and it is doubtful if equity could be raised. In addition working capital demands must increase, even if management improves working capital efficiency. Should tax reliefs be withdrawn, there are sufficient unused reliefs to carry forward in 1976 and 1977 but not beyond.

Thus it would seem prudent to prune the capital expenditure plans, perhaps to £4 million in 1976 and 1977 so as to accommodate working capital demands. The remaining £8 million could be phased into 1978-1979. The impact on growth may not be too severe since perhaps demand will fall for two years at least. Even if demand grows, sales may not be lost as EPL's management might better absorb and exploit the recent and now rephased asset expansion. They may also be able to focus on other internal issues. For 1976 EPL are contracted to £5 million but no doubt a portion can be delayed.

With such a slow-down, a focus on internal management and a sustained watch on inflation's effects over the next two years, EPL could be well placed not only to afford the delayed capital expenditure, but to develop their markets. From 1978 onwards, on most ranges of assumptions, profit growth looks strong and funds healthy. Tax reliefs are exhausted during 1982, but by then liquidity and profitability could be impressive.

3. Valuation

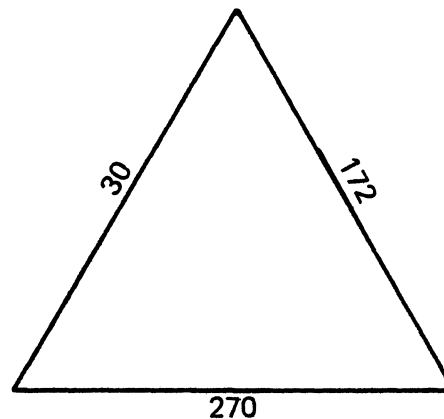
Valuation of EPL, given the distinctly uncertain economic future in 1976 and the apparent need for EPL to consolidate, is dependent on judgement as much as rational analysis.

Using asset valuation, a figure of 172p per share is derived. Usually an unhelpful guide, in EPL's case since their assets are new and of high quality, it perhaps is a useful pointer.

A market-oriented valuation would take the prospective after-tax profits of £1.88 million, (or perhaps before tax profits of £3.9 million since tax relief is available) multiplied by at least the sector P/E (derived from Exhibit 5). More than likely the earnings multiple would be considerably higher than the sector average because of EPL's growth record, but then also modified downwards because of higher than average risk. Thus interpolating a P/E Ratio from Exhibit 5 of say 9, the market might value EPL at 270p i.e. $\frac{1.88m}{6m} \times 9$.

Taking discounted future dividend streams for say 10 years at 10% discount rate (the approximate cost of capital) on the future projections, results in a value of 9.6p. However increasing the dividend payout ratio in later years, and discounting at 15% for risk yields a value of about 30p.

Thus from three valuation angles we derive a picture thus:



and might conclude that a reasonable valuation lay in the middle gravitating towards a market view of future earnings, since EPL's strategy is growth and the assets are only a means – and probably a unique means – to that end. A price of 200p might therefore be realistic.

To an outside investor lacking precise knowledge of the Company's technology, markets and intentions, EPL's shares must be regarded as being speculative. The next two years are crucial; thereafter performance could be impressive. The company therefore offers better than average prospects for capital appreciation whilst the downside risk is not too great.

If another company were bidding for EPL, the asking price would probably lie within the bounds suggested. At the end of the day in such situations, the value is what you agree it is!

TEACHING THE CASE

Experience suggests the case should be worked through step by step. It does however add interest if a snap poll is taken initially of how students view EPL's prospects. This judgement can then be re-assessed at the end of case discussion.

The first step is to draw a picture of EPL from trends and then test initial hypotheses through ratio analysis and funds flow analysis. At this point a view of past performance can be agreed.

Then from signals suggested by the historical analysis, and from triggers in the case, the third step is to work through the projection. At this point a view of future prospects can be agreed.

Finally, past performance and future prospects provide inputs to a valuation, using whatever techniques and bases the teacher prefers. It is vital to the success of the case to conclude by looking back at the analysis to emphasise the following points:

1. Trends and ratio analysis can give a valuable historical picture of company performance, but need to be supported by funds flow analysis.

2. For appraisal of any company, only the future is really important. Both profitability and liquidity (including financial structure) must be forecast.
3. Assumptions are inevitable. Consequently different ranges of assumptions should be embodied and tested.
4. Valuation depends on the purpose and on the nature of the company's aims and characteristics.

Occasionally certain accounting questions are raised. The following notes may help:

1. *Deferred Taxation*

EPL benefits from capital allowances because of its investment programme, and from stock appreciation relief because stocks are growing in volume with sales and in price with inflation. Financial accounting arrives at profit before tax figure which then is reduced by the current rate of corporation tax (52%) to a post-tax figure. However the two sources of tax relief when applied to EPL's profit rendered them tax free in 1975.

Thus EPL's profit and loss account in 1975 is as follows:

	<i>£000</i>
Profit before tax	3,319
Taxation at 52%	<u>1,830</u>
Profit after tax	<u>1,689</u>

The tax accounts would be thus:

	<i>£000</i>
Profit before depreciation and tax	4,645
Tax reliefs which can be offset	<u>4,645</u>
Taxable profit	<u>0</u>

The tax relief applied of 4,645 applied in the tax accounts less the depreciation shield of 1,126 applied in the financial accounts multiplied by the tax rate of 52% i.e.

$$(4,645 - 1,126) 0.52 = 1,830$$

then becomes called deferred tax as it may become due in later years in the case of stock appreciation relief, or in the case of capital allowances will be reversed as the depreciation tax shield no longer is available.

This deferred tax is a liability in the balance sheet. Unused deferred tax does not appear in the accounts. In 1977 accounting standards altered the treatment of deferred taxation (ED19) but this was not known in 1976.

2. *Inflation Accounting*

In 1976 the debate over inflation accounting was in progress, it seemed likely that current cost accounting would be introduced. At that time companies were not obliged to produce inflation-adjusted accounts; EPL did not. However, it can be fruitful to ask students how well EPL's accounts portray the effect of inflation and what amendments they would make.

3. *Notes Payable*

The amounts referred to in Notes 3 and 4 refer to repayment of principal. We are not told what interest rate pertains to the loan from the insurance company. The £12,000,000 to be borrowed, in total, from the insurance company has specified prepayments before the maturity date of 1 December 1995.

Incidentally, the reference to the last payment being due in 1995 refers to financial year 1996, and will in fact be due on 1 December 1995.

4. *Right to Purchase*

The value of the right to purchase shares in the future at a specified price depends on the expectation that the market price of the share will exceed the option price at some time during the rights period.

If at the time of granting the right the actual market price of the shares had been greater than the option price, presumably EPL would have valued the right at the premium times the 150,000 shares, since the insurance company could have immediately exercised the right and taken the corresponding profit.

However, as it was EPL took independent advice from a merchant bank. The merchant bank intimated that if they were offered this right they would be prepared to pay £900,000 for it, or £6 per share. Assuming that the option is not exercised until 1989 (reason through what is implied by this assumption), and money is worth 10% to the merchant bank, then they are valuing EPL's shares in 1981 at £7.50p plus £23 (the present value of which is £6 at a discount rate of 10%), or £30.50p.

How has EPL accounted for the loan? First, on receiving the cash (assuming the transaction complete)

Dr. Cash	12,000,000	
Cr. Long-term debt		12,000,000

All tangible expenses incurred in connection with executing the loan would then be credited to cash and debited to loan expenses. However, the £900,000 is an intangible expense; real nonetheless, but involving no cash. The company has accounted for it as follows:

Dr. Other assets – deferred loan expense	900,000	
Cr. Capital surplus		900,000

The deferred loan expense is being amortised over the period of the loan. In 1967 £26,000 was amortised because the loan was executed about half way through the year; presumably £60,000 would be amortised in a full year.

Dr. Loan expense	26,000	
Cr. Other assets – deferred loan expense		26,000

The capital surplus portion will remain on the balance sheet indefinitely, or until it is decided to remove the amount by a journal entry relieving capital surplus and crediting retained profits.

Appendix 1

ANALYSIS OF HISTORICAL DATA

<i>Profitability</i>	1971	1972	1973	1974	1975
Profit as a per cent of—					
turnover	3.9	6.7	4.1	7.0	7.5
net assets	5.2	8.9	4.7	7.5	7.3
capital employed	5.0	8.7	4.8	7.9	7.9
shareholders' investment	7.2	12.7	8.1	15.7	16.3
<i>Cash Sufficiency:</i>					
working capital/turnover	.30	.27	.33	0.27	0.30
l.t. debt/capital employed	.30	.32	.40	.49	0.51
working capital ratio				2.0	1.98
liquidity ratio				0.7	.6
times interest earned				5.03	3.8
<i>Funds Management:</i>					
net asset turnover	1.31	1.30	1.12	1.03	0.91
receivables period – days				50.7	55.9
inventory turnover – per year				1.8	1.5
payables period – days				58	64.8
cash/sales – months				0.41	0.13

Cost Structure:

cost of sales – per cent of sales		65.0	63.0
selling, G & A		16.9	15.9
interest expense		3.6	5.6

Value – in pence

book value per share	94	1.06	1.34	1.30	1.72
earnings per share	0.07	13	9	20	28

*Appendix 2*PROJECTED DEBT POSITION
(£000's)

	1976	1977	1978	1979
<i>Opening Balance – end 1975</i>				
long-term	10,922			
short-term	4,398			
	<u>15,320</u>			
Less: subsidiary debt not guaranteed – FFI	2,408			
NDC	950			
Opening balance – restricted debt	<u>11,962</u>	13,800 ⁺		
New borrowing – (ins. co)	2,500	<u>2,500</u>		
Ending balance – restricted debt	<u>14,462</u>	<u>16,300</u>		
<i>Ceiling on restricted debt</i>				
insurance company loan	9,500	12,000		
other allowed	4,300	<u>1,800</u>		
	<u>13,800</u>	<u>13,800</u>		
<i>Debt Repayment</i>				
Required under loan covenant	662	2,500		
Other repayments – FFI		112	224	224
NDC	63	63	63	63
Insurance company				400
<i>Total Repayments</i>	<u>725</u>	<u>2,675</u>	<u>287</u>	<u>687</u>

+ £14,462 less 662 = 13,800

Appendix 3

TAXATION FORECAST

	1976	1977	1978	1979	1980
Capital allowance	8000	8000	1800	1800	1800
Stock appreciation*	2394	2993	3741	4676	5845
10% Adjustment	807	947	800	1020	1294
Tax relief @ 52%	5747	6206	3871	4592	5487
Relief used	2034	2764	3676	4816	6240
Relief unused	3713	3442	201	(224)	(753)

* assume 25% increase in stock

Appendix 4

PROJECTED PROFIT AND LOSS AND FUNDS FLOW (£000's)

	1976	1977	1978	1979	1980
Sales (25% growth rate)	28,060	35,075	43,844	54,805	68,506
Profit before interest and tax (20% of sales)	5,612	7,015	8,769	10,961	13,701
Interest (10% on £17 m)	1,700	1,700	1,700	1,700	1,700
Tax (52%)	2,034	2,764	3,676	4,816	6,240
Profit after tax	1,878	2,551	3,393	4,445	5,761
Non-cash charges					
Depreciation	1,400	1,800	1,800	1,800	1,800
Amortisation	60	60	60	60	60
Deferred tax	2,034	2,764	3,676	4,816	6,240
Increase in long-term debt	2,500	2,500	—	—	—
Funds available	7,872	9,675	8,929	11,121	13,861
Dividend payments	94	94	94	94	94
Capital expenditure ¹	8,000	8,000	1,800	1,800	1,800
Debt repayment	725	2,675	287	687	687
	8,819	10,769	2,181	2,581	2,581
Increase in Working ² Capital	(947)	(1,094)	6,748	8,540	11,280

¹ From 1978 onwards, assumed to equal to depreciation expense

² Clearly increased working capital will be required not only to support higher sales, but also to accommodate inflation.

Appendix 5

AN ALTERNATIVE PROFIT AND LOSS AND FUNDS FLOW PROJECTION
(The conclusions do not change)

Year	1976	1977	1978	1979	1980	1981
Cost of goods sold	1 17682	22103	27628	34535	43169	53961
Selling and Admin.	2 4474	5593	6991	8738	10923	13654
Interest	3 1700	1700	1700	1000	1000	600
	4 23856	29396	36319	44273	55092	68215
Sales	5 28060	35075	43844	54805	68506	85632
	6 4204	5679	7525	10532	13414	17417
Depreciation	7 1800	1800	1700	1700	1700	1700
Cash Flow	8 6004	7479	9225	12232	15114	19117
Dividend	9 94	94	94	94	94	94
ACT	10 49	51	51	51	51	51
Taxation	11 —	—	188	2416	5477	6975
Internal financing	12 5861	7334	8892	9671	9492	11997
Spare Cash Used	13 151	—	—	—	—	12997
Borrowing	14 1774	-176	-688	-688	-688	-686
Available	15 7786	7158	8204	8983	8804	24308
Debtors	16 771	1052	1316	1664	2055	2569
Creditors	17 —	—	—	—	—	—
Stocks	18 —	—	—	—	—	—
Plant & Equipment	19 7015	6106	4579	1700	1700	21739
Spare Cash Generated	20 NIL	NIL	2309	5639	5049	NIL
Cash Flow	21 6004	7479	9225	12232	15114	19117
Investment	22 7015	6106	4579	1700	1700	21739

Stock Adjustment	23	—	—	—	—	—	—
Tax Loss	24	1011	1011				2622
Taxable	25	—	362	4646	10532	13414	—
Plant Investment	26	7015	6106	4579	1700	1700	21739
Investment Plan	27	8000	8000	1700	1700	1700	30000
Shortfall	28	985	1894	2879	—	—	8261
Cumulative Shortfall	29	985	2879	0	—	—	8261

Fudge Creations Ltd

This capital budgeting case provides an opportunity to analyse a machine replacement problem in a situation in which the machine being considered for disposal is new. There are also a number of important uncertainties in the figures. Further, the machines being considered for purchase are labour-saving devices, and as nearly 500 jobs are involved the social issues may also be explored briefly, although few data are given about these in the case.

Two questions are supplied for discussion in the case text. The first asks whether Mr Morrazoni was wise to install the Markowitz machines in the first place. The second asks whether it would be better now to replace the Markowitz machine with the Horman machine.

THE FIRST QUESTION

The appendices to this teaching note offer some other calculations which may support a conclusion on this issue. Fig. 1 describes the costs and revenues which arise in evaluating the first question. This concerns the decision already taken by Mr Morrazoni to install the Markowitz machines in the first place. As almost all of the transactions are taxed on a cash flow basis, the amount and the post-tax amount columns are identical, except for the capital transactions. It is appropriate to begin the discussion of this question by getting participants in the class to list the cash flows without, at this stage, worrying about aggregating them. The Markowitz machines were purchased, additional mechanics were hired, some handworkers were made redundant, some machinists were hired or transferred. In addition, the machines had to be supplied, maintained and equipped with power and the second-hand value has to be taken into consideration.

Item	£	£ Post Tax	Period	13% PV
27 Markowitz	- 445500	- 213840	0	- 213840
2 Mechanics	- 15000	- 7200	1-5	- 25324
Hand workers	+ 859994	+ 412797	1-5	1451903
Machinists	- 103680	- 49766	1-5	- 175038
0.96x2x27x250x8				
Redundancy	- 1435100	- 688848	0	- 688848
Loan	+ 350000	+ 350000	0	350000
Interest 13%	- 45500	- 21840	1-5	- 76816
Second-hand	+ 297000	+ 142560	5	+ 77376
Supply cost	- 252450	- 121176	1-5	- 426204
27x(9350)				
Loan repaid	- 350000	- 350000	5	- 189966
			NPV	<u>83243</u>

Fig. 1. Replacing Manual by Markowitz

In addition, in evaluating the financial suitability of Mr Morrazoni's earlier decision from an equity standpoint, it is necessary to take into account the loan (£350,000) which must be (presumably) repaid at the end of the period, and on which interest at the stated 13% rate must be shown. The loan and its repayment are the only two items in which the post tax cash flow is not 48% of the pre tax cash flow column.

The present value calculations are carried out in the normal fashion and a net present value of £83,243 is arrived at. As this is positive the assumption is that the project would earn enough to cover the current rate of interest. As to whether that means the decision was a wise one there are, of course, a host of other considerations to take into account. The question of social desirability of the redundancies involved might be discussed. The appropriateness of using a 13% discount rate is also a discussable issue. This is the marginal cost of capital (as far as the information provides). There is a strong school of thought which would wish to employ the weighted average cost of capital instead. A calculation of the weighted average cost of capital is shown in Fig. 2. On this basis, the net present value becomes a very high positive number indeed.

Debt outstanding	£2,500,000 (Ex 2)	Per cent of total capital
28 February 1974		<u>27.5%</u>
Pre tax interest	<u>£ 140,071 (Ex 5)</u>	
After tax cost of capital = 3.36%		
New debt, Markowitz	£ 350,000	3.8
Pre tax interest (13%)	<u>£ 45,500</u>	
After-tax cost of capital = 7.8%		
Equity 1000 Shares @ £625 = £6,250,000		<u>68.7</u>
		<u>100.00</u>
After tax dividend £40,000		
After tax cost of capital = 6.4%		
Weighted average cost of capital = .275 x 3.36		
	+ .038 x 7.8	
	+ .687 x 6.4 =	<u>5.616%</u>

At this rate, the NPV of the switch to Horman from Markowitz is £497522, using cash flows from Fig. 4.1.

Fig. 2. Fudge Creations Ltd, cost of capital

The wisdom of the decision to invest in the Markowitz machines is not, of course, purely a financial issue. The market estimate would be a crucial factor. The trends in sales of the confectionery market in the region as indicated in Exhibit 3 of the case are hardly mouthwatering. It would seem likely that the company might spend its money more usefully on promoting the product instead of buying machinery which it can hardly employ. Nonetheless, it appears that as far as financial variables are of importance in this situation, the decision of Mr Morrazoni was reasonably sound.

THE SECOND QUESTION

Fig. 3 is an indication of the comparative capacity requirements of the Markowitz and the Horman machines. This indicates that if the decision to convert were taken six Horman machines would be required.

Fig. 4 indicates that the operating costs and savings of the two machines will result in an annual net saving from conversion to Horman, of £208830. On these assumptions we are in a position to draw up Fig. 5 in which the financial consequences of converting from the Markowitz to the Horman machine are explored. In this case all of the cash flows are taxed and therefore, the tax effect is virtually absent. The outflows which take place at the beginning would be the cost of the Horman machines and the redundancy payment to the Grade II attendants made redundant. No figure is given for the redundancy pay which would arise. An assumption must therefore be made. The amount of £2000 which was approximately the amount paid in the previous redundancy activity has been used in Fig. 5. It appears that Mr Morrazoni was being more generous in computing these redundancy payments than the law

requires. The payment under current British rules must be 1¼ weeks' pay for each year of service. As Mr Ted Whiting has pointed out, it is difficult to visualise how more than £1000 could be payable to each employee, in a company that has only been in existence for 18 years. The voluntary increase of the redundancy payment is, however, permissible and would be tax allowable in the case of arm's length transactions. The total amount of the initial outflow on an after tax basis would therefore be £357120.

Current demand	174,681
Markowitz capacity	
4 gross/hour	
8 hour/day	
250 days/year	
27 machines	216,000
Horman capacity	
17 gross/hour	
8 hours/day	
250 days/year	34,000 gross/machine
5 machines would give 170,000 gross capacity	
6 machines would give 204,000 gross capacity	

Therefore need 6 Hormans, or even 7

Fig. 3. Annual capacity requirement, Horman

Markowitz labour costs			
2 men			
27 machines			
250 days/year			
8 hours/day			
£0.96/hour			103,680
Horman labour costs			
1 man			
6 machines			
250 days/year			
8 hours/day			
£1.45/hour			17,400
Running costs			
	<i>Markowitz</i>	<i>Horman</i>	
Maintenance	£ 700	£4950	
Power	8050	14700	
Supplies	600	2000	
	9350	21650	
	27	6	
	<u>252450</u>	<u>129900</u>	<u>122,550</u>
Annual savings			<u><u>£208,830</u></u>

Fig. 4. Annual savings

Item	£	£ Post-tax	Period	13% PV
6 Hormans	- 636000	- 3-528-	0	- 3-5280
27 Markowitz	+ 297000	142560	0	142560
Grade 2 Attendant 1. 45x1x6x250x8	- 17400	- 83521	1-5	- 29376
Grade 3 Attendant u. 96x2x27x250x8	+ 103680	49766	1-5	175039
Redundancy (54x2000, say)	- 108000	- 51840	0	- 51840
Markowitz Operating 27x9350	+ 252450	121176	1-5	426204
Horman Operating 21650x6	- 129900	- 62352	1-5	- 219306
Scrap Horman	+ 534000	256320	5	139120
Scrap Markowitz	- 297000	- 142560	5	- 77376
			NPV	<u>199745</u>

Fig. 5. Replace Markowitz by Horman

At the same time, Mr Morrazoni would be able to sell 27 Markowitz machines for £11000 each, realising (after tax) £142560. However, he would therefore lose the opportunity to scrap the Markowitz's at the end of five years' time and the only information we have on this point is that the price fluctuates with demand and not with utilisation. Accordingly, we have a cash inflow representing the immediately realisable £1100 per machine, and an outflow relating to this decision which represents the lose of a cash inflow in the future, which arises because of our decision to scrap the machinery now. This, of course, begs the question as to the realisability of the £11000 in five years' time. It is suggested that the manager will have a degree of control over the timing of his replacement decision. He can perhaps, therefore, hold on to the machine until such time as the market for their realisation is a good one. In that case, the 297000 future scrap value for the Markowitz is not unreasonable. A similar argument will hold for the £534000 which is expected to be realised in five years' time when the Horman machines come to be disposed of. The other costs and revenues are of an operating nature, and their calculation is fairly routine and is based on Figs. 3 and 4.

The net present value is nearly £200000 and the decision therefore to convert from the Markowitz to the Horman machines appears economically sound. The arguments previously advanced on social issues of course remains, though with lesser force as the redundancy involves much fewer people.

TAXATION

I am grateful to Mr Edwin A. Whiting for the following notes on the tax issue:

In 1974 the corporation tax rate was 52%. A 100% allowance in the first year was given for the acquisition of plant and machinery. No information is given in the case as to whether the Fudge Creations Ltd company was actually paying 52% effective tax rate, but in the absence of information as to losses and other capital allowances, it is necessary to make that assumption.

A balancing charge will not arise on the sale of plant but the sale proceeds would be deducted from a pool of written-down values of assets brought forward to the current year. If the company has plenty of old plant in its cost pool (and a company which has been around for 18 years probably would) this resale of an asset at significant profit would restrict the amount available for writeoff from the written down values in future years.

However, it is much simpler to avoid this discussion entirely. The students will have no previous experience of the cost pool and it is rather a specialist point. Instead, it is easier and more useful to assume (as they are instructed to assume in the case text) that the 100% writeoff in the year of acquisition is counter-balanced by 100% tax charge on the year of disposal. This will be the actual effect in companies which do not have a significant number of carried forward assets.

It is also true that there would be a delay between the earning of a revenue and obtaining the tax benefit which it brings with it. This has been ignored in the exhibits and to this extent the exhibits are

inaccurate. If a more precise answer is sought, the assumption could be made that the tax will be payable 15 months after the transaction. At a 13% discount rate this could be simulated accurately by using a corporation tax rate of 45% instead of 52%. However, this assumption and adjustment has not been made in the text and in the exhibits attached.

Hanson Manufacturing Company

The Hanson case is a very old one, but is still effective in teaching cost behaviour. It can be used in at least two quite different ways. For beginners, it can be used straightforwardly as discussed below, while for experienced managers it can serve as a useful jumping-off point for more advanced discussions of cost behaviour, using some readings on regression methods or on multiple category cost analysis.

George Benston's 'Multiple Regression Analysis of Cost Behaviour' (*Accounting Review*, October 1966), Robert Beyer's *Profitability Accounting for Planning and Control*, (Ronald, 1963 and my own 'Computerised Cost Classification System' (*Management Accounting* (USA), February 1972) all provide bases for developing the idea of contributions and of cost behaviour. For management audiences, the use of contribution analysis, and the concepts underlying it, will nowadays be commonplace. They can be expected to answer the case questions in very short order, so that the bulk of the class period can be spent on some measurement problems and causation problems arising in cost behaviour analysis.

The case itself has two questions. It is not advisable to take a vote on either, because the verdicts will be close to usually in favour of retaining product 103 and in favour of deferring the price reduction decision until some more market data are available. The unanimity may inhibit discussion. It is better to invite an individual to give his verdict on question one and to blackboard his rationale.

The rationale will no doubt be based either on exhibit 2 or on exhibit 4. A chart based on exhibit 2 is given at the end of this note, which it is useful to have on a transparency. This shows the contribution figures on a per-unit basis. The contributions can then be used in reconciliation of the profit or loss for either exhibit as shown in the two reconciliation transparencies.

Once the students' version is up, there will be some discussion on cost behaviour issues, notably on the adequacy of an analysis which treats costs either as totally fixed or as totally variable. A diversion into multiple regression (à la Benston) may be appropriate here, especially if a few statistically minded managers bring the idea up.

It is also useful to take a look at the standards in exhibit 4 and the variances from them. The standards are primitive, being the most recent actual figures per unit. The variations are therefore a mixture of price and volume effects, which cannot be separated completely. It is notable, though, that the aggregate variation on the variable costs is only 9 in approximately 2544, so the volume variation on fixed costs must be the main item.

On question 2, the decision is much less clearcut. The financial side can be studied by asking a student for his reasoning. A chart like "Product 101" attached should result. This suggests that the cut is sound, but omits many important questions. Also the estimates are very rough. If the firm manages to hang on to 918000 cwt in sales at \$2.45 the price cut is exactly offset. We do not know the answer to this question.

Even though the figure calculation indicates that the price reduction will bring in more revenue to the company, there are other considerations which should be taken into account. Some of these are:

1. If Hanson does not lower the price, it may lose customers permanently. Some customers may decide not to stay with a company that is unwilling to meet competitive prices.
2. If Hanson lowers the price, Samra may go even lower, although there is no reason to believe this will happen.
3. If Hanson lowers its price now, it may be difficult to raise the price later on.
4. Hanson may do well to keep its \$2.45 price for a while and see what happens.
5. What is happening to Product 101? Is it on its way out anyway? Industry sales are lower in 1955 than 1954.

From the above, it is apparent that the problem becomes one of marketing strategy. The figures calculated above can help to show the effect of various strategies, but they by no means provide the solution to the problem.

Rent	532
Property tax	152
Property insurance	145
Compensation ins (5% Ind lab)	44
Indirect labour	883
Light and heat	38
Building service	25
Selling exp	1838
GA	653
Depreciation	1357
Interest	145
Other income	<u>(20)</u>
	5792
Loss	<u>51</u>
	5741

<i>Item</i>	<i>Contrib/Unit</i>	<i>Units</i>	<i>Total</i>
101	1.3851	2132191	2954
102	1.3585	1029654	1397
103	1.4039	986974	<u>1390</u>
			<u>5741</u>

Fig.1. Reconciliation of 1954 income

	<i>101</i>	<i>102</i>	<i>103</i>
Direct labour	0.6063	0.5922	0.6965
Comp ins (5%)	0.0303	0.0296	0.0348
Materials	0.3585	0.4576	0.4912
Power	0.0105	0.0242	0.0305
Supplies	0.0245	0.0462	0.0355
Repairs	<u>0.0083</u>	<u>0.0145</u>	<u>0.0103</u>
	1.0384	1.1643	1.2988
Selling price	<u>2.4235</u>	<u>2.5228</u>	<u>2.7027</u>
Contribution/unit	1.3851	1.3585	1.4039

BEST

Fig. 2. Unit contribution

Rent		261	
Prop tax		77	
Prop ins		73	
Comp insurance		23	
Indirect labour		448	
Light and heat		20	
Bldg service		10	
Selling exp.		983	
G & A		328	
Depreciation		681	
Interest		73	
Other income		<u>(11)</u>	
		2966	
Profit		<u>80</u>	
		<u>3046</u>	

<i>Item</i>	<i>Contrib</i>	<i>Units</i>	<i>Total</i>
101	1.3851	996859	1376
102	1.3585	712102	970
103	1.4039	501276	<u>700</u>
			<u>3046</u>

Fig. 3. Reconciliation of income, Jan-June 1955

Let one unit of capacity be consumed on the production of one unit of 102.
 The direct labour dollars are said to be the best measure of capacity usage.
 If one unit of capacity is used on producing 1 x 102,

1.025	$\frac{6063}{5922}$	units of cap are used per 101
1.178	$\frac{6965}{5922}$	units of cap are used per 103

$$\text{Contrib/unit of capacity} = \frac{\text{Contrib/unit}}{\text{Units of cap/unit}}$$

	<i>C/U</i>	<i>UC/U</i>	<i>C/UC</i>	
101	1.3851	1.025	1.35	
102	1.3585	1	1.3585	BEST
103	1.4039	1.178	1.19	

Fig. 4. Capacity use 1954

Reduce price to \$2²⁵?

	<i>Unit</i>			
	<i>Std Costs</i>	<i>Adjustment</i>		<i>Adjusted</i>
Comp ins.	303			303
Direct lab	6063			6063
Power	105			105
Mat	3585	- 5%	-179	3406
Supplies	245	-5%	- 12	233
Repairs	<u>83</u>			<u>83</u>
	1.0384			1.0193
	1,000,000 units		<u>\$ 1,019,300</u>	
	<u>\$2²⁵</u>			<u>\$2⁴⁵</u>
	1,000,000 cwt			750,000 cwt
Sales	2,250,000			1,837,500
	<u>24,300</u>			<u>19,800</u>
	2,225,700			1,817,700
Var cost				
(1.0193x)	<u>1,019,300</u>			<u>764,475</u>
	1,206,400			1,053,225
	<u><u> </u></u>	<u>\$ 153,175</u>		<u><u> </u></u>

Contrib \$ 153,175 higher at \$2²⁵
 BUT how good are estimates?

Fig. 5. Product 101

James and Breasley Ltd

CASE OBJECTIVE

James and Breasley Ltd (J & B) is a case study in the design, implementation and operation of a financial control system. It explores budgetary control in a manufacturing environment, demonstrating the technical, managerial and behavioural aspects of financial control. The principal features are discussed in these notes, but the case is so rich in material that teachers may wish to select only certain issues, or indeed examine others which are not emphasised here. Taken together, cases A and B provide a realistic foundation from which management control system frameworks can be derived.

The student is asked four major questions:

1. To comment upon Frank's operating statement.
2. To comment upon Stokes' 'improved' operating statement.
3. To consider the design, implementation and operation processes involved.
4. In Case B to consider further how the system should be designed and operated.

Case A is a valuable case on its own; Case B adds many of the all-important behavioural issues, plus some equally relevant technical considerations. It has been found helpful to ask students to prepare Case A first for class discussion. Then Case B can be distributed for immediate reaction and diagnosis. The students can then make further recommendations through syndicate discussion, or produce a written report. Normally by separating the cases in this way, Case B makes a considerable impact, clearly demonstrating the importance of designing and operating financial control systems as socio-technical systems.

CASE 'A' ANALYSIS

Experience suggests that certain key points can be extracted from Franks' operating statement, with further discussion centred on Stokes' 'improvement'. There are at least nine issues which Franks' report demonstrates:

1. Reporting for action
2. Controllability
3. Allocation and apportionment
4. Significance
5. Overhead recovery
6. Activity levels
7. Flexible budgets
8. Cost centre definition
9. Report design

1. *Reporting for Action*

Students can be asked what is the purpose of this report. Its value as a control document can then be explored. Does it look like an *operating* statement? What does it emphasise? What would be *your* reaction to it? Is it likely to stimulate action? Clearly answers can only be negative and lead on to discussion of the following issues.

2. Controllability

This is the keystone of departmental control systems, for it is frequently meaningless or even dysfunctional to report costs or revenues which are outside the control of the departmental manager. Clearly he must be able to act on the cause of variances and this is generally a function of (a) his level of responsibility and authority and (b) organisational delineation.

Students can be asked what the pipe-making manager can do if depreciation variances occur; clearly nothing unless he is managing an investment centre, not a cost centre and even then investment charges are probably deliberate. Likewise can he control NHI and Graduated Pension when this is a function of manning, the more controllable variable. It can be debated whether reporting such items obscures the important issues, provides excuses for poor performance, or diverts attention. Of course controllability is more complex than this; often the manager can influence costs, even if he cannot ultimately control them. Repairs and maintenance is an example where the pipe-making manager influences the repair level by how well he looks after his machines, and might influence the costs of repairs or maintenance by how closely he monitors the work of the maintenance department.

Thus one would expect students to demand more emphasis on controllable costs and less on the non-controllable. It can be pointed out however, that exclusion of all non-controllables may provide incentives to shift responsibility, or might foster fragmentation so that inter-departmental conflict rather than co-operation arises. In a business such as J & B this may be a crucial consideration. Furthermore controllable costs, such as those arising outside the enterprise, can all too readily be classified as non-controllable. Therefore, ideally a report might emphasise the predominantly controllable, also include the influenceable and jointly controllable, but exclude the non-controllable.

3. Allocation and Apportionment

If costs are joint between cost centres, that is overheads, they have to be allocated on some basis. It may well be that by removing non-controllable items, the need for allocation largely disappears. However, influenceable overheads will remain and have to be allocated according to input, output or ability to pay bases and either ex-ante or ex-post. The relative merits can be discussed using the pipe-making department as an example.

4. Significance

In designing reports for action, it is generally found that it helps to emphasise those costs or revenues which are significant. Franks' report can be faulted in that labour and materials are probably the items over which he has most control, yet they are hardly the principal feature of the statement. Furthermore, might other criteria such as quality or completion dates be equally important?

5. Overhead Recovery

This is emphasised by Franks because of the Managing Director's interest in the matter. Clearly overhead recovery is important at overall plant level, but what can the Departmental Manager do about it other than treat it as background information? For control action, overhead variances need to be split into spending and volume variances (covered in the discussion of Stokes' report). The first requirements are to set valid activity levels, define relevant cost centres and compute meaningful recovery rates.

6. Activity Levels

Clearly, meaningful comparison of actual costs against budgeted costs can only be made if the budget reflects the current activity level. The wages variance in Franks' report could be explained by lower levels of activity, efficiency variances or wage rate variances. A first step is for the budgeted amount to reflect the month's level of activity (volume) and then to compute the standard wage costs for that level (see discussion of Stokes' report).

For overhead control, budgets must be based on realistic activity levels. In Franks' report he expects every £ of wages to recover £3.75 overheads. Thus if activity levels are below those forecast at the beginning of the year (or below 'normal' activity) overheads are under-recovered with a positive, yet meaningless variance. Conversely higher than expected activity levels produce too lenient an overhead recovery (Fig. 1a). Instead if *flexible budgets* are used reflecting actual activity level for the period, then the fixed, step function and variable elements of overheads can be recomputed to produce a realistic overhead budget. (Fig. 1b).

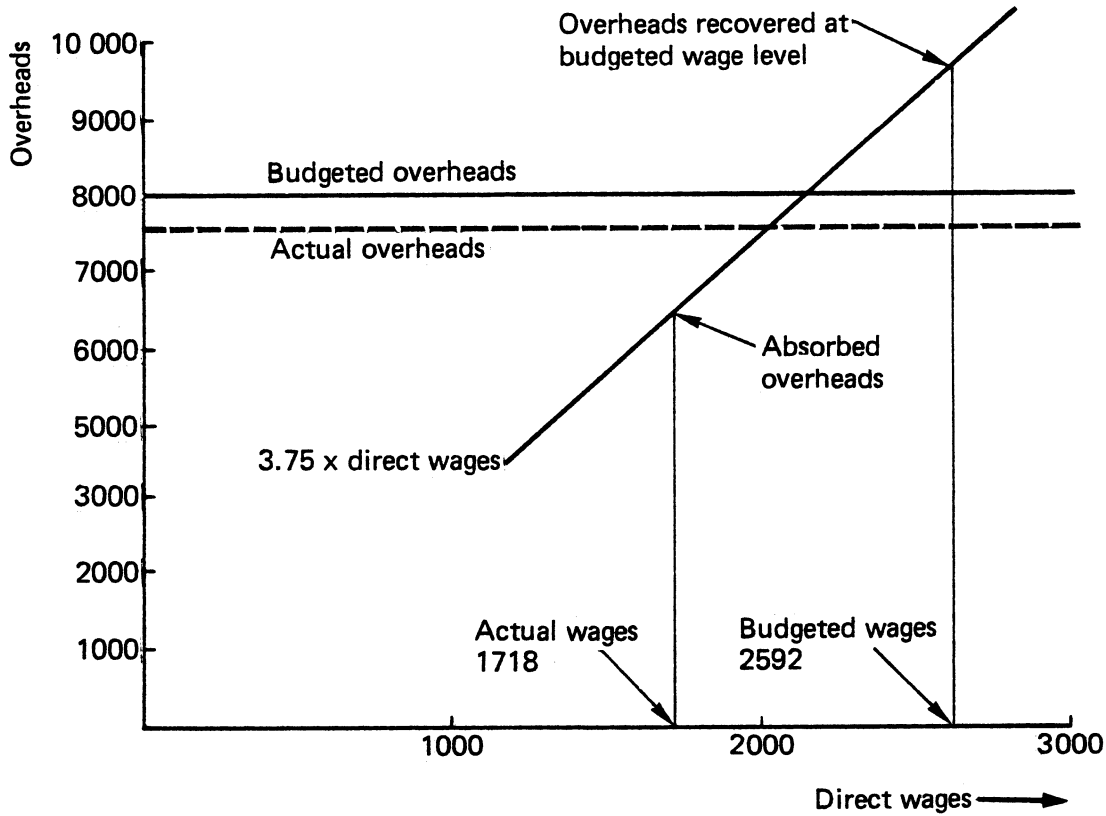


Fig. 1a. Mr Franks' overhead budget

Item	Variable test per hour	1000 hours	p500 hours	2000 hours
Repairs		500	700	850
Shop labour		600	700	900
Depreciation		350	350	350
Power	0.20	200	300	400
Added time	0.06	60	90	120
TOTAL		1710	2140	2620

If 1500 hours is the 'normal activity level' then for product costing the overhead rate might be $\frac{2140}{1500} = \text{£}1.426$ per hour

Fig. 1b. A flexible budget worksheet

Students can be asked how they would derive activity levels. Clearly the activity index should reflect the factors that cause variation in costs. Often the causation is output-related but the relationship is so complex that we have to resort to input factors such as direct labour hours or machine hours. Again standard hours are preferred (see below) but in their absence actual hours have to be used.

7. Flexible Budgets

Therefore, by computing expected or 'ought to' overhead costs for the current activity level it provides a more meaningful benchmark or standard. Cost variation with activity can be derived from examination of historical records, either by approximation or by more sophisticated methods such as regression analysis. Fig. 1b illustrates a typical worksheet. It must be remembered that where activity levels

change frequently, lags occur in reaction and adaptation. For this reason, year to date figures can provide a sensitive context. The difference between the actual overhead cost and the flexible budget is the controllable variance; the difference between the flexible and fixed budget is the volume variance.

8. Cost Centres

Milne was concerned about cost centre definition. Should overhead recovery be calculated on departmental activity levels or on a machine, section or process basis? Obviously a key question again is what causes overhead expenditure. Generally the complexity and cost of such detail is excessive. A departmental index suffices for control. However, for other analyses in decision-making, multiple indexes may be worthwhile. As in much cost accounting, it depends on the purpose.

9. Report Design

Budgetary control, and its reporting aims to influence managerial behaviour by encouraging pursuit of sub-goals and helping analysis of cost variances. Report design is therefore as much an exercise in communication and persuasion as it is of technical principles. It can be asked whether Franks' report helps Managers, especially those who either do not understand accounting, or distrust it. As is demonstrated later, information *use* is as important as information provision.

Mr Stokes' report provides an opportunity to examine some other aspects of budgetary control reporting, and to re-examine some of the earlier issues. In particular the following factors can be discussed.

1. Controllability
2. Overhead control
3. Standard costs
4. Levels of reporting
5. Operating measures
6. Report design

1. Controllability

Mr Stokes has attempted to separate controllable items more clearly and they are the focus of the report. However the prime costs, and significant costs, do not stand out. Nevertheless the bulk of the report is relevant.

2. Overhead Control

Mr Stokes has separated variable overheads from fixed overheads. The former he regards as influenceable and relates to hours produced in a flexible budget. The latter he separates between (a) discretionary costs controlled by top management but traceable to the department and (b) discretionary costs which are allocated on a potential usage basis. Such overheads could perhaps be consolidated, since all that is relevant to the machine shop manager is awareness of his overhead recovery for the period. Indeed as Stokes hints in his memo, a global factory capacity variance could be computed in order to save the time-consuming allocation process.

Stokes recognises that at the moment he can only distinguish overhead volume or capacity variance and spending variance (see Fig. 2a where the total cost budget is shown using activity levels based on productive hours). With use of standard costing he could establish efficiency variances as well, (see Fig. 2b) although it should be pointed out that in the case of overheads, the efficiency variance is somewhat fragile.

3. Standard Costs

Stokes is keen to implement standard costing, especially measurement of standard hours. Discussion of this point allows examination of the costs and benefits of standard costing. The need in manufacturing to support budgetary control with standard costs can be explored, concentrating on the price and usage variances and how they can be used in performance measurement of different functions in decision making. It should also be stressed that standard costing is an expensive system to maintain, especially in situations like J & B where the work and task is so uncertain.

4. Levels of Reporting

Franks' and Stokes' reports suffer perhaps because they attempt to satisfy both departmental and factory management needs. At the departmental level detail on controllable costs is required with only perhaps a summary memorandum line on the department's or factory's overhead recovery. Conversely factory management requires summary information on each department and detail on global costs.

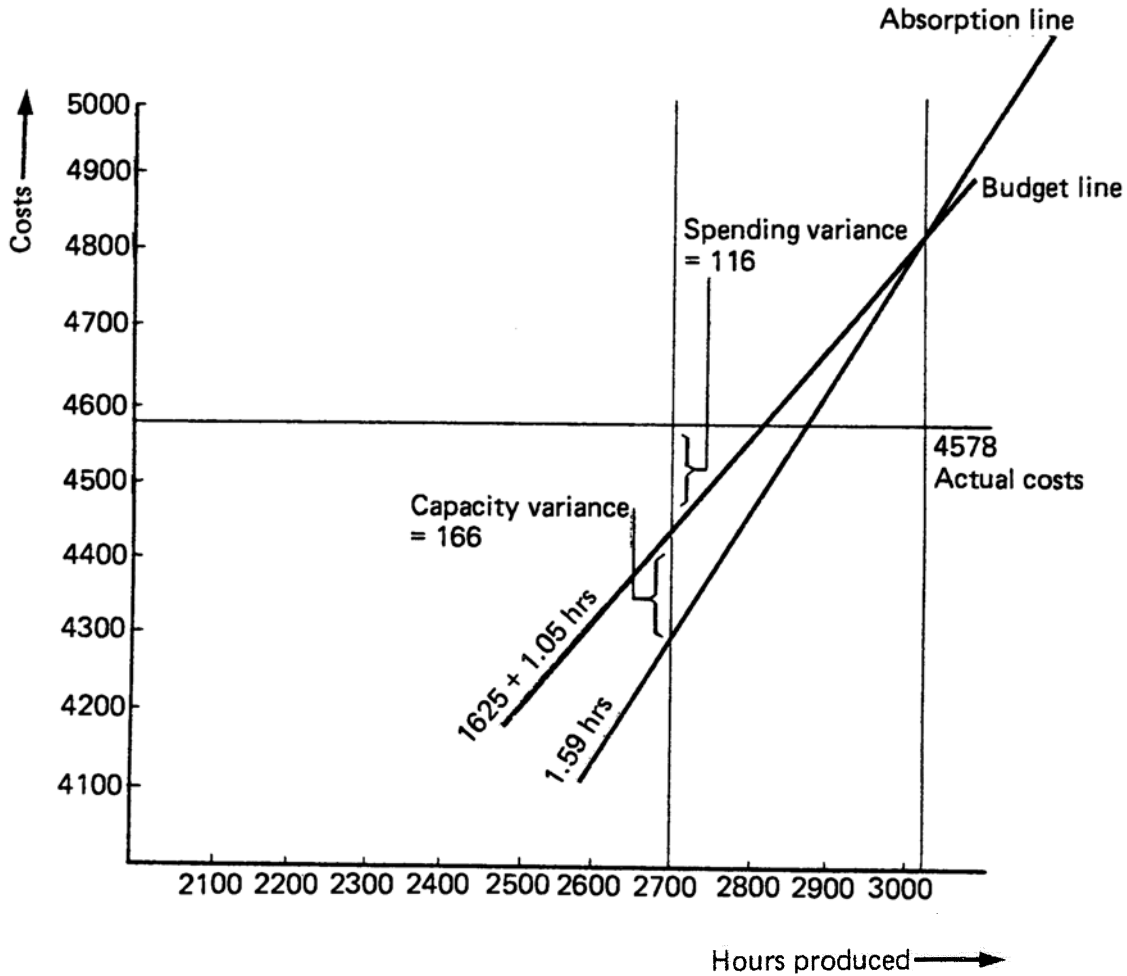


Fig. 2a. Mr Stokes' cost budget

Actual overhead incurred			
Flexible budget for actual hours			
Standard cost of actual hours			Spending variance
Standard cost of standard hours		Volume variance	
		Efficiency variance	

Fig. 2b. Overhead variances by standard costing

Students can be asked what balance of detail they recommend, bearing in mind that, say, the machine shop manager should be monitored at a higher level, yet not feel the works manager is constantly looking over his shoulder.

5. Operating Measures

Stokes has tried to provide key operating statistics on production. If standard hours were available, this would present a useful picture of both production input and output. Students should be asked for their opinions on such non-financial information. Hopefully they will support such measures for they are probably (a) more meaningful than cost data, (b) more relevant, and (c) better comprehended by production management whose daily work revolves around such measures. Often non-financial controls are more effective in some environments than costs and revenues. Indeed there may be other controls which are more important. See below.

6. Report Design

Stokes' report is 'cleaner' and more action-orientated; in particular the logic of budget, actual and variance columns in that sequence has been found to aid digestion. Conversely would year to date figures help; and if superiors are to discuss these reports with subordinates and if the reports are to be action documents, would a Remarks column be of value? The key question is the nature of the management process which these reports serve.

The students are asked how J & B can ensure the operating statement is a key to efficient and effective management control. Further they are asked to consider whether J & B should have concentrated on this end of the budgetary control process. Both these questions can be addressed by examining the design, implementation and operation processes of the J & B system. The following issues arise:

1. The linkage between planning and control.
2. Budgeting as a management process.
3. Who designs the system and how?
4. Which controls really matter?
5. The cost of costing.
6. Behavioural aspects of budgeting.
7. Are budgeting systems universally applicable?

1. Planning and Control

It seems that neither Franks nor Stokes have examined the budgetary planning process. How do these budgets relate to the total J & B profit plan, if at all? More important, should not the Departmental Managers be involved in setting the budgets through superior-subordinate negotiation? Participation in budgeting is generally held to be desirable, although there is less agreement on why it helps and how to go about it. Here theories of motivation, aspiration levels and communication are relevant. It has of course been suggested that control budgets built around such behavioural factors may differ from those used in planning. What is clear in J & B is that without some consultation or participation, the system will probably fail and the budgets will not be met.

2. Management Process

Milne has failed to appreciate that budgeting is a management process, not an accounting technique. To ask Franks, a cost clerk, to design, implement and operate a financial control system is folly. Ask students their thoughts on implementation; they generally feel strongly that an accountant should not be 'pointing out where things are going wrong' or being 'firm and persistent'. Clearly budgetary control should have been introduced from the top and implemented through all levels of management, for it is the managers who will use the budget reports.

3. The Design Process

It could be argued that if either Franks or Stokes were employed to design a system, the J & B managers should have helped them. In other words, participative design was required for several reasons:

- (a) Participation in design would have helped educate and develop managers into budgeting.
- (b) Participative design might aid motivation in budget-setting and achievement.
- (c) Managers have good ideas and especially understand the business and its needs.
- (d) The controls and the reports might then better fit the needs of the business and the styles and abilities of the managers.

4. Control and Controls

Stokes and Franks emphasised costs and efficiency. Inevitably this influences managers to concentrate on these controls whereas other aspects of performance might be more important – for example completion dates and quality. Furthermore, departmentalism might erode the co-operation which J & B contracts require. Budgets can focus on the wrong variables and thereby distort performance measurement and ultimately be dysfunctional. If J & B managers had contributed to the design, other controls may have been incorporated. Controls do not necessarily bring about control.

5. The Cost of Costing

There is inadequate guidance, but perhaps the introduction of cost-orientated control in J & B is too expensive. Simpler but more relevant controls may be preferred. Controls and information are not free goods.

6. Behavioural Aspects

The evidence so far indicates that social factors have been overlooked in the application of financial techniques. It is important that budgeting systems, since they aim to influence managerial behaviour, do not either incorporate invalid behavioural assumptions or indeed overlook behavioural considerations completely. We seek a blend between the technical system we aim to use and the social system in which it must operate – a socio-technical view. This is explored in more depth in Case B.

7. Universality

Finally, the momentum for budgetary control comes from Milne who was used to well-developed budgeting procedures in his previous company. There is a suggestion that this momentum overlooks the fact that J & B is a different business. Students should be asked how universally applicable a financial control system can be. Case B reveals the answer and provides evidence for a contingency approach.

CASE 'B' ANALYSIS

Some of the incipient problems evident in Case A become readily apparent in Case B. Not only had budgetary control not improved performance, but disturbing responses exist. Both social and technical problems are described in the case and these allow deeper discussion of budgeting. In particular, the following are significant.

1. Budgets and management style.
2. Budgets and group dynamics.
3. Budgets as pressure devices.
4. Budgets and performance evaluation.
5. Budgets and manipulation.
6. Budgets and accountants.
7. Task and technology.
8. Controls and control.
9. Managing reports.

1. Budgets and Management Style

Introduction of budgetary control in J & B it seems, is a move towards participative management. Often budgeting is advocated because it fosters participation. And many authorities claim Managers should participate in setting budgets and in subsequent analysis of performance. This case reveals the dangers of such generalisations.

Firstly, both company and individual manager's styles may not be participative. Authoritative styles and committative styles are not uncommon and may be valid in their context. Thus the mode of budget operation may have to fit a particular style and could vary within the same company. Clearly participation is not a panacea; indeed there is evidence that some managers prefer not to participate 'just tell me what I have to do and let me get on with it' is not a rare sentiment. Such attitudes can also provide escape from responsibility.

What would have helped at J & B is some measure of participation in the design and implementation of the system. Not only would managers have been developed into the system; they would have influenced its design and use.

2. Group Dynamics

Hofstede (see below) observed how group dynamics can influence budgeting behaviour. Often a manager may have loyalty to a peer group, a professional group, a subordinate group, an informal work group etc., because that group helps him attain his own individual goals. Indeed the group may influence his loyalties and values in the process. Such cohesiveness will influence his aspiration level and thus his response to budgets. In J & B the peer groups and work groups appear to produce such cohesion and thus have blunted the impact of departmental budgetary control.

Participation may help break down group loyalties and cohesiveness. On the other hand, in J & B where task interdependence is high and where craftsmen-supervisor relationships need to be strong, perhaps the control system should match the group structure more closely.

3. Pressure Devices

Argyris (see below) discovered how budgets can easily become, or be perceived as, pressure devices. Top management applies pressure on subordinates, through the budget, to improve performance. Often the search for constant improvement creates tension, leads to pressure being amplified through the levels of the organisation, or reinforces loyalties to other groups in self-defence.

In J & B the Works Manager is perceived to use the budget to exact retribution. His reluctance to delegate and devolve control and information would only increase the pressure; we see therefore how management style can impair the effectiveness of budgetary control.

4. Performance Evaluation

Tension and pressure can also develop where budgets are used in evaluation of managerial performance. Hopwood (see below) suggests that three styles of evaluation – budget-constrained, profit-conscious and non-accounting – can be discerned. These styles may not encourage managerial behaviour consistent with the organisation's long-run effectiveness. For instance, in J & B, emphasis on cost control may impair future quality control and delivery performance for which the company has a strong reputation.

These styles also have different effects on job tension, relationships with colleagues and so on.

In other words, budgets must be used with care. The use of Franks as budget officer, the momentum from Milne of applying a system imported from elsewhere, and the Works Manager's attitudes may bring about a style of evaluation which imperils J & B's future.

5. Manipulation

One way of relieving pressure applied by budgets, or of influencing budget-orientated performance evaluation, is to manipulate the budget data. Managers soon learn how to construct protective budgets; others are equally skilled at hiding unfavourable variances, mis-classifying costs, misrepresenting output or indeed – as at J & B – suppressing information. It should be remembered that some such 'adaptations' may be valid, perhaps avoiding inappropriate or dysfunctional consequences of a poor budget, or budgeting system.

6. Accountants

Where accountants design, implement and *operate* the budget, then insensitivity is likely. The accountant – such as Franks – is seen as an adversary, a critic and a fault-finder. Furthermore he is perhaps perceived to be free of the responsibilities and anxieties that typically weigh down the line manager. And if the accountant reports to top managements – Franks reporting to Milne for example – he may also be seen as an informer. Consequently hostility, defensiveness and non-co-operation are no means unlikely.

Clearly budgeting is a *management* process. The Accountant's role should be a facilitator not a controller. Accounting staff advise, assist and provide information and feedback.

7. Task and Technology

One firm's task and technology is frequently different from another's. J & B is engaged in long cycle-time, heavy, one-off constructional engineering. Standard costing and tight budget plans do not fit such technology as well as in process or mass-production industry. J & B's task relies on interdependence between skills, functions and departments. Close departmental cost control may impair that interdependence. On the other hand such task uncertainty may require more information processing than simpler processes in other firms. Woodward (see below) established a relationship between organisation structure and technology. Financial control systems are likewise related; Milne, Franks and Stokes failed to identify the critical features of J & B's task and technology. A more appropriate budgeting system would then have evolved.

8. Controls and Control

It is all too simple to devise controls in the hope that performance will improve. Case B shows how new controls assume a significance that is perhaps not intended. By emphasising control of labour, attention was shifted from the progress and control of individual jobs. Indeed managers were confused about the objectives of the system. New controls must be designed in congruence with other organisation objectives; otherwise suboptimisation is inevitable.

9. Managing Reports

Once control reports are introduced, managers quickly respond by either ignoring them if they seem inappropriate and unimportant, or by directing attention to the factors the reports emphasise. Case B illustrates how the flaws in report design discussed in Case A produced dysfunctional behaviour. Furthermore, reports can become abused by managers, for example by the Works Manager to exact retribution.

Case B thus demonstrates that information and report design not only must be based on sound technical principles, but constructed on realistic assumptions about how people behave. Designers must consider how information is used as much as how it is provided.

From the above discussion, the case can be used to discuss two important frameworks for financial control system design:

1. Socio-technical systems.
2. Contingency Theory.

1. Socio-Technical Systems

At its simplest, the socio-technical view says that technical systems should fit their social environment. Firstly, it is perhaps important that technical and economic values should not override social values. Thus factors like the quality of working life should be recognised and explicated. Secondly, it is likely that without such a good fit between the technical system and the social system, there is likely to be inferior implementation and operation.

Fig. 3 illustrates a socio-technical view where the technical system – in our case a financial control system – should fit the other variables of an organisation, namely the task, structure and people. In J & B examples are available of how these variables influence each other. For example:

- (a) The task of constructional engineering demands interdependence between functions, skills and departments. Did the budgetary control system help or hinder this interdependence?
- (b) The people presented various problems. In particular was the works manager's authoritarian style congruent with the demands of budgetary control?
- (c) Did the budgeting process, especially in budget-setting and performance analysis, follow both the hierarchical and lateral structure which probably exists in J & B?

Fig. 3 is only a framework. Other social factors may not come out of the model, for example, organisational climate. What is important is that system designers first examine and identify the social characteristics of the organisation, and then design the control system to fit.

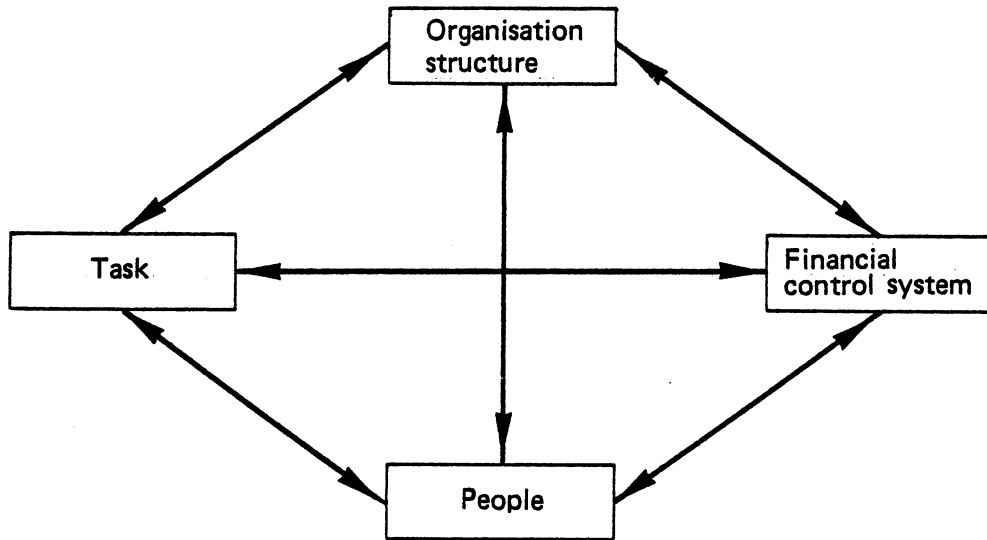


Fig. 3. A socio-technical view

2. A Contingency View

Several writers in organisational theory believe that organisational design is contingent upon the environment in which the organisation exists. The contingent variables they emphasise tend to be the external environment (especially its degree of uncertainty), the organisation's strategy, the technology, the task and the people. Fig. 4 presents such a view, adapted for financial control system design. The events in J & B provide a powerful argument for the contingency approach. A system which worked in another firm in Scotland was clearly ill-suited to James and Breasley. Financial control systems like organisations, cannot be designed as packages suitable for universal application.

Again the salient features of the local context must first be identified.

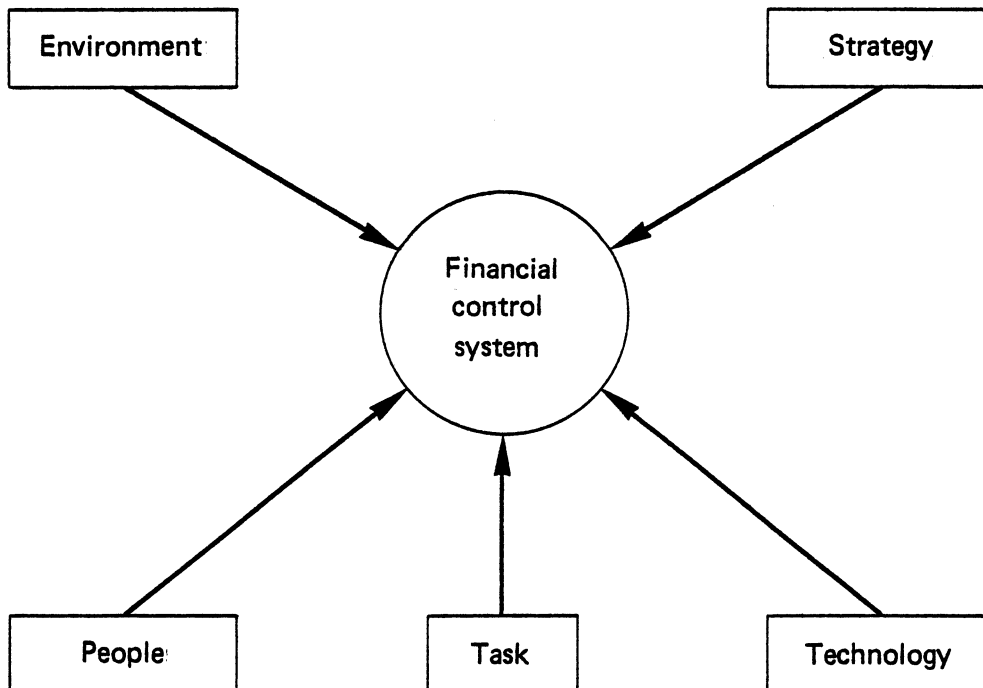


Fig. 4. A contingency view

The next step for J & B therefore is to analyse its particular external and internal environment. Then a relevant financial control system can be specified. Whilst without further information we might again overlook some crucial features, a revised management control system might incorporate the following features:

1. Participation
2. A Project Orientation
3. A Performance Focus
4. A Reporting Package
5. Encouragement of Informal Behaviour

1. *Participation*

Involvement of managers in redesign might (a) be of educational value, (b) help develop the organisation, (c) ensure the critical features of J & B are recognised and (d) help ensure the new system is used.

Involvement of managers in budget setting might help ensure more realistic plans are devised.

To foster participation, those with antipathetic views such as the works manager may either be in need of management development or of redeployment. It would seem that J & B's task demands participation rather than autocracy.

2. *Project Orientation*

It is difficult to plan the year's operations reliably and impossible to derive activity levels. Perhaps therefore for *control* purposes, each new contract or job should be planned on a project basis. Targets of completion, cost and quality would be set by those involved and responsibility would be delineated. Project planning and control techniques such as PERT could be incorporated.

Performance would be measured against project plan and across departments in order to encourage integration and co-operation. If necessary departmental costs can be collected and reported *within* the project framework.

Perhaps the organisation needs restructuring to support a project focus. Project managers might be appointed to plan and be responsible for the total performance of each contract. The weaker departmental managers and the difficult Works Manager would then continue in their functional roles.

3. *Performance Focus*

A project (or matrix) management approach allows performance to be measured in several dimensions and units besides cost, for example:

- profit on the contract, to encourage profit awareness and responsibility;
- costs to encourage cost control;
- completion dates to maintain delivery performance and aid trouble shooting;
- quality measures to encourage technical excellence.

4. *Reporting Package*

From such an approach it is likely that at least three levels of reporting are required:

- a project control report for project managers;
- a departmental cost report for departmental managers;
- a total performance report for top management.

5. *Informal Controls*

Social and self controls can be as effective as administrative controls. The new system should not discourage local and *ad hoc* initiatives nor informal and private control and information systems. The informal work groups could be supplied with project planning and control information to encourage the commitment and adaptation which informal groups bring. If other systems evolve they should be examined to see if they indicate improvements which should be made to the formal system, or whether they would be more effective if left as informal processes. Finally some of the schemes which Stokes

suggests in Case B should be investigated; they provide the supporting controls that most financial control systems require in complex organisations.

FURTHER READING

Basic reading is recommended in the case book. In addition the following texts have proved to be valuable supportive material.

- Argyris, C., *The Impact of Budgets on People* (New York Controllershship Foundation, 1952).
Bruns, W.J. and De Coster, D.T., *Accounting and Its Behavioural Implications* (McGraw-Hill, 1969).
Hofstede, G.H., *The Game of Budget Control* (Tavistock, 1967).
Hopwood, A.G., *Accounting and Human Behaviour* (Accountancy Age Books, 1974).
Lupton T., *Management and the Social Sciences* (Penguin, 1971).
Woodward, J., *Industrial Organisation* (Oxford University Press, 1965).

Manaus Woodpulp Corporation

CASE OBJECTIVE

Manaus Woodpulp Corporation (MWC) is a case study on capital investment appraisal under uncertainty. It is an example of one of the most problematic forms of capital investment appraisal, namely where the investment is direct and overseas. The scale of this particular project, and the uncertainties involved, may well justify use of a computer simulation model. Such a model is described in the case and perhaps should be extended.

The case study thus:

1. provides a capital investment appraisal problem
2. describes computer simulation modelling
3. demands further analysis
4. allows discussion of financial modelling
5. provides an opportunity to develop and use a financial model
6. also presents non-quantitative challenges
7. poses a financing structure question.

In particular the reader is asked the following questions:

1. What should the analyst do with the numbers obtained from the simulation analysis?
2. What recommendation should he make to the investment committee, as to total participation and proportion of equity within that total?
3. If you were told that the Brazilian cruzeiro had just devalued by 25% against the U.S. dollar, would you like the project more or less than before? Selling expenses, debt interest, debt retirement, and export revenues are in \$U.S.; all other items are in cruzeiros.

The case can be taught in several ways. For example if a computer model is *not* used, the following procedure may be employed:

1. Take an opinion poll from the class on whether they would invest or not.
2. Discuss the first question posed by the case, focusing on financial modelling.
3. Using an assumption about the project's viability, discuss the financing question.
4. Discuss the likely impact of a Brazilian devaluation, and how it might be examined further.
5. Discuss any further issues.
6. Reassess the opinion poll.

Clearly however the case study is improved by student participation in simulation modelling. Then:

1. An opinion poll can be taken.
2. *Either* a simulation model can be made available, and the class, in teams or as individuals, can analyse the project further by testing out their own preferences, assumptions and values *or* the students can develop their own model.
3. Then taking the class's agreed likely outcome, discuss the finance package – if the investment is to be made.
4. Discuss the Brazilian devaluation, using the model if possible.
5. Discuss any further issues.

CASE SOLUTION

What Should the Analyst Do?

This question can be tackled on two fronts, namely:

1. The benefit of modelling.
2. The implications of the analyst's model and how to proceed.

Computer-based models, by employing the processing power of the computer, enhance the manager's analytical ability in decision-making. They allow the manager to recreate part of his environment at low cost, nil risk, in a simplified way and in a problem-solving manner. They allow risk and uncertainty, for example in investment decisions, to be explored in some detail, particularly where interactive computing facilitates flexible and rapid dialogue. This is an invaluable facility for few investment projects today are devoid of uncertainty. The manager and the model can then learn together, redefining objectives, reshaping the problem, creating new alternatives and testing the decision's sensitivity to likely events.

Simulation models may be subdivided into:

- deterministic models, such as that employed in the case, where single point estimates for each important variable can be altered over many runs of the model to test the effect of different uncertainties. This is often called sensitivity analysis or what-if modelling, allowing the manager to ask what if questions and investigate the outcome.
- probabilistic models which incorporate uncertainty by allowing multiple-point estimates and including probability frequencies for the important variables.

The advantages of computer-based modelling in investment decision-making include:

- the ability to explore complex interrelationships
- flexibility as circumstances change
- speed, cost and accuracy from mechanisation
- the ability to distil key aspects of the problem
- an opportunity for insight and learning
- an aid to communication between decision-makers
- release of managerial time from computation into analytical thinking
- ability to consider longer futures
- ability to check decision-making consistency.

The possible limitations include:

- overemphasis of the quantifiable at the expense of other factors
- sensitivity to quality of data
- can become routinised and thus kill creativity
- overlooking the process and politics of decision-making.

Surveys suggest that managers prefer deterministic models to probabilistic models because

- they are cheaper to construct and use
- they are simpler to understand and interpret
- managers are reluctant to use or supply probabilities
- what if modelling is closer to conventional decision-making.

We can learn about developing and using deterministic models from the case study. The chief analyst has constructed a simple model with the key uncertainties and tested it with no more than low, high and mid-point input values. Surveys suggest that simple, quick and rough models are a wise first step to (a) aid understanding of models, (b) assess sensitive factors and (c) encourage complexity only to be built in slowly and surely. Most managers would be able to interpret Exhibits 3 and 4 and then suggest new views or alternatives to be tested, or ask for a more realistic model. Indeed a decision-maker may

well operate the model himself as confidence grows, and if a financial modelling language is available, preferably supported by interactive processing, could develop the model under his own control. Some managers however prefer an intermediary to develop and operate the model as long as they retain control.

From exhibits 3 and 4 it is clear that investment value, capacity date and export prices are the most sensitive factors. It should be noted that few combinations yield an IRR of more than 11% which is the current debt cost of capital. The sensitive factors could then be explored further with wider ranges tested. Alternatively a probability model could be employed deriving probability distributions (from past data or MWC management opinion, if this is feasible). It is likely that a deterministic model will suffice.

Ideally in teaching the case, the class can act as the investment decision-makers. Either a computer model can be made available for the whole group to use, or individuals can develop their own programmes. Assuming the former approach, a model can be programmed to allow say 26 different input data to be analysed. Individuals or teams can select these data values and be made responsible for interpreting the results when the computer model is run.

<i>Variable</i>	<i>Data Values</i>	<i>Team</i>
Capacity year	A - D	1
Export price	E - H	2
Export: home ratio	I - K	3
Investment total	L - O	4
Cost overrun	P - R	5
Devaluation date	S - V	6
Devaluation amount	W - Z	7

Fig. 1. Schema for Model Demonstration

A schema is reported in Fig. 1 where each key uncertainty can be tested, including for Question 3 a devaluation factor and devaluation date. The class of course may wish to test fewer variables, but over wider ranges. Clearly to increase the total number of input alternatives is not beyond the powers of the computer, but soon becomes unmanageable in the teaching situation.

Experience from using such a model to examine the uncertainties in Fig. 1 suggests the following sensitivity pattern:

<i>Uncertainty</i>	<i>Sensitivity</i>
Capacity date	Very sensitive
Export price	Sensitive
Devaluation amount	Quite sensitive
Investment account	Marginally sensitive
Cost overrun	Quite sensitive
Export: home ratio	Marginally sensitive
Devaluation date	Marginally sensitive

Net present values at 10% discount rate on the total price go negative under the following conditions:

- Capacity not achieved until 1987 and probably not beyond 1985.
- Investment totalling \$385 or \$420m and capacity not reached until 1983, unless offset by high export prices or high devaluation later on.

Net present values at 10% discount rate on the equity investment go negative unless:

- full capacity is achieved very early on with low investment or high export prices.
- full capacity is achieved by 1983 but with low investment and high export prices and high devaluation.

Thus we see that the date capacity is reached, the total investment amount, export prices and devaluation are the significant uncertainties.

Recommendations

The final decision must be made by the investment committee of General Development Investments (GDI). The analyst can make recommendations, backed up by the simulation results, with a caveat that the simulation model has only addressed the financially quantifiable aspects of the decision. The Investment Committee then must examine the model's results, ask questions, consider the other issues and in the end apply their own judgement.

We do not know the rate of return that GDI expect from their investments, from projects like MWC. At a discount rate of 10%, both the total investment and the equity portion produce positive net present values, assuming the projections are accurate and certain. In June 1976 risk-free returns in excess of the project's IRR could be earned from long-term deposits, the money market or gilts at home. Yet of course GDI's purpose is to invest overseas, and this opportunity does meet the criteria of their charter.

However, it is uncertainties which must be examined. Risk and uncertainty need not automatically deter investment, but they must be assessed as thoroughly as possible. We have seen that the project's success is particularly dependent upon achieving capacity by 1983, or soon after, and upon total investment not costing more than \$385m. It seems likely that capacity will be achieved by 1983 although this could perhaps be verified by further investigation or by experience gained in the past. More critically however, the investment costs are already exceeding estimates, when the project has barely begun. Thus the viability of the project is already in doubt, and perhaps should be reassessed by rerunning the model with a higher discount rate to allow for contingencies. The project then becomes more doubtful.

GDI have never invested more than £15m in any one project, equivalent to 9% of the MWC venture. It would seem injudicious to invest so much in a possibly marginal project, whilst to invest a small amount hardly seems worthwhile as GDI would be a trivial influence with little control. The financial risk is probably augmented by the business risk inherent in overseas investment, especially in export creation projects.

Were GDI to support MWC, then debt participation is probably preferable. With debt a fixed return can be expected. If the debt is made available immediately, the return is 8.9%; if invested later it earns 11%. GDI could also consider negotiating some security with debt. Equity participation on the other hand is not likely. For the equity portion to be profitable, the project's cash flows must meet or exceed expectations. The downside already is evident; only a few of the uncertainties need move in the wrong direction for equity returns to be at risk.

Thus the analyst should probably recommend that GDI do not participate in the MWC venture, and certainly not through equity.

Other Issues

GDI's investment committee doubtless would examine other relevant issues, besides the apparent financial viability. These include:

1. Opportunity to influence or control MWC developments, not just as part-owners or lenders but through local observation or audit.
2. Other opportunities, or competing projects for resources, which may be more viable.
3. Existing investments in the GDI portfolio, examining whether MWC participation would increase or spread financial and business risk.
4. Who else is participating, either to assess other investor's views, or because other investors may exert pressure on GDI.
5. Any pressures from third parties (e.g. government) to invest in Brazil.
6. Ability to agree any protection clauses with MWC.
7. Whether this project would increase GDI's political exposure, perhaps creating excessive investment in Brazil, South America or in other countries subject to similar political risks such as potential nationalisation.
8. Any experience that GDI have gained from similar projects, or investment in Brazil.
9. Whether the project is commercially promising in terms of market demands, export potential and production technology.

Answers to these questions are unlikely to dispel the doubts raised by the financial analysis. Conversely they may well reinforce the recommendation not to proceed. There is however one further question. Would GDI benefit from owning assets overseas?

Devaluation

What is the effect of a Brazilian devaluation by 25%? In short, it depends on whose viewpoint is being considered:

- Cruzeiro revenues and costs are unaffected.
- Foreign currency costs and revenues become more expensive (including distribution and remittances).
- Cruzeiro assets owned by GDI lose value; those owned by MWC are unaffected.
- Cruzeiro liabilities against MWC are unaffected; but against GDI lose value and thus create a monetary gain.

In this case, with debt participation, we can expect selling expenses, debt interest and debt repayment (all \$ cash flows) to increase in cruzeiro terms and impair the project's viability. Export revenues however being \$-dominated yield currency gains to help offset these losses. All other costs and revenues are cruzeiro-based and are unaffected. Thus the impact of a devaluation depends on the dollar : cruzeiro cash flow proportions and is best determined by the what-if model, testing the affect of different export prices and the like under a 25% devaluation in 1976.

Use of the computer model suggests that devaluation enhances the \$ return of the project under most sets of assumptions. The major exception is where exports are 75% or less of sales. This suggests that foreign currency revenues exceed foreign currency costs under most assumptions.

If GDI were considering equity participation, the same picture would emerge except that assets are devalued, giving rise to revaluation losses which affect GDI's balance sheet and, depending on which accounting standards are observed, could impair their profit and loss report.

Finally of course the cash flows and the model have been computed in \$ terms. It is interesting to ask students what would happen if the project were evaluated on a cruzeiro basis!

FURTHER READING

Grinyer J. and Wooler J., *Corporate Models Today* (I.C.A.E.W., 1976).

McCosh A.M., Rahman M. and Earl M.J., *Managing Information* (Macmillan, forthcoming).

Product Profitability at Merrydale Limited

CASE OBJECTIVE

This case explores the use of accounting information in decision-making. As the title implies, the case addresses the product-range decision: how to decide which products to drop from a product-line when the company (Merrydale) is making losses. Primarily it is an exercise in relevant costs and the contribution approach to decision-making. However other issues are also raised, for example the need for costing systems and questions of strategy.

When teaching Merrydale, the following five issues may be examined in turn:

1. Product profitability analysis using full costing.
2. Product profitability analysis using marginal costing.
3. Lines' anxieties.
4. Possible improvements on Martin's analysis.
5. Other considerations.

Comparison of full costing and marginal costing approaches to product profitability analysis is perhaps best achieved by splitting the case into two parts and discussing them separately. On page 112, the reader is asked to consider what action he would recommend using the full cost statement. The case may be divided here (or the students be asked only to read that far) and the implications of full product costing be discussed. Then the remainder of the case can be distributed (or read) and contribution approaches, plus the other issues, be examined. In this way the problems of full costing are fully exposed and the advantages of marginal costing became apparent.

CASE ANALYSIS

1. *Berry's Analysis*

Berry's product cost statement is based on full (absorption) costing. For each product he has derived a unit full cost and computed the unit profit or loss. In the absence of a product costing system, he has built up these costs as best he can. Of the first 25 products analysed, only 8 appear profitable.

However, analysis of full costs may be misleading. The elements of fixed cost have to be apportioned to each product on some *assumed* activity level. The eventual activity level may of course be different so that unit cost then changes. Clearly therefore product profitability analysis on full cost criteria could be misleading.

Secondly, full product costs can confuse for another reason. Inevitably in a multi-product situation, some fixed costs are joint and have to be allocated to each product (irrespective of activity level) on an arbitrary basis. This point can be emphasised by asking students what would be the likely impact on overall profitability if Berry's 16 'lossmakers' were dropped. Clearly unless demand for the remaining products increases, total profits may in fact fall for the dropped products can no longer contribute to total fixed cost recovery and the remaining 9 products must recover an even larger overhead burden.

2. *Martin's Analysis*

Martin has concentrated on unit *marginal* costs, for contribution analysis overcomes the two above problems inherent in full costing. Firstly marginal costs are constant irrespective of activity level, and secondly they avoid the confusion which arises from allocating joint fixed costs to different products. Thus Martin has calculated standard unit contribution for each of the 25 products.

In fact he has derived unit contribution per standard hour of production time because he believes labour is the scarce resource. Thus 'relevant costs' are seen to be future and differential costs, but related to constraining resources – if any exist. In the future the constraint might be space or certain raw materials; thus the definition of relevant costs can change over time according to circumstances. Fig. 1 contrasts the approaches of Berry and Martin.

Product	Unit profit	Ranking by unit profit	Unit contribution	Ranking unit contributions	Unit contribution per hour	Ranking by unit contribution per hour
137	0.15	2	0.45	12	1.22	1
74	- 0.05	14	0.70	6	1.05	2
404	- 0.07	15	0.77	4	0.57	8

Fig. 1. Alternative methods of cost analysis

Martin has classified the products' contribution per hour on a criterion of return on investment. Class A represents the contribution required to earn 20% return on investment, Class B represents a break-even contribution and Class C contributes less than break-even. It should be stressed that such analysis rests on at least two assumptions.

1. An activity level of 180,000 production hours.
2. That demand for any product mix selected must be sufficient to provide the right level of activity the contribution rate requires.

Berry was concerned that no product costing system existed. Without available costs, he felt that decision-making would suffer. Clearly this point is valid; Merrydale cannot plan short-term or long-term operations without reliable and accessible costs. Certainly the firm cannot respond flexibly to changing conditions.

Martin recommends a standard costing system so that expected costs are used in decision-making, rather than actuals which reflect unrealistic inefficiencies. With standard costing Merrydale could then:

1. Evaluate costs of production and stocks for financial accounting purposes
2. Improve management control especially as the Works Manager suggests that on the whole marginal costs are those which are controllable at the departmental level and the remainder are controllable at factory level
3. Above all, have a 'library' of costs for decision-making, used in product, manufacturing and pricing decisions.

It is essential however that the decision-making focus is not overwhelmed by the former two uses – for example standard marginal costs must be available as well as standard full costs.

3. Lines' Anxieties

Lines raises three major questions. Firstly he queries the practice of relating contribution to standard hours and in particular summing times over different departments. If production hours, or capacity, is the scarce resource then Martin's approach is valid – as long as the constraint is total hours and departmental efforts are interchangeable. Perhaps one department is a bottleneck; then contribution would be related to standard hours required in that department. If constraints change then of course a new analysis is required.

Lines is also concerned about relative capital employed and value-added between products. Standard hours may be a reasonable proxy for capital employed in which case Martin's analysis meets Lines' anxiety. However, is the question relevant? Most of the capital employed:

- (a) represents sunk costs;
- (b) is unlikely to be separable between products;
- (c) if allocated amongst products will vary with activity level.

Martin should explain that to maximise contribution will maximise profits, and in a multi-product situation this will maximise return on capital employed.

Contribution does not reflect value-added; that would be calculated as selling price minus cost of bought-in goods and services. Again, however, is value-added analysis relevant? To maximise value-added does not maximise profit – and perhaps in Merrydale's loss-making situation, losses should be made good first.

Finally Lines asks about other costs. This point is relevant, for Merrydale is both a manufacturing and marketing business. Marketing, administration and similar costs can easily erode gross profit margins. Thus if further marginal selling and distribution costs are incurred by a product, they should be included in the analysis. Thus where feasible, contribution should be computed as selling price minus all marginal costs. This point is expanded below.

4. Other Improvements

Firstly Martin should have included non-manufacturing marginal costs in his analysis, if any exist or are identifiable.

Secondly, was Martin correct in concentrating on unit costs and contribution? If products are dropped because of inadequate unit contribution, an assumption is being made that sales of the higher contribution products can be increased, thereby maintaining full capacity and providing a better contribution to overheads and profit. A high unit contribution does not improve total contribution if its sales are insignificant! Conversely a high volume low contribution product can make a major contribution to overhead recovery.

Thus a second stage of analysis is required, where the total picture is presented. An example is shown in Fig. 2. Note that by examining aggregate contribution, any fixed costs that are traceable (separable) can be subtracted from an individual product's contribution to give a truer picture of its value in the product mix.

Data	137	74	73	40.	Total
Unit sales	xxx	xxxx	xxxx	xxxx	xxxxx
Selling price	1.32½	2.29	2.09	2.73	
Sales revenue	xxxxxx.xx	xxxxxx.xx	xxxxxx.xx	xxxxxx.xx	xxxxxx.xx
Unit marginal cost	x.xx	x.xx	x.xx	x.xx	
Unit contribution	x.xx	x.xx	x.xx	x.xx	
Total contribution	xxxxx	xxxxx	xxxxx	xxxxx	xxxxxx
Separable fixed costs	xxxx	xxxx	xxxx	xxxx	xxxx
Total contribution	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Joint fixed costs					xxxxx
Total profit					xxxxx

Fig. 2. Aggregate contribution analysis

Clearly contribution analysis must be used with care. The role of unit contribution is summarised below:

1. As a yardstick for assessing new products – but total demand must also be considered (as discussed above).
2. As an indicator of 'loss-maker' products – but high-volume sales can compensate low contribution.
3. As a signal to raise prices if contribution is inadequate, subject to market considerations.
4. As a guide to where efficiency improvements are required.
5. As a guide in pricing, for contribution pricing allows more market-oriented flexibility than does full cost pricing.
6. As a guide to which products to promote harder.

For profit planning and product-range decisions, however, the aggregate contribution must also be examined (a) to ensure the demand function is considered and (b) because management can then see

whether total fixed costs are covered by the total product mix and what profit is likely to be earned. Sensitivity analysis can then be applied to aid understanding, to introduce some margin of safety and to help in contingency planning.

In periodic management accounts, it is valuable to show contribution and contribution margin as distinct items in profit and sales reports. In this way management can monitor actual performance against expectations held when product decisions were made.

Finally, the product mix decision is one area of management accounting where operations research techniques have been applied with success. Maximisation of contribution amongst several products where constraints apply can be explored through linear programming. A simplified and generalised formulation (in the absence of full information) of the Merrydale problem in LP terms is shown in Fig. 3. The solution would be that combination of products which maximises total contribution subject to the constraints in operations.

ASSUMPTIONS

1. Merrydale's objective is profit maximisation.
2. Product 137 = A, Product 74 = B, Product 73 = C (form Martin's Table)
3. Unit Contribution taken from Martin's table
4. Merrydale's products pass through three departments X, Y and Z which have capacity limitations of 800, 1000 and 400 standard hours respectively.
5. Products A, B and C require the following standard hours input each department.

Product			
Department	A	B	C
X	20	10	10
Y	20	20	10
Z	5	4	5

PROBLEM FORMULATION

Maximise $0.45A + 0.705B + 0.52C \dots\dots$
 Subject to

- (1) $20A + 10B + 10C \leq 800$
- (2) $20A + 20B + 10C \leq 1000$
- (3) $5A + 4B + 5C \leq 400$
-
-
-
-
-
-

where A, B, C $\dots\dots \leq 0$

Fig. 3. A linear programming approach to product mix decision

5 Other Issues

Besides financial criteria, there are many other factors which enter into product-range decisions. These include:

1. Can any of Merrydale's products be improved or developed, either to reduce costs or to command premium prices?
2. Is Merrydale's pricing strategy correct? Could some products command higher prices and others be reduced in price to gain higher volumes? Competition is fierce of course and price discretion may be impossible.

3. If certain products are dropped would product families be broken up, with deleterious effect on sales of the remaining products?
4. Could any products be promoted by non-price means?
5. Are supply contracts to electronics firms a possibility?
6. Are there both short-term and longer-term product decisions to be made?
7. Should Merrydale analyse their product-market strategy in more detail? Are they strong or weak in different segments of the market? What are their product/market strengths and weaknesses compared with their competitors?
8. What new products can be developed? How innovative are Merrydale?
9. Where does Merrydale fit into Falco's corporate strategy? It seems strange that a recent acquisition has been allowed to make losses over three years.
10. If Merrydale has inadequate costing systems and generally poor information for decision-making, can we be sure that production management is as efficient as claimed?

In short, cost accounting can supply some of the answers to product profitability questions. Marketing factors may be just as important. In the longer run strategic issues are raised. Whatever decisions are made, Merrydale then must achieve their new objectives; improved control systems may still be necessary.

FURTHER READING

1. For product-market strategy see: Ansoff, I., *Corporate Strategy* (Penguin Books, 1968).
2. For linear programming see: Haley, K.B., *Mathematical Programming for Business and Industry* (Macmillan, 1967).
3. For management information design for operational, management and strategic decisions see: McCosh, A.M., Rahman, M. and Earl, M.J., *Managing Information* (Macmillan, forthcoming).

Newcastle Investment Company Ltd

CASE OBJECTIVE

This case (Newcastle) addresses many of the key methodological issues of capital budgeting. The problems posed allow the underlying theoretical issues to be discussed, but within a context where practical implications are important.

Case A provides an opportunity to discuss the following:

- the different models or methods of capital investment appraisal;
- the organisational context of capital budgeting;
- the information needs of capital budgeting;
- risk and uncertainty in capital budgeting;
- the interdependencies of capital budgeting.

Case B is concerned with:

- determination of cost of capital in capital budgeting;
- capital planning and capital budgeting;
- relationships of capital structure and investment decisions.

The case is satisfactorily taught by addressing in turn the questions posed. Rigid structuring of the discussion is probably dysfunctional; since there are many issues, several of which are interdependent, the teacher may have to structure discussion in a reactive mode. There are opportunities however for sustained quantitative analysis.

CASE A

It is difficult to assess Mr Smith's views for the following reasons:

1. The methodology employed is deficient.
2. The contextual information is inadequate.
3. The information and analysis is deficient.

Some of these inadequacies can be remedied, by using improved methodology and employing some assumptions. Others can only be highlighted with recommendations on how to proceed, given further information.

The Methodology

Newcastle employ the accounting rate of return method for capital investment appraisal. This is not uncommon, being attractive for its consistency with the accrual convention of accounting. However it is deficient because:

- it fails to recognise the time value of money;
- it is inadequate when future returns are uneven;
- it can confuse income and expenditure with cash flows;
- it can be dysfunctional if performance measurement is by ROI, since conservative behaviour may be encouraged;
- it is inadequate for project ranking;
- it does not handle tax effects.

Thus Newcastle's proposals should be re-assessed on a discounted cash flow basis, either by the net present value or internal rate of return (IRR) methods. Using DCF, any project whose IRR exceeds the minimum rate (probably cost of capital), or whose net present value, when discounted at the minimum rate, is zero or positive, is desirable. In this way shareholders' value will be maximised.

Theoretically and practically, Net Present Value (NPV) is preferred because:

- IRR is tiresome to calculate, involving trial and error and interpolation, especially if cash flows are uneven,
- IRR is unreliable in ranking problems where either different outlays are involved, or projects are mutually exclusive. This is because the IRR approach assumes that the reinvestment rate is equal to the indicated rate of return over the remaining life of the proposal. The NPV method however implies re-investment at a rate equivalent to the required rate of return used as the discount rate, which approximates to the opportunity rate for investment.
- IRR cannot be used if the cost of capital changes (which is unlikely) during the project.

However, firms do use IRR since (a) Managers often find it easier to interpret and (b) the cut-off rate need not be specified beforehand.

If we assume that the annual rates of return computed for each proposal were based on even annual cash flows, then the projects can be re-assessed using the NPV method. First, however, the discount rate must be selected. This subject is discussed in detail in the next section. If we assume the extra capital required to finance the proposals is raised in the proportions historically used, we can use the weighted average cost of capital calculated from data in Case B (see Fig. 6), namely 16% (This calculation, unlike that in Case B, includes the cost of retained earnings using an external yield approach.)

Thus, with these assumptions about annual cash flows and the discount rate, the proposals yield the net present values shown in Fig. 1. Thus five proposals on financial criteria, using these assumptions, are non-viable. Furthermore if we assume none of these projects is mutually exclusive, they can be ranked; the higher the net present value, the higher the profitability of the proposal. However further information is required, before any firm conclusions can be drawn.

<i>Proposal</i>	<i>Initial investment</i>	<i>Net present value</i>	<i>Profitability index</i>
Heathcote – Computerisation	590,000	214,000	1.36
Heathcote – Storage tanks	8,750,000	6,860,000	1.78
Smithsom – Railroad cars	1,200,000	4,000	1.00
Smithsom – Purchase of space	4,000,000	47,000 –	0.99
Blistol – Machinery	5,500,000	2,472,000	1.45
Newcastle Chemical – Power facilities	3,100,000	454,000 –	0.85
Newcastle Chemical – Materials handling	2,300,000	757,000	1.33
Newcastle Chemical – Barges loading	4,500,000	368,000 –	0.92
Newcastle Chemical – Affiliate	2,100,000	168,000 –	0.92
Newcastle Investments – Office modernisation	750,000	109,000	1.15
Newcastle Investments – Office purchase	2,000,000	282,000 –	0.86

Assumption: 1. Regular annual cash inflows as implied by accounting rates of return
2. Discount rate of 16%

Fig. 1. The proposals reassessed by NPV method

The Context

The context is important because (a) capital investment decisions are not made solely on economic criteria, (b) such decisions are made in a behavioural context and (c) availability of finance may be relevant.

Firstly the strategic context is inadequate. Are any of the projects strategic necessities, perhaps essential for fundamental changes in strategic direction? For example a project with low profitability in the short run might be acceptable because of its longer-term implications.

Secondly the management control context is inadequate. Should any of these decisions be made at lower levels, say within the unit companies? Would Newcastle accept use of different discount rates for different businesses or activities?

Thirdly it is not entirely clear whether the capital budget is unconstrained, for financial or other reasons. For example the following questions might be asked.

- Is Newcastle management growth-minded? The case suggests it is.
- Are there future projects in the pipeline which might be prejudiced if any, or all, of these are accepted?
- Can Newcastle raise additional capital, besides funds generated from operations, to finance these projects?
- Is Newcastle in managerial need of any slow-down, postponement or consolidation of investment?

In the absence of this contextual information, Newcastle would accept the six proposals yielding a positive NPV, and raise any necessary capital. Suppose, however, the capital budget is constrained, the problem of optimising the proposal's schedule when there are investment indivisibilities or mutually exclusive projects becomes more difficult. This can be discussed including integer programming solutions.

We can neither agree with Mr Smith and accept all the proposals, nor argue that acceptance of the above six projects with positive NPVs is correct. There is inadequate information about each proposal upon which to make such decisions. In particular the following information is required:

- type and nature of each project;
- timing of cash flows;
- detail of cash flows;
- risk and uncertainty of each project;
- project interdependencies;
- non-quantitative factors;
- tax information.

Firstly, the type and nature of each project could be relevant. For example, which are maintenance projects and which are development, which are replacement and which are expansion? Whilst all investment projects should be assessed alike, such considerations are important. For example a maintenance or replacement project may in the short term be essential, whatever its NPV. Of course, ideally no project should be presented on urgency grounds, since replacements and the like can be foreseen: however the reality tends to be different.

Secondly, in order to discount for the time value of money, the cash flow timing is required. We have assumed regular annual inflows and a once for all outflow in year 0. With timing information, the NPVs might then be different. Also if funding is a problem, it could be relevant to see when each project generates cash for reinvestment or which projects need excessive early funding, perhaps using payback screening for guidance.

Detail on the cash flows would help, to test the reliability of the estimates, to seek sensitive components and to ensure all outflows are included such as working capital needs etc. It is not unusual for the component cash flow data to fit the desired cut-off rate! In particular we would wish to assess the risk and uncertainty of each project, and collectively within the firm's investment portfolio.

Most capital budgeting literature does not differentiate between risk and uncertainty. Here risk and uncertainty is defined as the possibility that the actual cash flows which the Newcastle proposals will generate may differ from expectations. The business risk of the sector in which Newcastle operates and the financial risk of their capital structure can be handled separately, perhaps by modifying the discount rate.

Each proposal should be assessed in terms of risk and uncertainty, not only because nothing is certain, but because it is easier to assess risk at the individual project level rather than at the level of the firm. Basically the uncertainties to be considered are of timing, amount and value (inflation). Individual project risk and uncertainty can be assessed by five major methods.

The discount rate can be modified upwards to incorporate risk and uncertainty premiums. This

method is common because it is simple to use. However it can only be derived by crude estimation and unfortunately fails to differentiate between different causes and degrees of risk within one project. The case provides no information upon which uncertainty premiums might be based.

Probability approaches offer more scope. Probabilities can be put on a range of cash flows for each project and an *expected value* derived. (Fig. 2). In addition in order to measure the dispersion of the expected value, a *standard deviation* can be derived for the probability distribution of the cash flows. By dividing the standard deviation by the expected value a coefficient of variation can be computed; the greater this coefficient, the greater is the risk of the project.

Annual cash inflow = x	Probability	Expected value = x
160,000	0.1	16,000
180,000	0.2	36,000
200,000	0.4	80,000
220,000	0.2	44,000
240,000	0.1	24,000
		200,000

$$\therefore \text{Expected value} = \text{£}200,000 = \bar{x}$$

$$\text{but standard deviation} = \sqrt{\sum_{x=1}^n (x - \bar{x})^2 P_x} = \delta$$

$$\therefore \sigma = \text{approx } \text{£}21,900$$

Fig. 2. Hypothetical expected value and standard deviation for Heathcote computerisation project

To employ any of these probability-based methods, the sponsors of each proposal would have to supply their own views of likely cash flows. Managers often resist giving probabilities, but it is only a formalisation of the subjective judgement and hunches they often use. Indeed putting probabilities on expected cash flows may be a good discipline.

Once these expectations and dispersions are derived, how should they be presented? The entire distribution often is illuminating because it suggests probable downside as well as upside risk, and the distribution may well be skewed one way or the other. Alternatively optimistic, pessimistic and middle views can be presented or the expected value, standard deviation and coefficient of variation provided in summary form.

A similar approach would be to ask the Newcastle managers who are sponsoring these projects to provide *certainty equivalents*. Experience suggests this method is not widely used.

A common approach is to employ *sensitivity analysis*, examining how sensitive the project viability is to modifications of the input data. Each element of cash inflows and outflow can be 'wobbled', as can inflation rates and the like, and 'what if' questions posed. This process may well be of value in the Newcastle situation, especially for any of the projects associated with the government joint ventures. Sensitivity analysis also allows the effects of inflation to be assessed, especially if different cash flows may be subject to different inflation rates. Thus a *deterministic simulation model* might be used to assess each of the Newcastle projects in more detail.

Alternatively, those projects which involve heavy outlay, or which seem particularly risky, could be probed further with a *probability model*. Managers could be asked to supply probability distributions, either subjectively or by measurement, for the key variables in each project. Fig. 3 illustrates the process.

Of course each project is not 'an island'. To maximise the shareholders' value, Newcastle should be concerned with the risks of the portfolio of projects – current and proposed – as a whole; using *portfolio theory*, the total risk might be reduced by seeking projects whose correlation coefficients between each other are not too highly positive. Probability distributions of each proposal, and joint probabilities of expected values would have to be derived. In practice we might ask which projects have any joint relationship with each other, and try to avoid too much risk in one direction.

There are of course other interdependencies. Does any proposal have a chain reaction with another, past, present or future? There may be price-level factors, technological connections or changes, or

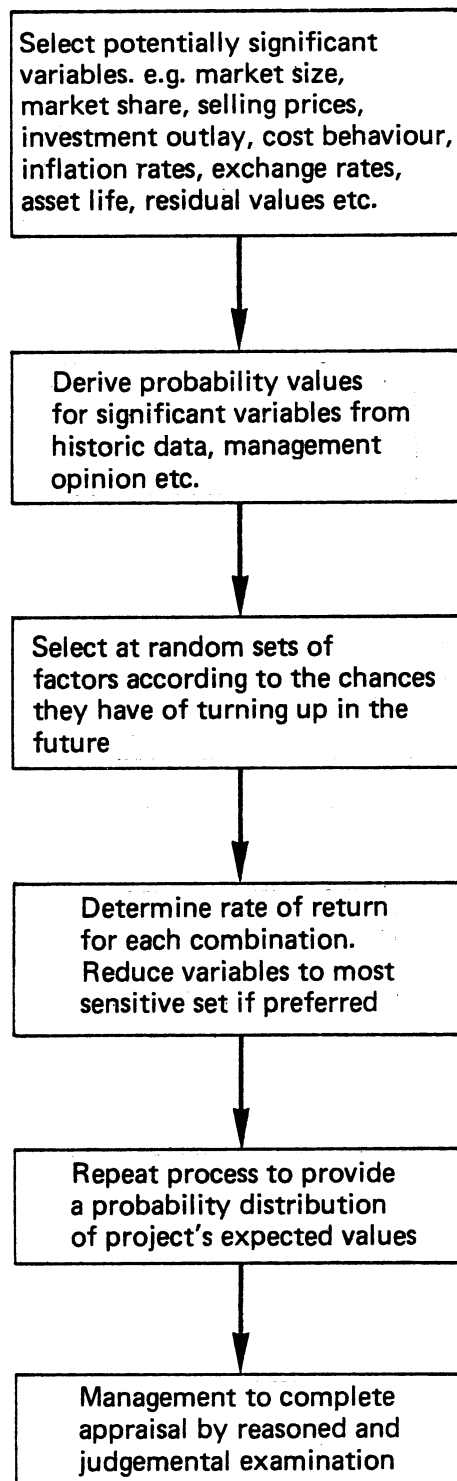


Fig. 3. Simulation in capital investment appraisal

indeed financial obligations which must be accommodated as the result of past investment decisions, or which may influence future investment opportunities. Such information is required.

Furthermore, are there qualitative considerations? Are any of the proposals more or less socially desirable than others? Are there environmental or legal factors? Are there industrial relations or change problems? Such issues may well be as important as the harder financial criteria.

Finally we are only given before tax data. It is common to ignore tax because (a) of its complexity and (b) economic analysis before tax is perhaps the rational approach. However, tax may be a relevant (i.e. differential) cost especially if certain projects have different tax implications or the tax timing varies. Again this information is required.

Thus with the information supplied in Case A, we can recommend acceptance of the six projects whose NPV is positive, but only if the assumptions about the cash flows and cost of capital are valid, and if there is no capital rationing. Furthermore the other information requirements specified above are really needed before these recommendations can be made with any confidence. In addition we might wish to ascertain the real returns (after inflation), not only adjusting cash flows for inflation, but then discounting them at money discount rates (Fig 4).

Assumptions	1 Annual cash flow savings of £21,800
	2 Predicted inflation rate of materials stored of 20%
	3 General inflation rate predicted to be 15%
	4 Discount rate (cost of capital) of 10%
	5 Thus money discount rate = $\frac{1}{((1 + 0.1)(1 + 0.15))^n}$

Time	Cash flow £000	Inflation factor	Money cash flow (£000)	Money discount rate	Present value (£000)
0	- 590	1	- 590	1.0	590
1	218	1.2	262	1.265	207
2	218	1.2 ²	314	1.265 ²	196
3	218	1.2 ³	377	1.265 ³	186
4	218	1.2 ⁴	452	1.265 ⁴	177
5	218	1.2 ⁵	542	1.265 ⁵	167
6	218	1.2 ⁶	651	1.265 ⁶	159
					<u>502</u>

∴ NPV = £502,000

Fig. 4. Hypothetical appraisal of Heathcote computerisation proposal – adjusted for inflation

CASE B

Two questions are asked, but subsumed within these are two more. Thus we must consider

- how much finance to make available?
- and thus how to raise it?
- what rate of return to adopt?
- and thus whether the proposals are affected?

The Total Budget

If Newcastle aims to maximise the shareholders' value of the company, then all projects which yield more than its real cost of capital (historically about 16%) should be accepted. The total investment cost of the six viable projects is £19.09m and thus the capital budget should be set at least that level, with perhaps a margin for flexibility. Any figure less than £19.09m is non-optimal.

However, since only £8.75m is available from internal sources, Newcastle will have to raise capital externally. If this is possible, the capital budget should not be rationed. Yet there are other considerations, for example

1. Can the funds be raised without unduly increasing financial risk?
2. If funds are raised, would next year's capital investments financing be jeopardised?
3. Are capital markets currently attractive for raising funds?
4. Is further working capital also required – especially as the company is aiming for growth and in 1977 inflationary pressures existed?
5. Can Newcastle absorb all these projects?
6. Do any of the projects require later investment?

If none of these issues is problematic, and if the assumptions behind the project NPV calculations are valid, the total capital budget should be about £20m. £8.75m is available, but how should the gap of £11.25m be raised?

Financing The Investment

Assuming the market conditions are right, there are two conflicting views on capital structure to consider. The traditionalist (and perhaps intuitive) view would suggest Newcastle should increase its gearing (currently 0.32) to lower its cost of capital and increase market value per share. This would increase risk, which perhaps the cost of new debt reflects. Also the P/E ratio might suffer, at least in the short-term. However, to raise £10m in debentures only raises gearing to 0.36, whilst a £20m debt issue would lead to a gearing of 0.40. Thus the share price can probably stand say £10m debt but beyond that might suffer in the short-term.

The Modigliani–Miller view would suggest the cost of capital and total market value of the firm are the same for all degrees of leverage, and with corporation tax the cost of debt (and of capital) decreases.

From both points of view therefore there would appear to be a case for raising the finance by debt. If Newcastle prefer to be geared at current levels, they could either issue convertible debentures so as to accelerate restoration of gearing in the future; or plan to raise the subsequent tranche of capital by equity, perhaps when the market price improves.

How much debt should be raised? After this issue probably Newcastle would prefer not to raise any more capital for two years. Thus they need at least £11.25m for this year's capital budget plus whatever funds may be needed for next year's investment. We can build up the requirements as follows:

1. Gap to be filled this year = £11.25m.
2. Working capital needs this year unknown. However, perhaps the difference between the retained earnings of £9.14m (15.6m PAT – 6.45m dividends) and funds available for investment of £8.75m, plus depreciation, will meet working capital needs.
3. Assume investment outlay next year increases by 10% = £22m.
4. Assume earnings grow by 15% as implied by current share price and dividend yield.
5. Assume next year's working capital financed as this year's.
6. Then next year's available finance would be £10.12. Thus £22m - £10.12m = £11.88m to be raised.
7. Thus total finance required = 11.25m + 11.88m = £23.13m.

The acid test that remains is whether Newcastle can meet the costs of debt or equity without undue risk. Fig. 5 contains the calculations for raising £23m. We see that with debt financing, the gearing is not too high, the times interest earned is quite safe and the required retained earnings is generated. With equity financing, the gearing reduces considerably and with it financial risk, but the dividend requirements render retained earnings too low for the next year. Thus the advantages of the tax-reduced cost of debt show through, and the financial package would benefit from being debt-oriented.

In short, as long as Newcastle's profit performance does not deteriorate, they seem able to raise the necessary capital, probably by debt, or a mix of debt and equity, perhaps in the proportions historically employed.

	Debentures	Convertibles	Shares
1977 P.B.I.T. (15% growth)	50980	51555	48450
Interest on £45m Debt	3600	3600	3600
Interest on £23m Debt	2530	3105	0
1977 P.B.T.	44850	44850	44850
Tax at 6%	26910	26910	26910
1977 P.A.T.	17940	17940	17940
Preference dividends	1	1	1
Ordinary dividends (15% growth)	7418	7418	9978
Retained earnings	10521	10521	7951
Gearing 1979	0.32	0.32	0.32
Gearing 1977	0.39	0.39	0.26
T.I.E. 1976	11.83	11.83	11.83
T.I.E. 1977	8.32	7.69	13.46
Divident cover 1976	2.42	2.42	2.42
Dividend cover 1977	2.42	2.42	1.80

Fig. 5. Alternative methods for raising £23m (£000)

Rate of Return

We must assume the objectives which underlie finance theory, namely that Newcastle aim to maximise the value to their shareholders as reflected by market price. Thus the firm should accept all projects which yield more than its real cost of capital. However definition of the real cost of capital is difficult, for it depends on the firm's capital structure, which in turn may depend on the amount of finance required, which in turn may depend on the amount of investment, which in turn may hinge on the cost of capital!

However, we must advance beyond this spiral; most financial theorists would agree that the cost of capital is the rate of return on the project that will leave unchanged the market price of the firm's stock. This would seem to be the weighted average cost of capital, for any project yielding more than the average cost will enhance the share price in the long-run. This claim of course is only valid if business risk is unaltered, if a constant dividend payout ratio is maintained and if Newcastle continue to finance in the proportions which currently exist.

The economist's argument advanced in the case – a marginal cost approach – contradicts this view. He favours use of a hurdle rate which approximates to the cost of the cheapest finance available. This piecemeal approach is attractive in the short-term. However it overlooks some important issues including:

1. Existing capital which may be utilised may cost more.
2. It would lead to 'arbitrary' capital investment decisions if the market cost of money fluctuates.
3. Sustained low-cost debt financing will ultimately reach a limit, only to find more profitable proposals have to be rejected.
4. If the cheapest cost is used as the standard and the real (average) cost is greater, the shareholders may ultimately be worse off.

Thus both theory and practice tend to support use of the weighted average cost of capital. This should be calculated on the long-run proportions of finance that the firm adopts; otherwise arbitrary decisions occur. For example, if the hurdle cost of capital is less than the real cost, shareholder value will suffer, and if the reverse occurs then profitable projects could be rejected, again to the detriment of the owners.

However, on what proportions should the weighted average cost be based, if Newcastle increase their debt by £23m? If the amended proportions are to become permanent policy, then they should be the base. However, if this tranche of debt is subsequently balanced by a share issue to restore gearing Newcastle should continue to calculate the weighted average on 1976 proportions. Let us assume the latter.

To compute the weighted average, one correction should be applied to the calculations in the case. Retained earnings are not free. They have an opportunity cost which is either (a) that rate obtainable

on external investment of funds (external yield criterion); or (b) the dividend foregone by shareholders which in a tax-free regime is the cost of equity capital (based upon current market prices), or more realistically the cost of equity capital after tax (at the average shareholder rate).

The external yield, being easier to apply, is more commonly used and is adopted (taking 11% as roughly indicated by current debenture rates) for recomputing the weighted average cost of capital illustrated in Fig 6. The result is 16%.

	Pre-tax cost	Amount in £m	Weights	Weighted average cost
Debentures	8%	45.0	0.316	2.53
Preference shares	12.5%	0.1	—	—
Ordinary shares	24.2%	64.5	0.454	11.00
Retained earnings	11%	32.6	0.229	2.52
		142.2		16.05

Fig. 6. Re-calculation of Newcastle's weighted average cost of capital

However, it was pointed out earlier that the cost of capital is related to the amount of capital raised or employed, which in turn is related to the number of investment proposals accepted. Thus if possible the total capital budget and the cost of capital should be determined simultaneously. This can be attempted as follows:

1. Calculate and plot the 'marginal cost of capital schedule'. (Since the case does not indicate the range over which the quoted costs of capital apply, we can derive a MCC schedule.)
2. Estimate the total investment outlay (capital budget) for acceptable proposals at a range of discount rates.
3. Plot the capital budget range from step 2 on the MCC schedule from step 1. This plot is the 'investment opportunity schedule'.
4. Where the MCC and IOS curves intersect denotes the correct hurdle rate (MCC) and optimal capital budget (IOS).

Whichever method is used to calculate the cost of capital, it is important to re-examine the figure periodically, for conditions may change for a sustained period. For example:

1. The firm's business risk may decline so that an optimal capital structure would involve more debt.
2. Capital market conditions could undergo a pronounced long-run change, making either debt or equity more favourable.
3. An expectation of a significant period of shift in capital markets would instigate a medium-run departure from the long-run optimal capital structure.
4. Accretion of retained earnings over time could alter the real rate of capital.

Thus forecasting of capital markets, monitoring of costs of capital, willingness to be flexible in capital budgeting (eg phasing or postponing investment where necessary) and consideration of opportunist financing are all parts of Mr Smith's role.

Summary

The following conclusions can be drawn:

1. Mr Smith should, if our assumptions are valid, accept the six proposals with positive NPVs.
2. The NPV's are calculated using a weighted average cost of capital of 16%. This should be the hurdle rate if long-run financing continues in the current proportions.
3. Newcastle should not limit their capital budget just because internal funds are inadequate. Approximately £23m should be raised to finance the next two years' capital investment.
4. It would seem sensible to raise most, or all, of this finance by debt.

5. However, Mr Smith should first of all seek for each proposal, the information specified earlier and reassess the situation. He should also establish the MCC schedule and then derive the optimal budget and the correct discount rate.

FURTHER READING

1. Bierman, H. and Smidt, S., *The Capital Budgeting Decision* (Macmillan, 1966).
2. Brigham, E.F., *Financial Management: Theory and Practice* (Holt, Rinehart Winston, 1977).
3. Carsberg, B. and Hope, A., *Business Investment Decisions Under Inflation: Theory and Practice* (ICAEW, 1976).
4. Merrit, H.A.J. and Sykes.A., *The Finance and Analysis of Capital Projects* (Longman, 1963).
5. Van Horne, J.C., *Financial Management and Policy* (Prentice-Hall, 1975).

Prendergarth Shipping Co

* (Teaching Note by Professor James Reece)

GENERAL

This is a marvellous case to use as a grand finale on relevant costs. In the past it was used as a two-day case, with the complexity of the problem causing students not to get very far in their first evening of preparation. The questions on the attached assignment sheet, developed by Professor Charles J. Christenson, suggest to the student how the problem must be looked at in small pieces, and then the pieces put together. These questions make the case teachable in only one day. However, I recommend calling on a strong student to answer questions 1-4 to help ensure getting through the discussion in 80 minutes. Similarly, experience has shown that tolerance of lengthy discussions on relatively minor points (e.g. will the *Warrior* make 69 round trips in East Africa, or a smaller number? Will the large vessels indeed save 72 miles steaming distance?) will preclude getting to the more interesting issues of the case.

CALCULATIONS

1a. Balik Papan to Singapore: contrib. per ton (indep. of ship used):

				Tapioca BP → S	Gen'l Mdse. S → BP
Revenue per ton				\$ 5.10	\$ 2.70
Costs per ton	<u>BP</u>	<u>S</u>			
Lighterage	.25	.16			
Stevedoring	.56	.32			
Cranage	<u>—</u>	<u>.14</u>			
Total costs	.81	+ .62	=	<u>1.43</u>	<u>1.43</u>
Contrib. per ton				\$ <u>3.67</u>	\$ <u>1.27</u>

1b. Total contrib. per trip (BP-S and return):

		Tons x Cont. per ton	=		
<i>Warrior</i> : BP→S	3,950	x \$ 3.67	=	\$14,496.50	tapioca
S→BP	3,150	x \$ 1.27	=	4,000.50	gen'l mdse.
				<u>\$ 18,497.00</u>	r.t. contrib.
Large vessels: BP→S	6,850	x \$ 3.67	=	\$25,139.50	tapioca
S→BP	3,150	x \$ 1.27	=	4,000.50	gen'l mdse.
				<u>\$29,140.00</u>	r.t. contrib.

∴ Contrib. for large vessel: \$ 10,643

2. Costs per round trip (indep. of freight carried):

	<i>Warrior</i>		<i>Large vessels</i>	
	<i>BP</i>	<i>S</i>	<i>BP</i>	<i>S</i>
by ship's → Portage	\$1,575 ¹	\$ 900 ²	\$5,250 ³	\$2,500 ⁴
tonnage → Lighthouse	73	126	73	126
fixed chg. → Special charge	—	—	2,000	—
Total fixed	1,648	+ 1,026 = 2,674	7,323	+ 2,626 = 9,949
Bunkerage	\$ 73/mi. x	960 mi. = 701	\$1.27/mi. x	960 mi = 1,219
Total/Trip		<u>\$3,375</u>		<u>\$ 11,168</u>

[∴ Cost for large vessel: 7,793]

1.	4,500 x \$.14/day/ton x 2-1/2 days	= \$ 1,575
2.	4,500 x .20	x 1 = 900
3.	12,500 x .14	x 3 = 5,250
4.	12,500 x .20	x 1 = 2,500

↑

max. tonnage
Contrib./round trip

	<i>Warrior</i>	<i>Large Vessels</i>
Tonnage Contrib.	\$18,497	\$29,140
Less: Operating costs	<u>3,375</u>	<u>11,168</u>
Contrib. /r.t.	15,122	17,972
x Trips/yr.	x 50	x 50
	<u>\$756,100</u>	<u>\$898,600</u>
Contrib. for Large Ship	<u>\$142,500</u>	

3. If *Warrior* transferred to E. Africa, preferred port for large vessels is *Zanzibar*, since it has lower cost/ton and cost/trip.3.4. Costs/Savings by using *Warrior* as a shuttle:

	<i>Large vessels</i>		<i>Warrior</i>
	<u>D - E - S</u>	<u>Z</u>	<u>D - E - S</u>
Portage	\$7,750 ¹	1,170 ²	1,395 ³
Lighthouse	62	—	62
Total Fixed	7,812	1,170	+ 1,457 = 2,627
Bunkerage	\$ 1.27/mi. x 72 mi.	91 (o.w.)	73/mi. x 144 mi. = 105 (r.t.)
Total/Trip	<u>7,903</u> saved		added <u>2,732</u>

1	12,500 tons x \$. 31/day/ton x 2 days	= \$ 7,750
2	4,500 x .13	x 2 = 1,170
3	4,500 x .31	x 1 = 1,395

Warrior added costs/ton (all at Zanzibar):

Lighterage + Stevedoring + Cranage = .14 + .32 + .13 = \$.59/ton

Warrior round trips = $\frac{345 \text{ days}}{5 \text{ days/r.t.}}$ = 69 r.t.

Summary of net savings of *Warrior* move to E. Africa:

Saved: \$ 7,903/trip x 80 trips/yr =		+ \$ 632,240
Added: 2,732 " x 69 " =		- 188,508
1,350 tons/trip x 80 trips/yr x \$.59/ton x 2	∴ handlings	= - 127,440
(dates & nuts)	unload <i>Warrior</i>	
	load Large	
<hr/>	<hr/>	
tons/yr. from D-E-S	added handling cost ton @ Z	+ \$ 316,292

5. Total effect of moving *Warrior* to E. Africa using large ships in East Indies:

Added E. Indies contrib.	\$ 142,500
" E. Africa "	316,292
Total	<u>\$ 458,792</u>

SCARCE RESOURCE

At this point it is seductive for the student to say the *Warrior* should be moved to E. Africa and replaced in the E. Indies by large vessels. However it is crucial not to overlook the following:

Large vessel-days saved in E. Africa: 80 x 3	= 240
" " " needed in E. Indies: 50 x 6-1/2	= 325
Additional vessel-days required for switch	<u>85</u>

However, the case indicates that Prendergarth is at capacity; i.e. vessel days are a scarce resource to which some value ('shadow price') must be assigned. This can be done by calculating the average contribution per vessel-day last year, using data given in Exhibit 6 (assuming the *Warrior* had an insignificant influence on these figures in 1963):

Revenues		\$49,661,000
Voyage expenses	33,480,000	
- Fleet costs (fixed)	19,714,000 (27x \$730,163)	
Variable costs		<u>13,766,000</u>
Contribution		35,995,000
Contrib./Vessel-day =	$\frac{\$35,995,000}{27 \times 345 \text{ days}}$	= <u>\$3,853/vessel day</u>

The student who realised this may have used the following calculation to conclude that the 'switch' is preferable to the status quo:

Added contrib. from switch (above:	\$458,792
Less: lost contrib. from removing 85 vessel days from other routes	
85 x \$3,853 =	<u>327,505</u>
Net added contrib. of switch	<u>\$131,287</u>

While this shows the switch to be *preferable* to the status quo, it does not prove the switch to be *optimal* since:

Contrib. in E. Indies with large vessels	\$898,600
(see part 2 in 'Calculations' above)	
Contrib./day =	$\frac{\$898,600}{325 \text{ da.}}$
	= \$2,765/da.

[This \$2,765 figure can also be used to show the switch preferable to the status quo by comparing it with the opportunity cost of not putting the *Warrior* in E. Africa:

Lost <i>Warrior</i> contrib. in E. Indies	– \$756,100
Saved costs using <i>Warrior</i> in E. Africa	<u>316,292</u>
Loss if 240 freed-up large vessel-days not used	– 439,808
Opportunity cost per day freed-up:	$\frac{\$439,808}{240 \text{ da.}} = \$1,833/\text{day}$

Since $\$2,765 > \$1,833$, the switch is better than the status quo]

Now we know that Prendergarth averages \$3,853 contribution per large vessel-day. Hence, if the company is turning down work on its 'average' routes, the 240 vessel-days freed-up by moving the *Warrior* to E. Africa should be utilised elsewhere than in the E. Indies; i.e. from a strictly quantitative analysis, the *optimal* decision is: move the *Warrior* to E. Africa and drop the E. Indies tapioca runs.

However, this conclusion is only tentative, and would be final only if all of the following were also true:

1. In fact, there are opportunities to earn more than \$2,765 per vessel-day on other routes.
2. It is logistically feasible to insert these 240 vessel-days into the system (i.e. scheduling problems are not insurmountable.)
3. Prendergarth is willing to accept the ill-will in the E. Indies that dropping the tapioca runs may cause. Moreover, they feel that if shipping rates in the E. Indies later go up, making those routes more attractive than others, they would be able to re-enter the market (i.e. other shippers won't have moved in and tied up all the business).

SUGGESTED STUDY QUESTIONS FOR PRENDERGARTH SHIPPING COMPANY

- 1a. How much contribution can be earned by carrying one ton of tapioca from Balik Papan to Singapore, dock to dock, independent of the operating costs of the vessel? How much can be earned by carrying one ton of general merchandise from Singapore to Balik Papan?
- b. Given the contribution/ton figures arrived at in (a), what is the total contribution which can be earned on one round trip of the *Warrior* between Singapore and Balik Papan and return? By one of the large vessels?
2. Independent of the amount and type of cargo carried, what are the incremental costs of sending the *Warrior* on a round trip between Singapore and Balik Papan and return? One of the large vessels? What then is the total contribution *per round trip* for each of the vessel types? What is the total contribution *per year* for each of the vessel types?
3. If the *Warrior* is transferred to the East Africa route, which is the preferred port of call for the large vessels; Zanzibar or Dar-es-Salaam? What costs can be saved by having the large vessels avoid one of the two ports, and how much will these savings amount to in a year?
4. What would be the cost per year (both tonnage and operating) of using the *Warrior* on the East African shuttle run?
5. What action should Mr Thomas take?

TAC Construction Materials Ltd

CASE OBJECTIVE

This case illustrates the operation of a standard costing system in a manufacturing company. The distinctive value of the case is as an exposition of (a) how standard costs are compiled and used, and (b) how costing systems contribute to financial control. Because the case is illustrative and yet stimulates discussion, it has been found to be especially valuable to those with little previous experience of either the practice of financial control, or its theory – in particular postgraduate business students and those who have been ‘on the receiving end’, such as line managers or engineers.

The reader is asked six specific questions, namely to comment on how useful and appropriate the TAC Construction Materials Ltd (hereafter ‘TAC’) costing system is for:

- (a) measuring cost control performance;
- (b) measuring corporate performance;
- (c) evaluating work-in-progress and finished goods stock;
- (d) evaluating production flows and the cost of goods sold;
- (e) helping the marketing department to arrive at pricing decisions;
- (f) controlling and monitoring the performance of individual managers.

especially paying attention to the assumptions embodied in the process.

Often it is helpful to firstly examine the standard cost build-up procedure. A useful class strategy therefore is to tackle the following issues in turn:

1. Costing Systems and Their Purposes
2. Standard Cost Build-Up
3. Using Standard Costs
4. Costing Assumptions
5. Conclusions on Costing Systems

CASE ANALYSIS

1. *Costing Systems and Their Purposes*

Since standard costing systems frequently provide the data-base of financial control, and since in practice they can assume their own momentum irrespective of purpose, it is fruitful to examine their potential use at the outset. The classification of accounting uses derived by H.A. Simon (*Administrative Behaviour*, Macmillan, New York, 1957) provides a framework, namely:

1. Scorekeeping
2. Attention Directing
3. Problem-Solving

These purposes are explained in Fig 1. Since TAC claim that their standard costing system has been redesigned to accommodate management accounting uses as well as financial accounting, Fig. 1 also shows the objectives that TAC set out to achieve.

It should be stressed that when costing systems are multipurpose, several factors follow:

1. Standard cost build-up needs to be as modular and elemental in form as possible.
2. Assumptions are made which may suit one purpose better than another.

PURPOSE	MAJOR QUESTION	TAC's OBJECTIVES
SCORE-KEEPING	How are we doing?	* Financial Accounting * Stock and WIP Evaluation
ATTENTION-DIRECTING	What Problems Should We Be Looking Into?	* Budgetary Control * Profit Planning and Control * Cost Control
PROBLEM-SOLVING	Which Is The Best Way?	* Contribution Analysis * Pricing Decisions * Production and Marketing Decisions

Fig. 1. Standard costing and its uses

3. Thus standard costs must be interpreted and used with care, dependent on the purpose in hand.
4. Multipurpose systems are costly; however, the multiple benefits may justify the expense.

2. Standard Cost Build-up

Firstly, the point should be made that standard product costs comprise the costs of production only, namely material, labour and production overheads. The definition of *standard* can be discussed emphasising its 'ought to' nature, but incorporating notions of realism, fairness, attainability and stretch.

The elements of cost may be arranged to fit the purpose. Normally labour, materials and overheads are identified to aid cost control. Whether to separate variable from fixed overheads can be discussed. For attention directing such separation has some merit, since overhead volume and efficiency variances can then be computed. The major value however is that marginal costs can be derived for problem-solving purposes i.e.

$$\text{Material cost} + \text{labour cost} + \text{variable manufacturing overheads} = \text{manufacturing marginal cost.}$$

The sources of cost data can be explored to (a) aid comprehension of cost build-up and cost flows, (b) stress how accounting information is dependent upon data collection by other functions and (c) stress how standard costs include assumptions. Fig. 2 depicts the data sources and subsequent cost build-up in diagrammatic form.

From Fig 2 it becomes clear that standard costs comprise three components

(a) *quantity*: of materials from the Quality Control Department in TAC, often from engineers' parts-lists, designers' bills of quantity etc in other organisations; of labour in manning levels from TAC works management, often from industrial engineers' method and time studies in other organisations; of overhead volumes expressed in activity levels derived from sales predictions and plant capacities.

(b) *price*: of materials from the Purchasing Department; of labour from the Industrial Relations Department in the form of wage rates; of overheads as budgeted levels of expenditure decided by both departmental managers and the company's top management.

(c) *performance*: quantity estimates in particular need to be realistic yet also aid motivation. Accordingly they are modified to accommodate allowable slacks, to align with historical performance and to incorporate stretch. Such adjustments are derived from past records, special studies and bilateral negotiations between departmental managers.

Besides building up costs by elements, most firms also subdivide them into production stages. The costs can then be used for work-in-progress evaluation, method and routing decisions, and other similar manufacturing problem-solving as at TAC.

By tracing through cost build-up in Fig. 2, it is evident how costing systems depend on other functions' support. This case thus emphasises, say to engineers, quality controllers, buyers and the like, the importance of supporting data and the ultimate purposes such data serve. Without 'quality control' of base data, subsequent decision-making is impaired.

Element of cost	Price	Quantity	Source of data	Cost computation	Cost total
<i>Material</i>					
A. C. Furnish	0.13028 per sq. yd. flat	1.2280	* Price from Buying Dept. * Quantity from Quality Control Dept. * Allowances from Works Management	1.2280 X 0.13028	= 0.15998
<i>Labour</i>					
Fibre treatment	0.00084	1.2280	* Price from Industrial Rel. Dept.	1.2280 x 0.00084	= 0.00104
Pulveriser	0.00026	1.2280	* Quantity from Works Management	1.2280 x 0.00026	= 0.00032
Sheeting	0.00985 per sq. yd. flat	1.2280	* Performance Allowances from works manage- ment & historical data	1.2280 x 0.00985	= 0.01210 0.01346
<i>Overheads</i>					
Variable	1.93 per £ direct labour		* Price from Overhead Budgets	1.93 x 0.01346	= 0.02598
Fixed	2.67 per £ direct labour		* Quantity from standard capacity in £ labour	2.67 x 0.01346	= 0.03594

Fig. 2. Standard cost of corrugated sheets: derivation and compilation

Also evident are the assumptions upon which costs are built. These are discussed in more detail below. Clearly, however, the assumptions behind overhead costs are critical. Firstly some fixed overheads are discretionary and many are allocated by cost centre on some quasi-equitable basis. Then final allocation to unit product is dependent upon initial estimates of activity level; any deviation from expectations will produce variances.

A major assumption not discussed in the case is that of price levels. Inflation has challenged both the theory and practice of standard costing. It is interesting to discuss how inflation should be incorporated into standard cost build-up. For example should year-end, mid-year or year-opening prices be used? And for each alternative what is the impact on each application of standard costing? Furthermore what are the valid reasons for standard cost revisions, and how might these be achieved?

Finally TAC build up their standard costs by computer. It can be fruitful to examine the benefits of mechanisation. These can include:

1. The volume of processing and storage required; at TAC there are 20,000 products each with 4 elements of cost and an unknown number of stages.
2. Ease of subsequent evaluation, use and enquiry.
3. Source data being available from other computer systems such as production control. This not only provides a simple interface, but reduces data duplication, improves data control and allows functional integration of information.
4. Simplified and quicker standard cost revisions.
5. Collection and analysis of costs in greater detail.

The major disadvantages are that with computerisation, it is easy to (a) overlook and thus under-value the importance of data administration and (b) use the resultant standard costs with insufficient sensitivity and assumptions-questioning. Nevertheless in most firms where data volumes are high, standard costs are computer-based.

3. Using Standard Costs

Scorekeeping uses at TAC include evaluation of stock and work-in-progress and calculation of cost flows into the profit and loss account. Computation of sub-costs of stages of production helps in work-in-progress evaluation. The process of evaluating stock and cost of sales and production at standard cost can be discussed, including how to handle variances as period costs and their subsequent readjustment at year-end. Students often do not appreciate the benefits of standard costing in scorekeeping, namely the ease and efficiency it brings to period accounting, and the identification of variances for control; here the role of scorekeeping and attention-directing overlap.

In attention-directing, standard costs at TAC are used primarily for cost control, exhibit 5 being a typical cost report at the factory level, showing variances for each product. The foot of this report (lines 34 to 41) demonstrates the scorekeeping functions of standard costing. Exhibit 5 demonstrates how by using variance cost codes at data capture, more meaningful variance analysis for cost control can be employed. Thus lines 4 to 9 break down material usage variances into detailed causes.

OVERHEAD VARIANCES

$$\begin{aligned} &(\text{Standard Hours} - \text{Actual Hours}) \times \text{Standard Overhead Rate} \\ &= \text{Overhead Efficiency Variance (Code 24 Ex. 5)} \\ &\quad \text{of Production Manager} \end{aligned}$$

$$\begin{aligned} &\text{Actual Overheads} - (\text{Actual Hours} \times \text{Standard Overhead Rate}) \\ &= \text{Overhead Spending Variance (Code 26 Ex. 5)} \\ &\quad \text{of Divisional Manager} \end{aligned}$$

$$\begin{aligned} &(\text{Actual Hours} \times \text{Standard Rate}) - \text{Flexible Budget Overheads} \\ &= \text{Overhead Volume Variance (Code 29 Ex. 5)} \end{aligned}$$

LABOUR VARIANCES

$$\begin{aligned} &(\text{Actual Hours} - \text{Standard Hours}) \times \text{Standard Labour Rate} \\ &= \text{Labour Efficiency Variance (Codes 20-22, Ex. 5)} \\ &\quad \text{of Production Manager} \end{aligned}$$

$$\begin{aligned} &(\text{Actual Labour Rate} - \text{Standard Labour Rate}) \times \text{Actual Hours} \\ &= \text{Labour Rate Variance of Industrial Relations Manager} \end{aligned}$$

MATERIAL VARIANCES

$$\begin{aligned} &(\text{Actual Quantity} - \text{Standard Quantity}) \times \text{Standard Material Cost} \\ &= \text{Material Usage Variance (Codes 3-9, Ex. 5)} \\ &\quad \text{of Production Manager} \end{aligned}$$

$$\begin{aligned} &(\text{Standard Price} - \text{Actual Price}) = \text{Material Price Variance of} \\ &\quad \text{Purchasing Manager.} \end{aligned}$$

Fig. 3. Analysis of variance

Typically standard costs provide the technology for manufacturing budgetary control. Taking TAC's example of overhead analysis and using conventional variance analysis, Fig. 3 can be discussed to show how standard costing can be used to evaluate managerial performance. It should be emphasised that standard costs are based on assumptions; thus variances may not only provide feedback for correcting short-term activity, but for modifying short-run plans or budgets if assumptions turn out to be invalid, or indeed stimulating longer-term adaptation if variances grow larger or recur.

TAC divisional management 'acts' when variances exceed 2% variation from expectation. The validity of such significance tests can be discussed. For example is 2% a rational limit or would statistical significance tests be more appropriate? Are trends more important than relative variations, and is significance also to do with absolute value?

The interdependence between budgetary control and standard costing should be stressed. For example activity levels, upon which standard costs are based, derive from the budget plan. Then if standard costs are to be used as sub-goals (and communication devices) in budgetary control, then should managers participate in standard setting and how? And should reward systems be related to performance, by standard cost-oriented bonus schemes as implied by the case? In short, what is the role of standard costs in budgeting?

It is claimed that TAC use standard costs in problem-solving, namely in manufacturing and marketing decisions. The relevance of standard costs and standard marginal costs to decision-making can be explored. A key question is how to use variances in problem-solving; for example during inflation what emphasis is placed on price variances?

The case thoroughly documents the contribution of standard costs to financial control systems, describing how when combined with sales budget variance analyses, they are employed at different reporting levels. Thus the profit plans and subsequent profit and return on investment reports at factory, divisional and company levels (Exhibits 9, 8, 7 and 4 respectively) include standard gross profit and gross profit after variances.

4. Costing Assumptions

TAC's standard costing, indeed most product costing systems, are based on the following assumptions:

- (a) That price and rate predictions are realistic and will not 'drift' too much;
- (b) that stretch built in is attainable;
- (c) that allowances are appropriate;
- (d) that performance expectations are valid;
- (e) that sales forecasts are accurate;
- (f) that sales levels do not exceed capacity;
- (g) that overhead allocations are equitable;
- (h) that overhead apportionments are valid;
- (i) that separation of fixed and variable costs is valid.

The implications of each assumption, and the consequences that arise if they turn out to be invalid, can be discussed. Particularly the effects of inflation can be examined.

Above all it should be stressed that in using standard costs, two questions should be asked about the inbuilt assumptions:

1. Does the purpose the cost is to serve differ from that for which the original assumptions were made?
2. Have events proved the original assumptions invalid?

Then any necessary modifications can be made; without such sensitive use, decision-making is easily impaired.

5. Costing Conclusions

The TAC case can be used to demonstrate the following 'principles and practices' of standard costing:

1. Standard costs are designed to meet the purpose.
2. Standard costs are built on assumptions.
3. Standard costs serve both financial and management accounting.
4. Standard costs serve both decision and control.
5. Standard cost systems, if multipurpose, must be used with care, according to need.
6. One use of a standard costing system often dominates others. Frequently scorekeeping unwittingly is emphasised; at TAC attention-directing seems to be deliberately dominant.
7. Standard costing systems are increasingly dependent on computerisation.
8. Standard costing is expensive; without attention to both system costs and benefits, it can easily become too complex and costly. There is no evidence one way or the other at TAC.

FURTHER READING

1. Cox, B. and Hewgill, J.C.R., *Management Accounting In Inflationary Conditions*. (Institute of Cost and Management Accountants, London, 1976).
2. Dupoch, N., Birnberg, J. and Demski, J., 'An Extension of Standard Cost Variance Analysis', *The Accounting Review*, vol 42, No. 3. July 1967.
3. Gee, K.P., *Management Planning and Control in Inflation*. (Macmillan, 1977).