A STUDY OF MANUFACTURING OVERHEAD COSTS

A thesis submitted to the Department of Accountancy, University of Canterbury, Christchurch, New Zealand, in partial fulfilment of the requirements for the degree of Master of Commerce.

by Marimuthu Gurunathan,
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# CONTENTS

## LIST OF FIGURES AND TABLES

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AN INTRODUCTION TO THE STUDY</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Objective of the study</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Survey questionnaire</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Synopsis</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>PLANNING THE CAPACITY</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Planning the technical capacity</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Provision of reserve capacity</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Planning service and ancillary departments' capacity</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Planning administrative capacity</td>
<td>19</td>
</tr>
<tr>
<td>3</td>
<td>DIFFERENT CAPACITY MEASURES</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Introduction</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Types of capacity measures and product costing</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Capacity measures and cost control</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>How to express capacity measure</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Economist's concept of capacity</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>PRODUCT COSTING AND INCOME DETERMINATION</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Different product cost concepts</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Full absorption costing</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Allocation based on actual capacity</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Allocation based on practical attainable capacity</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Allocation based on planned utilisation of capacity</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Allocation based on cyclical capacity</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Allocation based on expected actual capacity</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>A suggested approach</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Direct (variable) costing</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>The case for full costing</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>Conclusion</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>CONTROL OF OVERHEAD COSTS</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Purpose of this chapter</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Some brief historical notes</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Limitations of 'traditional' cost control techniques</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>Classification of overhead costs</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Traditional use of standard costing and flexible budgeting in control</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>The volume varance and the control of capacity utilisation</td>
<td>60</td>
</tr>
<tr>
<td>Chapter</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>5</td>
<td>Flexible budgets and the control of variable costs of capacity</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>The use of statistical techniques</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>Control charts</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Responsibility accounting, cost allocation and control</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>Control of managed costs</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Production costs</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Administrative costs</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>Marketing and distribution costs</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Research and development costs</td>
<td>91</td>
</tr>
<tr>
<td>6</td>
<td>BEHAVIOURAL CONSIDERATIONS IN THE USE OF BUDGETS AND STANDARDS FOR COST CONTROL</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>Introduction</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>Motivation</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>Goal acceptance through participation</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>Conclusion</td>
<td>99</td>
</tr>
<tr>
<td>7</td>
<td>OVERHEAD COST ALLOCATIONS, PRODUCT COSTING AND COST CONTROL - A FRAMEWORK</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>Some brief historical background to overhead cost allocations</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>The problem</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>Purpose of the chapter</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>Overhead cost allocation - general</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Some criteria used for departmental overhead cost allocation</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td>A suggested approach towards the allocation of overhead costs</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>The allocation of service department's cost to other departments</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td>Control of service department's costs</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td>Allocation of production department's costs to products</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td>Problem of joint costs</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>Control of production costs</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>120</td>
</tr>
<tr>
<td>8</td>
<td>PRODUCT PRICING AND OVERHEAD COSTS</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>Introduction</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>Pricing policies</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>Organisational goals and pricing policies</td>
<td>123</td>
</tr>
<tr>
<td></td>
<td>Stable pricing policy</td>
<td>126</td>
</tr>
<tr>
<td></td>
<td>Product life cycle and price policies</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>Economic theory and pricing policies</td>
<td>129</td>
</tr>
<tr>
<td></td>
<td>Role of cost in pricing policies</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Overhead costs and pricing policies</td>
<td>134</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>142</td>
</tr>
</tbody>
</table>
CHAPTER 9: SIGNIFICANCE OF FIXED OVERHEAD COSTS IN INVENTORY VALUATION FOR EXTERNAL REPORTING

Introduction 144
The need for external financial reports 145
The nature of information to be provided by financial reports 145
The effect of the 'going concern' and 'realisation' assumptions on accounting information in the external reports 146
Valuation in accounting and its effects on accounting information 150
Discounted future exchange value 151
Net realisable value 152
Input values 154
Cost or market whichever is lower 156
Problem of price-level changes 157
Summary and recommendation 158

CHAPTER 10: CONCLUSION

Some possible criticisms 160
An area for further research 161

APPENDIX A: SURVEY QUESTIONNAIRE 162

SELECTED
BIBLIOGRAPHY: 170
TABLES AND FIGURES

LIST OF FIGURES

Fig. 1. Short-run Average Cost Curve 28
Fig. 2. Plant Operating Cost Characteristics 68
Fig. 3. Calculation of Capacity Utilisation Index 68
Fig. 4. Average Cost Curve for a given Scale of Operation 69
Fig. 5. Performance Report, Variable Factory Overhead 71
Fig. 6. Cost Control Decision Chart - Unfavourable Variance 78
Fig. 7. $\bar{X}$ Chart for the Control of Factory Overhead 82
Fig. 8. $R$ Chart for the Control of Factory Overhead 82
Fig. 9. Diagrammatic Presentation of Manufacturing Overhead Cost Allocation 117
Fig. 10. Product 'A' Cost Statement (Single Process Manufacture) 118

LIST OF TABLES

Table A. Classification of Companies 4
Table B. A Further Breakdown of Table A 5
Table C. Classification of Responding Companies according to Types of Product Manufactured, Processed or Handled 6
Table D. Comparison of Different Measures of Capacity used for Allocating Fixed Capacity Costs to Production 23
Table E. How Companies identified their Overhead Cost of Items 32
Table F. Classification of Overhead Costs by Companies 105
Table G. Type of Overhead Costs included in Product Costs 106
Table H. Criteria used for Allocating Departmental Overhead Costs 106
Table I. Bases of Allocating Production Overhead Costs to Products - New South Wales Companies 114
Table J. Bases of Allocating Production Overhead Costs to Products - Norway and U.S.A. 115.
CHAPTER 1

AN INTRODUCTION TO THE STUDY

The study of overhead costs in a manufacturing firm relates to the study of capacity planning and utilization. Long before the Industrial Revolution and the advent of steam power and use of heavy machinery, production of goods was largely a handicraft business. Labour time and cost, together with the material used, were the predominant factors of production. The production process was most probably carried out in some form of cottage industry, and the problems of having factory space and other facilities never occurred and thus the question of overheads or the provision of capacity to produce never arose. Today, however, the most outstanding characteristic of manufacturing firms is the extent to which they have incurred heavy capital expenditure to invest and provide for the capacity to produce. The rapid development of science and technology has changed the nature of the production process and there is an increasing trend towards greater mechanisation and automation. Who knows, at the rate computer technology is currently developing, we may yet reach the stage of complete automation in factories!

Accountants, over the years, have been concerned with the problem of product costing, product pricing and cost control. In the past, where overheads were insignificant, the problem of product costing was largely concerned with identifying the raw materials cost and labour cost to product units. However, with the ever increasing commitment to overhead costs in industries in modern times the accountant's task has become more onerous. Whilst material and labour costs could be traced to
products or other cost units, without great difficulties, overhead cost because of their joint nature and different behaviour pattern have perplexed accountants over the years. Accountants, with the desire to identify all manufacturing costs to products, have resolved to the allocation of overhead costs. This practice has been severely criticised by some accountants, economists and management scientists as being an irrelevant task that should at best be done away with. It has been repeatedly stated by these writers,\(^1\) that the practice of allocation of overhead cost is irrelevant and contrary to sound product costing, cost control and product pricing.

Since the time of J.M. Clark's book,\(^2\) many writers have argued that different costs are needed for different purposes and that the tasks of cost control, product costing (for inventory valuation) and product pricing are independent functions, requiring different costs. This different cost-information, it is argued, cannot be supplied from an accounting system based on cost allocation. Those who argue against cost allocation fail to note that the problem of cost allocation pervades through the whole process of accounting, not just with overhead costs. Furthermore, the reasons for arguing against cost allocation are not very clearly stated by those who wish to throw overboard cost allocation. Take the example of direct costers. Here we note a group of people who believe that the cost of a product unit

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should be its direct (variable) costs. Thus they argue that fixed overhead costs should not be allocated. Fair enough, but sometimes their argument states that fixed overhead costs should not be charged to products because being allocated costs, they are arbitrary in nature. This is an irrelevant reason because even the direct (variable) costs have problems of cost allocation! Take another example. This time with writers who advocate cost control, through the technique of Responsibility Accounting. Here the argument runs as follows. Costs should only be charged to cost centres based on the cost centre manager's ability to control it. Thus allocated costs are contrary to the technique of Responsibility Accounting, since the manager has very little ability to control the allocated costs. Here again, the fallacy of the argument lies in ignoring (i) that responsibility can be both direct and casual (indirect), (ii) that it is impossible to identify responsibility centres in a cut and dry manner, and (iii) that allocated costs, if properly presented, can be very useful for cost control via Responsibility Accounting.

Objective of Study: The objective of this study is an attempt to develop a general framework for overhead cost accounting and prove by argument that within this single framework it is possible to process the cost in a manner that will meet the varied needs of product costing (for inventory valuation and income determination), cost control and product pricing.

Survey Questionnaire: To aid the study, a survey questionnaire was prepared and circulated to 183 companies in August 1969 (see Appendix A). The companies were selected from Rydge's 1969 Year Book. These companies are operating in the State of New South Wales, Australia. The companies were selected on the basis of (i) their paid-up capital, and (ii) the number of employees. These two factors were selected to give some indication of the size of the companies. It is admitted that paid-up capital is an inadequate indicator of size. Total assets would have been a better choice. However, this information was not available from Rydge's 1969
Year Book when the selection was made. Of the 183 companies selected, 68 replied positively, whilst 9 stated they were unable to complete the questionnaire for various reasons. Thus a positive response of 38% was recorded. The following tables give a breakdown of the companies which responded positively.

### TABLE A: Classification of Companies

<table>
<thead>
<tr>
<th>number of employees</th>
<th>1,000 and less</th>
<th>between 1,000 and 5,000</th>
<th>5,000 and above</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$3m and less</td>
<td>between $3m and $10m</td>
<td>$10m and above</td>
<td></td>
</tr>
<tr>
<td>A1 38</td>
<td>B1 4</td>
<td>B2 10</td>
<td>B3 9</td>
<td>23</td>
</tr>
<tr>
<td>A2 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3 -</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total 41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C1 -</td>
<td>C2 -</td>
<td>C3 4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total 42</td>
<td></td>
<td></td>
<td></td>
<td>68</td>
</tr>
</tbody>
</table>

From Table A, it can be noted that more than 60% of the replies came from companies having paid-up capital value of $3m and less. This is so because 60% of the companies selected came under this group classification. A further point to note is that more than 50% of the replies came from group A1, representing a paid-up capital of $3m or less and with 1,000 employees or less. Table B, below reveals a further breakdown of this group A1.
TABLE B: A further breakdown of Group A₁ as per Table A.

<table>
<thead>
<tr>
<th>Number of employees</th>
<th>$1m and less</th>
<th>Between $3m and $1m</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 and less</td>
<td>D₁: 20</td>
<td>D₂: 6</td>
<td>26</td>
</tr>
<tr>
<td>between 1,000 and 500</td>
<td>E₁: 1</td>
<td>E₂: 11</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>17</td>
<td>38</td>
</tr>
</tbody>
</table>

As revealed in Table B, 26 companies of the 68 which replied had less than $3m paid-up capital and employed less than 500 employees. This amounts to 30% of the positive replies.

It may be noted that the replies are biased towards the small and medium sized companies as characterised by their paid-up share capital and the number of employees. But then, a survey of Australian companies would reveal that such is the size of the majority of Australian manufacturing firms. Therefore it is maintained that though the replies are relatively small, they are quite representative of Australian manufacturing firms. The following table shows the classification of the 68 companies into types of products manufactured, processed or handled. It is acknowledged that the classification used has been adapted from Professors E. Bryan Smyth and Walter L. Burke's work on *Survey of Financial Organisation and Control in Australian Companies*, 1968, published by the University of New South Wales, School of Accountancy, as the first John V. Ratcliffe memorial publication, research monograph series.
TABLE C:
Classification of responding companies according to types of product manufactured, processed or handled

<table>
<thead>
<tr>
<th>Category of Products</th>
<th>Number of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Motor cars, parts and accessories</td>
<td>5</td>
</tr>
<tr>
<td>2. Food products</td>
<td>4</td>
</tr>
<tr>
<td>3. Products to the building industry</td>
<td>7</td>
</tr>
<tr>
<td>4. Clothing, textiles, yarn</td>
<td>8</td>
</tr>
<tr>
<td>5. Factory and farm equipment engineers</td>
<td>5</td>
</tr>
<tr>
<td>6. Metal and metal products</td>
<td>3</td>
</tr>
<tr>
<td>7. Petroleum, oil, petrochemicals</td>
<td>1</td>
</tr>
<tr>
<td>8. Chemicals, plastics, paint</td>
<td>8</td>
</tr>
<tr>
<td>9. Gas, fuel, coal, coke</td>
<td>2</td>
</tr>
<tr>
<td>10. Paper, printing and packaging</td>
<td>5</td>
</tr>
<tr>
<td>11. Refrigeration and air conditioning</td>
<td>1</td>
</tr>
<tr>
<td>12. Electronic products, communication systems</td>
<td>7</td>
</tr>
<tr>
<td>13. Furniture, office equipment</td>
<td>3</td>
</tr>
<tr>
<td>14. Pharmaceuticals, drugs, veterinary supplies</td>
<td>2</td>
</tr>
<tr>
<td>15. Industrial supplies</td>
<td>4</td>
</tr>
<tr>
<td>16. Sundry consumer products</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>68</td>
</tr>
</tbody>
</table>

The questions raised in the survey were for the purpose of knowing how accountants in practice handled the problems of overhead accounting, many of the answers given did help to prove the validity of the framework, whilst many answers revealed that much had to be done in practice to help improve overhead accounting.

Synopsis: Overhead costs are the direct result of providing for both technical and administrative capacity. As such, it becomes highly significant that we understand how capacity is planned. The nature of initial planning affects
the processes of product costing and cost control. The substance of the arguments for various methods of costing products, and the manner and significance of methods used for cost control, rely heavily on the initial assumptions that prompted management to plan capacity in a particular way. Technical and economic factors, and the assumption of future changes in the technical and economic environment play a great part in initially establishing capacity in a particular form. Chapter 2 of this study discusses some economic and technical considerations in the planning process. The size of capacity desired is a function of the expected utilisation of capacity based on product demand. However, management seldom plans capacity size to meet the demand. The reasons for this may be due to any one of the following causes - (i) the uncertainty of demand forecast and thus expected capacity utilisation; (ii) technical factors, which do not make it feasible to have the exact size desired; and (iii) future cost factors which sometimes favour carrying capacity in excess of planned (expected) utilisation. The above reasons are not exhaustive but are major ones.

Having established the capacity, the question of choice of capacity concepts becomes relevant. This choice is needed for calculating product costs, i.e. we have to determine how to allocate to products, the costs of capacity used in production. Furthermore, the study of capacity concepts leads us to a better understanding of the significance and limitations of standard cost techniques used for cost control. The knowledge of capacity concepts also aids in critically evaluating methods of reporting capacity utilisation. Chapter 3 discusses the various capacity concepts such as practical attainable capacity, planned utilisation of capacity (similar to normal capacity), budgeted capacity (expected actual capacity), scheduled capacity, and actual capacity. The problem of carrying reserve capacity is also discussed.
Chapter 4 discusses the various methods of product costing and how these affect the measurement of income. The use of full cost based on different concepts of capacity results in different product costs. Furthermore, under and over absorbed capacity cost variances result from the use of predetermined overhead rates (based on any one of the capacity concepts). The way this variance is accounted for affects the net income. There have been many advocates for direct (variable) costing as the basis for determining product cost. This is discussed in detail. The writer, however, is in favour of full cost, based on planned utilisation of capacity.

For control purposes overhead costs have been classified into fixed and variable components. However, this classification is inadequate for control purposes because control is not solely dictated by cost variability, but cost avoidability. Management must know what costs can be avoided by its actions. Furthermore, the fixed-variable dichotomy of cost is unrealistic. It is therefore suggested that costs be classified into (i) committed, (ii) managed, (iii) costs varying with time, and (iv) costs varying with volume of activity.

The control of overhead costs has been generally carried out with the aid of budgets and standards. Volume variances are calculated to show the extent of loss through idle capacity. Efficiency variances are calculated to show unnecessary costs incurred because of inefficiency. Budget variances are calculated to show price changes in the overhead items. However, it is necessary to evaluate critically the usefulness of such tools. To what extent does the calculation of volume variances under various methods assist in the control of capacity utilisation? It can be shown that it doesn't really assist in such control procedures. In fact, it may even be asked whether it would not be better to do away with volume variances. Flexible budgets have been advocated widely as a useful tool for controlling variable costs. Does
It really? It can be shown that the technique of flexible budgeting is inadequate. Its assumptions are at times non-operational. For it to be adequate, further revisions are needed. One of the more recent advances in the attempt to improve cost control has been to apply statistical techniques to the traditional control tools of standard costs, budgets and variance analysis.

The use of standards and budgets would be inadequate for control if a proper reporting system is absent. The purpose of reporting can be described as three-fold - (i) appraisal of the individual's own performance, (ii) appraisal of the subordinate's performance, and (iii) appraisal of the activity of the various divisions. The technique of Responsibility Accounting has been widely advocated as an efficient tool for management control. Basically this technique involves the design of the accounting system being focused upon the responsibility centres of individual managers. Accounting data is recorded such that, each cost or profit centre is identified with its own cost and revenue over which the manager in charge has control. Thus, allocation of cost is the direct antithesis to this technique of responsibility accounting. The major failing of this concept is its oversimplicity. In reality, it is hard to have cut and dry authority-responsibility relationship in any organisation. The actions of each and every manager affects the other. Furthermore, responsibilities can overlap and conflicts arise. The direct control over any cost item is easier said than done. In the case of revenues, the problem of transfer pricing makes

divisional performance measurement (based on the criterion of profit) a farce. It is argued that allocations of overhead cost need not be the antithesis but rather a useful adjunct to the concept of Responsibility Accounting. A further consideration for improving the effectiveness of Responsibility Accounting is the study of behavioural implications of budgets and standards on people. This is covered in Chapter 6.

The application of statistical techniques to improve the usefulness of standards, budgets and variance analysis for cost control will be inadequate if due consideration is not given to the behavioural problems which arise in the process of control. Effective cost control can only be achieved if people are motivated towards this objective. How do we motivate these individuals? Do budgets and standards serve as tools of motivation or are they conceived by the budgetees as pressure devices, and thus negating the process of motivation? Several research projects have been carried out in the U.S.A. on this matter of motivation, and one general remark that prevails in these works is that participation by employees in setting the standards and budgets is an essential factor towards motivation. However, effective participation is only possible if due consideration is given to such factors as (i) the skill needed of the participants, (ii) the communication of company goals and objectives to the participants in a manner that will facilitate their understanding and appreciation, and (iii) the individual needs of the participants. In short, the right environment must prevail for effective motivation and control. Management must therefore create this environment.

For purposes of planning and decision making, management needs information of future costs and revenue. However, the present framework of the accounting system is only capable of providing past and current data.
This, therefore, entails an extra function for the information processor to convert or project with the aid of past and current data, the future data for management decisions. However, within the context of the present accounting system, the accountant can still perform his task of product costing and cost control. Much has been said of the futility of cost allocation for the control purpose. Chapter 7 takes issue on this and presents a framework whereby it suggests that cost allocation is not futile but a necessary adjunct to effective cost control. It is the manner in which cost information has been processed in the past that attributes to the sceptical view of the usefulness of cost allocation.

Some of the major suggestions of Chapter 7 are: (i) costs should be classified into (a) direct committed, (b) direct variable, (c) allocated committed costs, and (d) allocated variable costs; (ii) direct variable costs should be further grouped according to the various activity indices such as machine hours, labour hours etc.; (iii) direct costs are best controlled at their source; (iv) flexible budgets can be used for control of each group of direct variable costs and allocated variable costs; (v) price variances should be eliminated at their source; (vi) in controlling committed costs, each supervisor should only be held responsible for the efficient use of the facilities of his department; (vii) cost control should be by departments and not by products; (viii) a committee should be formed at the factory level to look into cost allocation and control.

The framework as presented in Chapter 7 can be used not only for the purposes of product costing and cost control, but also for providing information for product pricing. No doubt, before constructing a framework of accounting that will provide cost information for pricing, the case for
using cost for pricing must be established. It must be admitted that no matter how management establishes its price policies, the result of such policies should be the recovery of costs plus a satisfactory return on investment tied up in the business. Costs, therefore, are uppermost in the minds of businessmen when they decide on price policies. However, different market structures and market opportunities, together with other economic factors, may demand the use of different cost concepts. The framework of accounting must exist to provide this information about costs.

The framework as developed in Chapter 7 provides for clear identification and separation of direct fixed costs and allocated fixed costs. This framework allows the accountant to work out the average variable cost, the average fixed cost and the average total cost per unit produced. Furthermore, because the cost information is carefully segregated, it allows the accountant to be aware of the degree of accuracy of the information. Errors can arise in the allocation process.

Processing information for product costing, cost control and pricing are largely for internal use by management. At the end of the accounting period the company has to present its annual financial reports to its shareholders. If it has inventories of finished goods and work-in-process, it must present these in the financial reports. How will the company cost these inventories for this purpose? Chapter 9 discusses this matter in the light of traditional accounting practices and modern accounting theories. The costing of inventories affects both the income statement and balance sheet.

4. It has been argued widely that for purposes of product pricing, the relevant cost is the differential or incremental cost. However, this depends on whether the firm is a price-taker or price-setter. Generally, firms will wish to recover their incremental costs plus a contribution towards its joint fixed costs.
The valuation of inventories cannot be based on a single value concept. This is so because there are different users of external reports, each requiring some specific information. Shareholders will want to know the earnings per share and the current value of the firm; creditors may want to know the current cash equivalent or liquidating value of the assets; management is interested to know the value to the firm as a going concern. Thus it may be useful to give multi-valued statements showing current costs and current output value of the assets. It is maintained that the framework of Chapter 7, though it records only historical cost, is useful for the purpose of deriving current cost data. This current cost data is based on the assumption that the business is intending to produce its own goods and not buy it from an outside source. The assumption is that it is cheaper to produce than to buy. Thus the current cost data refer to cost of materials, labour and overhead. With reference to fixed overhead its current cost is a fraction of the opportunities available to the fixed production facilities. Where opportunities do not exist, there is no current cost of fixed overhead.

It can therefore be noted that the study attempts to develop a framework wherein information as regards manufacturing overhead is processed in such a manner that the various needs for control, costing and pricing can be met. It is hoped that this study does at least attempt to open the door for further detailed research on overhead cost accounting, and has proved that allocation of overhead cost, if it is properly done, can be meaningful.

5. This statement no doubt will be challenged by those who maintain that there is only one valid valuation concept, i.e. "current cash or monetary equivalent" value.
PLANNING THE CAPACITY

Planning the technical capacity: The planning of technical capacity, which can be defined as the physical equipment needed for production, involves deciding two factors, (i) the size of the capacity, and (ii) the physical design of the capacity, i.e. the degree of divisibility of equipment purchased. The decisions on both these factors will involve not only costs but also risk and uncertainty in demand, expected technological developments and the existing state of technology as expressed in the types of machines currently made available.

The size of technical capacity to be installed will to a large extent be based on the company's forecast of the demand schedule and its sales planning over the period of years under consideration. The average output expected to be produced over this period is significant but the company may not select the level of capacity based purely on the least average cost for the average output. To do so, would constrain the manufacturer to produce at this level, in the same manner, in order to maintain least cost. This in reality is not possible because the manufacturer knows "in fact ... he will normally produce less than the planned output, that this output will fluctuate, that he may very well have to alter the precise nature of the product in order to meet some change in the market or because he can get an advantage by so doing, and that minor changes in the technique of production, at least, are always likely, and that the effect of these may be important, taken cumulatively."

6. It is argued here that management of companies have their own strategies and goals to follow over the indefinite period of life ahead. Such being the case, the process of long-range planning most probably covers one phase of development at a time over the company's existence.

risks in demand, product and process have to be considered besides cost in establishing the size of plant. In deciding to construct a plant, the following alternatives may be considered:
(1) to build a plant large enough to produce according to the five-year sales plan;
(2) to build a plant to meet the first two of the five-year sales plan and to add another increment to match the remaining three years' sales plan;
(3) to build a plant to meet the first year's sales plan and to add subsequent increments as needed for the five-year sales plan.

The decision will depend on two factors -
(1) divisibility or flexibility of the equipment purchased;
(2) the economic and technical feasibility of replacement and/or increment of production process.

Traditional economic theory of the firm maintains indivisibility of plant size, once it has been acquired and established. Furthermore, traditional economic theory fails to distinguish indivisibility in use from indivisibility in acquisition. David Maxwell, in a recent article, maintains that a distinction be made between factors of production and factor services. He maintains that "... indivisibility characterises the acquisition of factors of production. They can often only be acquired in discreet 'lumps', these 'lumps' are often not completely compatible, and typically factors of production cannot be purchased at a rate simultaneous with the rate at which they yield factor services.

The services of factors of production are, however, far more divisible than the factors themselves, primarily because they are yielded through time.\textsuperscript{8a}

Joel Dean maintains that "opportunities for segmentation are greater than economists have generally recognised. In many industries the development of versatile and adaptable plants, in order to produce a variety of products in a wide range of proportions and in order to operate efficiently at many rates of output, have brought about much time, speed and unit segmentation which have reduced the practical importance of discontinuities."\textsuperscript{9}

The firm may ensure divisibility at acquisition by purchasing smaller units of the plant rather than one large unit.

The factors which affect the divisibility of the plant on acquisition are:

(i) technical feasibility - that is, can the production process be operated effectively on a segmented basis? It is possible that technical efficiency may be lower on a segmented basis, whilst costs may be lower. Thus, a trade-off between technical efficiency and cost will have to be made.

(ii) cost of obsolescence, as a result of acquiring one large non-divisible machine may be great as the result of unexpected fall in demand for the products. If this cost is greater than the additional costs of extra supervision, repairs and maintenance and operators' wages which will result if the plant is divisible on a unit basis, then management may opt to buy a divisible unit. Furthermore, management may buy a smaller machine, but work extra shifts. Again, the cost of obsolescence of the big machine will have to be compared with the increased costs of operating on multiple shifts. These increased costs generally represent the overtime premium and loss in efficiency which generally results from working

\textsuperscript{8a} ibid. p. 213.

multiple shifts.

The greater the divisibility of the plant purchased, greater is the control management has over its use via variations through speed or shifts of operation.

The degree to which the firm has control over plant services and the degree to which indivisibility exists determines the shape and configuration of the firm's cost curves. The greater the control over plant services, and the greater the degree of divisibility, the longer the range of output over which average total cost will be constant. 10

**Provision of reserve capacity:** Another problem in capacity planning is that of provision of reserve capacity. It was mentioned earlier that the expected average output over a period of years is a significant factor in ascertaining the size of technical capacity to be installed. However, it was also mentioned that the use of average output as the size of technical capacity to install could lead to certain problems, such as seasonal fluctuations and changes in the trade cycle, which may cause the manufacturer to alter his output. Furthermore, the possible occurrence of unexpected breakdowns in machines, thus reducing the technical capacity, also has to be accounted for. These factors contribute towards the decision of carrying reserve capacity. Besides these, the following factors are also considered by the businessman in deciding to carry reserve capacity:

(i) most business policies provide for growth because the inability to take the opportunity when growth occurs can result in the business either stagnating or retrogressing.

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10. This, no doubt, is subject to the assumption of constant factor-service prices, and without consideration for external economies and diseconomies.
(ii) It may not be easy to make piecemeal addition and alterations to existing plant, e.g. a blast furnace or a printing machine. Taking the latter as an example, the installation of a printing press involves excavations and bedding it up properly. Once installed, it may not be easy to renovate and make additions to it. It is a 'sunk' investment and to make any future changes will result in heavy costs. Thus, these heavy costs may be greater than the initial investment for a much larger machine. No doubt we can impute an interest charge on the investment tied up in reserve capacity and consider it as a cost as well.

(iii) Technical problems can dictate the installation of reserve capacity, e.g. the equipment is specially made to the requirements of the business or made to order.

In all three cases, the probable production delays arising from not having reserve capacity to meet expanded demand can be a costly factor.

With reference to the planning and carrying of reserve capacity, the survey revealed the following information:

(i) 31 as against 34 firms indicated they carried reserve capacity.

(ii) Reasons for carrying reserve capacity:

(a) 6 firms indicated that reserve capacity was carried because expected costs of increasing capacity outweighed cost of maintaining reserve capacity.

(b) 7 firms stated that reserve capacity was carried for reasons of uncertainty of trend in growth.

(c) 14 firms stated that technical problems dictated the maintenance of reserve capacity.

Several interesting comments were received, and they all agreed that carrying reserve capacity was essential to meet sales fluctuations (both
seasonal and cyclical). One comment stated that the cost of holding stock to meet such fluctuations was higher than carrying reserve capacity.

Another comment noted the technical aspect of plant installation. It stated that plant capacity came in 'blocks' and an addition of a unit of plant will create reserve capacity for a period. It was generally agreed that the responsibility for carrying reserve was with top management since it decided the matter.

Planning service and ancillary departments' capacity: Having decided on the production equipment to be installed, the task of establishing the capacity of service and ancillary departments to support the production departments arises. Questions like: how large a maintenance force should we have? How large an inspection force should we employ? How large should the materials handling and storage facilities be? can only be answered in conjunction with the production capacity we plant to utilise. Furthermore, management's policies regarding quality control, delays in maintenance and repairs, quantities of materials order and carried, have strong influence on the capacity of service and ancillary departments. Thus the size of service department's capacity may not necessarily be in line with the established technical production capacity. In all probability it will be much less. The reason for this could be attributed to the fact that future increments to these service departments need not necessarily encounter the same problems as revealed for the technical production capacity. The costs related to the establishing of technical production capacity can be considered as "committed" whilst in the case of service departments the cost can be considered as "managed".

Planning administrative capacity: The task of establishing the administrative capacity is quite different from that of establishing the technical capacity. The size of management staff needed is a function of the organisation structure. The more concentrated authority is the smaller
will be the number of management staff needed. Thus, the cost of
management personnel is a 'managed' cost and is controllable by policies
of top management.

Andrews, with regard to this problem, says:

"a businessman starting up may be very cautious when planning
the personal part of his organisation and plan to rather finer
limits, preferring to extend gradually so that the organisation
settles down. He may plan to finer limits in the matter of
reserves, just because people are much more flexible than
machines in the amount of work that they can do, so that for
short periods, there may be a hidden reserve in the establishment
not merely because it will be possible to work overtime but also
because for limited periods, human beings can extend themselves
and take on responsibilities which would overwork them in the
longer run."11

CHAPTER 3

DIFFERENT CAPACITY MEASURES

Introduction: For purposes of (i) allocating capacity costs based on some standard or predetermined rate to products and (ii) controlling capacity costs, the accountant needs to express his technical production capacity and his service and ancillary departments' capacities in some form of measure. Accountants generally have tended to rest upon physical output considerations such as 'practical attainable capacity', normal capacity' and 'expected actual capacity' as being appropriate measures. However, each of these measures will result in different information of product costs and capacity costs utilised. Besides the problem of what capacity measure to adopt, accountants have tended to use a single measure of capacity for both purposes of product costing and capacity cost control. This, as it will be proved in subsequent chapters, is quite erroneous.

Types of capacity measures and product costing: In surveying accounting literature on overhead (capacity) costs, it was found that a definitional problem arises over the 'normal capacity or activity' measure. Some authors have tended to define it as that capacity of plant at which it produces a physical volume of goods to meet the long-run average sales demand. Others have tended to define it in terms of factory production. Schlatter and Schlatter in their book, admit that


a majority of accountants would define 'normal capacity' to mean long-run average sales demand, but they also state that there are others who would define it as the rate of activity at which production is most economical. This is very similar to the economist's concept where capacity is identified as that level at which the average cost is minimal.

'Practical capacity' or 'practical attainable capacity' is generally defined as the maximum level at which the plant can be fully utilised after allowing for predictable and unavoidable operating interruptions such as maintenance, repairs, set-ups, and operator personal time.\textsuperscript{15}

Expected actual capacity represents the budgeted capacity for the forthcoming period which generally is of twelve months duration. Each of these three capacity measures, when used for product costing, will give different cost information. For example, assume the following information:

- Fixed capacity costs - $240,000 per year
- Practical attainable capacity - 100,000 units per year
- Normal capacity (long-run average of sales demand) - 80,000 units per year
- Expected actual capacity - fluctuates from year to year.

The following table shows the different product cost information that will be derived by using different measures of capacity:

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Budgeted Sales Volume Units</th>
<th>Expected Actual Capacity Basis</th>
<th>Normal Capacity Basis</th>
<th>Practical Capacity Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Overhead Rate</td>
<td>Overhead Applied</td>
<td>Under-(Over-) Applied</td>
</tr>
<tr>
<td>1</td>
<td>60,000</td>
<td>$4.00</td>
<td>$240,000</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>70,000</td>
<td>3.43</td>
<td>240,000</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>80,000</td>
<td>3.00</td>
<td>240,000</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>90,000</td>
<td>2.67</td>
<td>240,000</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>100,000</td>
<td>2.40</td>
<td>240,000</td>
<td>-</td>
</tr>
</tbody>
</table>

Nil

Nil

$240,000
It can be noted from Table D that:

(i) the use of expected actual capacity for allocating overhead costs, results in a fluctuating unit cost. Furthermore, there is no budgeted under- or over-applied variance, since all costs are allocated on to expected sales volume. However, actual variance may arise when the budgeted rate is applied to actual production.

(ii) the use of normal capacity or practical capacity results in a standard or constant unit cost. However, in the case of normal capacity, the budgeted variance over the long-run is zero, whilst in the case of practical capacity, the variance accumulates to a fairly large sum.

(iii) the constant under-applied variance in the case of using practical capacity arises because the plant's capacity to produce exceeds the average long-run sales demand.

The survey revealed that 39 of the 68 companies used standard costing. In using standard costs, 37 firms adopted the expected actual capacity measure, 14 adopted the practical capacity measure, whilst only 1 adopted the long-run average of several years' expected sales as a measure of capacity. The above information also indicated that some firms use more than one method of measure of capacity. The reasons why the majority of firms adopted expected actual capacity can be attributed to

"(i) the widespread conviction that the year is the key period and (ii) adherence to the idea that overhead costs for a given year generally must cling or attach to the units produced during that year regardless of the relationship of the years' activity to average long-run activity." 16

Furthermore, the measurement problem that accompanies 'expected actual capacity' (i.e. the budgeted capacity) is far less than that associated with 'normal capacity'. Changes in trend, aside from cyclical changes, make the estimates of 'normal activity' very difficult. Many businesses of a service

type nature do not easily avail to long-term estimation.

The reason for practical capacity being used by the companies surveyed was that many of these companies had just enough capacity or lack of capacity to meet their sales demand. Thus, many of these companies were operating under conditions of over-full capacity, and hardly could meet their expected sales demand.

The question of income measurement and product costing is covered in Chapter 4, and no further comments will be made here with regard to treatment of overhead variances and choice of capacity measure.

Capacity measures and cost control: With reference to capacity cost control, the three measures of capacity do not provide assistance for the purpose. It was noted in Chapter 2 that firms do carry reserve capacity above what is required for expected sales demand. If this were so, then the practical attainable capacity is made up of two components - (a) capacity to meet expected sales demand and (b) reserve capacity.

For purposes of costing and control, it is necessary to identify such capacities separately. 17

The National Association of Accountants research study in capacity costs which was cited earlier, refers to three measures of capacity. These are as follows:

(i) rated capacity - the equipment or plant is operated continuously at the maximum output for which it was designed. This does not allow for any delays, slowdown for maintenance, repairs, holidays, etc.

(ii) practical attainable capacity - similar to what was stated earlier, i.e., capacity to produce after allowing for delays, etc.

(iii) scheduled production - output currently planned or scheduled for a given unit of plant.

This is similar to the expected actual capacity.

17. Chapters 4 and 5 discuss these issues separately and therefore no reasons are stated at this juncture for this statement.
There is not much difference between the above measures and those previously discussed. For effective control it is suggested the following measures of capacity be used.

(i) practical attainable capacity - as previously defined.

(ii) planned utilisation of capacity - average of long-run capacity to meet sales demand. This is similar to normal capacity.

(iii) budgeted annual capacity - same as the expected actual capacity.

(iv) scheduled production - production scheduled as per orders received. This is based on monthly or weekly orders received. 18

(v) actual production - units produced or standard hours allowed.

From the five different measures of capacity, the following can be noted:

(a) The difference between practical attainable capacity and planned utilisation of capacity reveals the extent of reserve capacity carried, or excess capacity needed. If we assume reserve capacity, this must clearly be brought to the attention of top management who may have initially decided to carry this capacity. If we assume that excess capacity is needed, top management should be so notified of this need.

(b) The difference between planned utilisation of capacity and budgeted capacity reveals the extent of planned idle or over capacity utilised.

(c) The difference between budgeted capacity and scheduled production reveals the extent to which marketing management has failed to fulfil its expected obligation and responsibility.

(d) The difference between scheduled production and actual production reveals the inefficiency or failure to meet the processed sales orders by production management.

How to express capacity measure: So far we have discussed measures of capacity for the factory or plant, but how do we express this measure? Can we express this measure of capacity in terms of time (machine hours, labour hours or a combination of both) or should we express in units produced? For the plant as a whole, the measure is an output measure and can best be expressed in terms of completed units. However, problems can arise when the units produced have different expressions, such as pounds, gallons, cubic feet, etc. When it is not possible to bring the multiple products to a common denominator, time based on some standard measurement should be used. For individual equipment, time based on some standard measurement should be used. When a single product is produced by the individual equipment or work centre then completed units can be used to express the measure of capacity. No general ruling can be given on this matter. Each individual firm and its components have to be studied carefully to arrive at the relevant means of expressing the capacity measure.

Economist's concept of capacity: In contrast to the accountant's measure of capacity, the economist defines his capacity as that level of output at which the short-run average total cost per unit is at a minimum. This definition is based on the assumptions that the firm is operating on a given scale under competition and with the aim of profit maximisation. This capacity is defined as 'rated' or 'effective'.

If as a result of diseconomies in the scale of operation the average unit cost is higher than that of the rated capacity, it falls on management to decide whether to change the present scale of operation. 19

This definition of capacity fails to consider the existence of reserve capacity and management's reason for carrying such. Because of

the existence of reserve capacity, it is possible that the minimum average cost at the rated capacity may be lower than the average cost at the planned utilisation capacity and the practical attainable capacity. The following diagram illustrates this point:

![Diagram showing short-run average cost curve with SAC, SAC1, SAC2, planned utilisation capacity, rated capacity, practical attainable capacity, and output axes.]

The diagram illustrates that in the short-run, if demand is high, the reserve capacity can be used (though at higher cost) until such time management feels that it is economically feasible to expand further. It should be noted at this juncture that the reason for carrying reserve capacity could have been influenced by management's belief that high future costs will be incurred to increase capacity frequently. Thus, though the average cost is high at the practical attainable capacity on the present plan SAC1, it may be lower than the expected average cost if the plan was to develop a smaller scale of plant SAC. (See SAC2 in the diagram which illustrates what may happen when the small scale plant SAC is expanded to meet high demand. It can be noted that level of output Z is operated on a lower cost on SAC1 than on SAC2). One final remark before closing this chapter. In the case of contracting capacity, the nature of the plant established must be considered. If high degree of rigidity prevails, then there is nothing that management can do except to seek new avenues for its products.
CHAPTER 4

PRODUCT COSTING AND INCOME DETERMINATION

One of the fundamental tasks of the accountant is to determine the net income or profit of the company. The two major approaches to the determination of business income are (i) the capital maintenance approach and (ii) the transactions approach. By the former approach, income is determined by valuing net assets at the beginning and end of a period. The change in value between the two points in time, together with adjustments for dividends paid and other capital transactions represents the income for the period. By the latter approach, income is arrived at by the matching of revenue and expenses of the particular period. Even if the latter method is adopted, valuation of assets are still necessary for income determination and balance sheet preparation.

One of the major problems in using the capital maintenance approach is the selection of a value concept that can generally be accepted. Unfortunately, accounting theorists have yet to settle this issue. In view of this unsettlement, accountants have tended to trot along the more conventional approach of matching revenues and expenses (i.e. the transactions approach).

In accepting the transaction approach to income determination the accountant has inevitably accepted the task of computing product's costs which is a relevant item in the matching process. The task of computing product's cost is a complex one, largely because different view points exist as to what constitutes a product's cost.

In the operation of a manufacturing business, costs are incurred for various activities. The accountant in the process of cost accounting has classified these costs into functional categories such as: production or manufacturing costs, selling and distribution costs, research and development costs, general administration costs, engineering service costs, etc. The question is - which of these costs are to be associated to the products and which are to be written off as period costs?

Production or manufacturing costs, which constitute materials, labour and factory overhead, do not provide any great problem of identification. They are generally considered as product costs. However, it must be noted at this juncture that different ideas prevail as to the types of factory overhead costs that should be identified to products.

Selling and distribution costs have generally been identified as costs incurred after the product is physically completed, and therefore not part of the product cost. However, it is essential to note here that these costs should be further classified into (i) order-getting and (ii) order-filling costs. The former includes such costs as advertising and market research, sales promotion, direct selling and marketing administration. The latter includes such costs as packaging, materials handling, freight charges, and credit collection. The general case has been to treat order-getting costs as period costs. However, with regard to order-filling costs, each item of cost is considered separately.

Research and development costs represent an interesting area of study for both costing and control. In these days of modern industry, research and development is becoming a very important and relevant function. However, the research function can mean different things to different companies. Some may consider research to mean fundamental or basic inquiry which has only a vague, if any, relationship to products or processes. In
such circumstances, the cost of such pure research cannot be identified to products manufactured. On the other hand, research could mean applied work to improve existing products or processes. Here, we can identify the costs to a class of products but, the question of allocation over time arises. These costs benefit the product not just for a period, but for years to come. The same problem arises for developmental costs. Developmental work takes on where research work leaves off. Developmental work is the transformation of research accomplishments to products of marketable value. Here, we can identify the development costs to the products, but the problem of allocating the costs over time arises. A further problem to note is the treatment of administration costs of research and development. Should these be allocated to products or written off as period expenses? At this juncture, no attempt will be made to answer this question or others similar to this. The answers (if any) will be reflected in the various product cost concepts that will be discussed shortly in a subsequent section.

Finally, general administration overhead costs have been treated as period costs, though writers have questioned whether it would not be correct to allocate these to (i) the production function and (ii) the selling and distribution function. The reason for this suggestion apparently lies on the assumption that there are only two major functions in a business - production and distribution. It may be noted that some companies have followed the practice of charging these head office costs (i.e. general administration) to their factory as part of its share of general overheads to be included in product costs.

The following Table E gives a summary of how companies responding to the survey questionnaire treated some of their overhead items for product costing.
TABLE E: How companies identified their overhead cost items

<table>
<thead>
<tr>
<th></th>
<th>Period Costs</th>
<th>Product Costs</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing Depts.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Service Depts.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Supply</td>
<td>4</td>
<td>84</td>
<td>12</td>
</tr>
<tr>
<td>Maintenance and Repair</td>
<td>8</td>
<td>80</td>
<td>12</td>
</tr>
<tr>
<td>Stores - factory</td>
<td>14</td>
<td>86</td>
<td>-</td>
</tr>
<tr>
<td>- field warehouse</td>
<td>53</td>
<td>47</td>
<td>-</td>
</tr>
<tr>
<td>Cost Dept.</td>
<td>62</td>
<td>35</td>
<td>3</td>
</tr>
<tr>
<td>General Accounting</td>
<td>80</td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>Purchasing Dept.</td>
<td>44</td>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td>Receiving Dept.</td>
<td>30</td>
<td>66</td>
<td>4</td>
</tr>
<tr>
<td>Time Keeping</td>
<td>42</td>
<td>42</td>
<td>6</td>
</tr>
<tr>
<td>Personnel</td>
<td>55</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Pay-office</td>
<td>60</td>
<td>27</td>
<td>13</td>
</tr>
<tr>
<td>Order-getting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advertisement</td>
<td>92</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Sales Promotion</td>
<td>93</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>Direct Selling</td>
<td>92</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Marketing Administration</td>
<td>93</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>Order-filling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packaging - factory</td>
<td>10</td>
<td>90</td>
<td>-</td>
</tr>
<tr>
<td>- shipment</td>
<td>33</td>
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<td>Transportation - Interfactory</td>
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<td>- factory to warehouse</td>
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<td>76</td>
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<td>Clerical costs</td>
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<td>11</td>
<td>-</td>
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<td>Credit collection</td>
<td>91</td>
<td>9</td>
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<td>General Administration</td>
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<td></td>
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<td>Salaries - top management</td>
<td>86</td>
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<td>4</td>
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<tr>
<td>- others</td>
<td>86</td>
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<td>Research and Development</td>
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<td>Royalties</td>
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<td>52</td>
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Different product cost concepts: In the days when overhead costs were insignificant in the manufacture of goods, the cost of products was largely made up of raw materials and labour. Together they were classed as the prime costs of products. However, as overheads became more significant with the increasing modernisation of industries, the cost of such overheads claimed a major part in the product cost. Even though overhead costs are considered part of the product cost, different schools of thought exist as to how it should be calculated.

Basically there are two schools of thought - (i) the direct (variable) costing school and (ii) the full (absorption) costing school. In the survey conducted, 28 companies indicated they used direct costing method and 32 companies indicated they used full absorption costing method for their products in determining profit. However, the term direct was interpreted in three ways by the companies using it, (i) to mean prime costs, (ii) to mean direct product costs, i.e. all costs directly traceable to the products and (iii) to mean variable product costs. It was the third interpretation that was meant to be in the question asked. Seven firms explicitly stated they used the concept of direct (variable) cost for product costing and some of these used standard direct costs.

Full absorption costing: The idea behind the theory of full cost is that:

"Any type of cost may be 'deferred' if it originates in a justifiable expenditure and represents a factor from which a future benefit or contribution can reasonably be anticipated."

The full costers believe that all factory overheads contribute towards future benefit and thus should be allocated to products as costs.


22. Note: the term 'overhead' as used in subsequent sections and chapters will mean overhead considered to be related to products. Unless otherwise stated, this definition will prevail.
The problem of allocation is the difficult task the accountant has to face when preparing cost and other financial statements. The variable part of factory overhead is generally considered easier to allocate since these variable costs vary with volume of activity. A greater problem exists as regards the fixed overhead. Here the allocation of fixed overheads to products is indissolubly bound up with the theories underlying capacity measures and the techniques of handling capacity cost variances. The following are some of the capacity measures used for allocating fixed overhead costs to products: (i) based on actual capacity, (ii) based on attainable capacity, (iii) based on normal capacity or planned utilisation of capacity, i.e. average activity over a number of years, (iv) based on cyclical capacity, (v) based on expected actual capacity.

Allocation based on actual capacity: By this method, actual costs accumulated for the period is allocated to the actual volume of production. Where the production is of a single product, the problem of allocation hardly exists. Each product unit bears an equal share of the burden. However, where multiple products exist and are processed either separately or jointly the problem of allocation becomes at times arbitrary. This arbitrary allocation is often severely criticised by some accountants and non-accountants. This matter will be discussed separately later on. The point to note regarding the use of this method is that unit product costs will fluctuate from period to period. Thus, when volume of production is high, average fixed cost will be low, and when volume is low, average fixed cost will be high. Management who use such costs data for pricing naturally will be concerned because they may be quoting high prices (because of high cost) in times of low demand and vice versa. Another point to note is that the overhead costs so allocated included the costs of inefficiency (or efficiency) and idle capacity. For these reasons, the need for a predetermined overhead rate became quite obvious.
Allocation based on practical attainable capacity: This is one of the many capacity measures used for establishing a pre-determined overhead rate. By this method, the budgeted annual fixed overhead is allocated to the products based on the practical attainable capacity of the plant. Several writers have criticised this method. The primary criticism being that this method is based on a production concept and ignores the demand function. The method therefore disregards the existence of chronic overcapacity, particularly during periods of economic recession, as a factor to be reckoned with in the computation of product costs. The use of this method may frequently result in having idle capacity variance. This is generally treated as a loss. This again draws another criticism. It is argued that treating the idle capacity as a loss results in a paradox where a justifiable business decisions, to purchase plant at the stated capacity, has been made at considerable costs which are not in any way productive of benefits.

Brummet states:

"...it seems unreasonable to insist that full practical utilisation is necessary to justify potential postponement (in inventories) of all related costs for matching against revenues. A planned or anticipated utilisation of fixed costs factors at the time of acquisition provides a more appropriate base for use in the assignment of costs than does the practical capacity concept."

The writer is of the opinion that all these criticisms and opinions fail to consider the existence of reserve capacity. Chapter 3, whilst discussing capacity measures, did indicate that practical attainable capacity was composed of planned utilisation of capacity plus the reserve capacity. It

23. Refer to Chapter 3, Table D for illustration. Also refer to definition of practical attainable capacity given there on page 22.


may be more appropriate to isolate the total fixed costs to those related to reserve capacity and those related to planned utilisation of capacity. Allocation based on planned utilisation of capacity: This method is widely suggested by writers dissatisfied with the practical capacity measure. The view of these writers is that the overhead costs should be assigned to products based on the company's selling ability, i.e. to consider the company's ability to produce and sell its output. The selling capacity is based on the average long-run demand for the product over several years sufficient to smooth out any cyclical and seasonal fluctuations. The argument states that the overhead costs should be recovered over the long-run if the firm intends to make a profit. However, the use of planned utilisation of capacity, without consideration for existing reserve capacity will result in charging the product with costs of reserve capacity. This is wrong in the opinion of this writer since it is maintained that reserve capacity costs should be charged only if this additional capacity carried is used for production.

The use of the planned utilisation capacity measure for allocating overhead costs to products results at times in capacity variances. Two schools of thought exist as to how this variance should be accounted for. One school suggests we account for the variance in the period it arises. Different methods are suggested as to how we should account for this. One way, is to charge the whole amount to the profit and loss account (deducting from or adding to the gross profit figure). By this way, the variance is supposed to represent a loss or gain arising from the use of fixed productive facilities. A second way is to distribute to the cost of

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27. It may be argued that this will involve arbitrary allocation. This need not be so, if we use the differential cost of a plant capable of producing the planned utilisation of capacity and the current cost of existing capacity. The difference relates to cost of reserve capacity.

28. Refer to Table D, Chapter 3 for illustration.
goods sold, finished goods inventory, and work-in-process. This tantamounts to full actual cost. The third way is to charge to cost of goods sold. This is similar to the first suggestion, except that cost of goods sold carry the burden of variance. The survey revealed the following practices adopted by 42 companies:

(1) variance charged wholly to cost of sales 23 firms
(2) variance charged in proportion to cost of sales, work-in-process and finished goods 7 firms
(3) variance charged to annual profit and loss account as a separate item 12 firms

Several interesting comments were made in regard to the methods mentioned. The following are some of these:

"Charged initially to revaluation stock account. Every three months, standard cost is revised and revaluation account utilised to meet stock write downs. Difference is charged to cost of sales."

"Volume and spending variances charged to gross profit."

"Variances are deducted from each product department's net profit."

"Though charged to cost of sales, gains arising from productions exceeding sales are held in a provision suspense and used to reduce value of finished goods inventory."

"Shown distinctly as 'overhead variations account' in cost of sales group in annual profit and loss."

The second school of thought suggests we defer this capacity variance so that over the years the favourable and unfavourable variances will cancel out.

Criticisms can be levied at both schools of thought. With reference to the first school of thought, it has been suggested that by adopting the method of accounting for variances in the same period, fixed cost charges for production facilities would be calculated on the basis of straight-line
or equal proportion method. This has been criticised on the grounds that this approach of calculating fixed cost charges ignores the service benefits consumed. As a result, there will be poor matching of costs with revenues registered in that period. It appears that these writers would prefer to calculate fixed cost charges assignable to products on the basis of expiration of service potentials from the productive facilities used. A close approximation to service potentials used or benefits derived would be to calculate fixed cost charges on the basis of unit of production or activity. The result would be that there will be no capacity variance (provided that the long-run ex-ante and ex-post capacity coincide). The major criticism of the second school of thought is that seldom will the capacity variances even off in the long-run. This is so, because errors of estimation, changes in trend and costs may frequently occur. The following section takes on this matter for further discussion.

Allocation based on cyclical capacity: This method is similar to the planned utilisation of capacity, in that both use the average long-run capacity to sell as the capacity measure. However, this method treats the capacity variance according to the second school of thought discussed previously, i.e. to defer the variance over the long-run period. Both Ferrara and Brummet tend to advocate the view that fixed cost charges for the productive facilities used should be based on the expected or planned output and not on their physical output potentials. Both have similar viewpoints on the treatment of capacity variances, i.e. defer them over the long-run period. As

29. Brummet, op. cit.
32. Brummet, op. cit.
regards the possibility of variances not cancelling off in the long-run as the result of changes in the expected output in the long-run, on account of factors which could not possibly be foreseen Ferrara suggests:

"losses incurred on the basis of such extreme changes might be called idle capacity." 33

Brumnet makes a similar comment as follows:

"... rates could be established on the basis of planned utilisation over the expected life span of each commitment. This would be the degree of utilisation which had been used to justify the commitment or decision to acquire the facility. At periodic intervals the anticipation of utilisation could be recalculated. If there were no change in expectation of utilisation there would be no reason to change the rates, and all underabsorbed balances should be deferred from period to period. Neither would there be any reason for a change of rates if there were a downward adjustment of anticipated utilisation. However, in this case, an amount determined to be the product of the percentage reduction of anticipated utilisation and the period's charges to products using the original rate should be charged to current revenues as a reflection of post-decision unfavourable developments with regard to utilisation of the facility. .... If anticipated utilisation were adjusted upwards there would be evidence of post-decision favourable developments or of benefits in excess of those anticipated when related decisions were made." 34

At this juncture, it may be asked, how long should the long-run period be?

It is suggested that this period coincide with the planned time of use of the fixed facilities installed. This may be in line with the company's replacement policy.

A further point to note regarding Ferrara's article is that he treats semi-variable costs as being relevant only to that period's production and as such should be allocated to that period's production. No capacity variance will arise. However, this approach will result in fluctuating unit costs if we do not efficiently and effectively utilise the services of such cost.

Allocation based on expected actual capacity, i.e. budgeted capacity:

This method differs from that of planned utilisation and cyclical capacity

33. op. cit. p. 496

34. op. cit. p. 71
measures mainly in the time span adopted. This method allocates the budgeted fixed overhead costs to the budgeted or expected capacity. This method coincides with the company's budget procedure. The results of adopting this method is that unit costs will fluctuate from year to year due to cyclical changes. The capacity variance is generally accounted for in the same period and thus not deferred. In accounting for capacity variance in this way, the final result is the same as that when using planned utilisation of capacity and accounting for capacity variance in the same period.35

In all of the four cases discussed, the writers have not considered the problem of reserve capacity. A firm commits its resources for the acquisition of capital assets with the clear intention of using it fully. Thus, the initial decision to acquire these assets must be carefully deliberated. Once the decision is made, the firm should make every effort to fulfill its objectives and goals. If subsequently it is found that the initial decision was wrong and portion of the capital assets acquired become unused and obsolete, then it is only right to write off this excess capacity as a loss arising from that particular decision. To this extent, the writer agrees to the viewpoints of Brummet and Ferrara. However, because these writers have ignored the existence of reserve capacity a different approach is suggested.

A suggested approach: It was stated at the outset that the major factor influencing the capacity decision was the long-run expected demand of the

35. Note, this is only so if the variance is disposed of in the same way, e.g., assume an annual budgeted fixed cost of $9,600. The expected or budgeted capacity is 10,000 units, the planned utilisation of capacity is 12,000 units, and actual production is 8,000 units. Assume the variance is disposed of by charging proportionately to cost of sales, finished goods and work in process. By using the budgeted capacity measure, the applied overhead is $7,680 and the variance is $1,920. By using the second capacity measure, the applied overhead is $6,400 and the variance is $3,200. But when reallocated (i.e. disposed of) they add up to be the same.
company's product. However, we further noted that other factors had to be considered as well, such as, additional capacity to meet plant maintenance, unexpected growth in demand, technical problems that may arise when attempting to expand capacity and the fact that certain equipment comes in given sizes and we have no alternative but to accept these. Where management decides to carry more than the required capacity for its planned utilisation, it is suggested that this additional capacity be identified separately\textsuperscript{36} from the planned utilisation of capacity. Products produced within this planned utilisation of capacity should be charged with the costs of the planned utilisation of capacity on the basis of unit of production.\textsuperscript{37} Where additional capacity arises because of technical problems, i.e. machines could only be purchased in certain sizes, the costs of such capacity should also be inventorised (become part of the cost of planned utilisation of capacity) as this is an unavoidable item. However, with regard to reserve capacity, the related costs should be carried as an asset,\textsuperscript{38} (not treated as a loss) and an imputed interest charge be levied for carrying this additional capacity. The imputed interest represents the cost for management's decision to carry reserve capacity. If the reserve capacity is used, its cost will be charged to the production. If the reserve capacity is not used at all, it will have to be written down and the loss recorded as arising from management's error in that decision. The difference between the suggested methods and that of Brummet and Ferrara is that the latter by not recognising reserve capacity have tended to inventorise

\textsuperscript{36} Re footnote 27, p. 36.

\textsuperscript{37} Brummet, op. cit. and Ferrara, op. cit.

\textsuperscript{38} It is assumed here that the plant capacity is divisible and therefore can be sold or bought is small units.
all costs of capacity over the planned utilisation. By so doing, they do not reveal how the management's decision to carry additional capacity has resulted. Also, they have inflated product costs.

**Direct (Variable) Costing:** This term is used to designate a method of costing whereby the product manufactured is charged with the direct raw materials cost, direct labour cost and variable factory overhead cost. Like the full cost approach, this method also ignores other costs which are relevant to the process of production, e.g. research and development cost. The reasons are purely related to the difficulties of measuring the benefits derived from such services to the products. Horngren and Sorter attribute this reason, in the case of full costing, to:

"preoccupation with physical evidence... Thus expenditures for research, advertising, employee training and the like are usually expensed, although it seems clear that in an economic sense these expenditures represent future benefits."\(^{39}\)

The same reason could also be applied to variable costing. The direct (variable) costers maintain that only variable production costs can rightly be construed as product costs. Fixed factory overhead are expensed as period costs. Thus, the only difference between full costing and variable costing is in the treatment of fixed factory overhead cost.

The case for variable costing has been strongly advocated for more than two decades. The issues involved have ranged from the misgivings of cost allocation practised under full costing, to irrelevant cost analysis resulting from full costing. What must be stated at the outset before venturing into the subject more thoroughly is that, variable costing is useful for managerial cost analysis. This is acknowledged even by the full costers. However, with regard to cost allocation, it must be admitted that

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the problem of allocation is common to both forms of costing. Even variable costs have to be allocated!

In the discourse between variable and full costing techniques, the question of what an asset is, is always raised. The definition of an asset is relevant to the argument, because inventories of finished goods are carried at the end of each period in the balance sheet, classified as an asset.

The term asset has been defined to mean service-potentials. By this definition, any outlay having the potentialities of providing future economic benefits shall be construed as an asset. How do we interpret when costs have future service-potentials and therefore be classified as an asset in the balance-sheet?

The proponents of variable costing depend on the cost obviation concept of service potential, i.e. costs have service potential to the extent that their current incurrence will avert the necessity of future incurrence of such costs. Future costs can be reduced or obviated in two ways - (i) by avoiding the reincurrence of the same type of cost or (ii) by reducing a different cost (possibly an opportunity cost).


41. Note: the case for using cost, which is an entry-price, arises because the thesis is based on the transactions approach to income measurement. No attempt will be made here to discuss exit-price for product costing and inventory valuation. This is deferred till Chapter 9.


Regarding whether these avoidable costs should be represented by historical data or future data, the following views have been expressed:

"The measurement of an asset may be the future cost obviations as reflected by past cost incurrences. This would set recorded costs as an upper limit; this is in keeping with present accounting custom. Alternatively, the measurement of cost obvation could be based on the expected level of future costs if, as and when, accounting no longer looks to recorded cost for balance-sheet expressions."

Horgren and Sorter discuss the issue rather vaguely. They maintain that if a given cost (i.e. historical or current) prevents the incurrence of a future cost, the given cost can be classified as an asset. They conclude that the notion of an asset as future cost avoidance is valid with or without the original cost restrictions.

It appears that in order to operate within the traditional accounting framework, the original cost should be used. It may be suggested here that any form of adjustments for price-level changes should be done outside this framework. This suggestion is made in the light of methodological difficulties faced by writers who advocate a framework of accounting within which such adjustments mentioned can be accommodated.

The variable costers maintain that their concept of product cost passes the 'future benefit test' whilst that of the full costers fails to do so. Horngren and Sorter maintain the same view, except in the case of fixed factory overhead it depends on the following assumptions:

44. David Green Jnr., op. cit. p. 190.
1. Future production at maximum capacity with future sales in excess of capacity by the amount of increase in ending inventory.

2. Variable production costs are expected to increase.

After making these assumptions, they set about to prove that fixed factory overhead need not necessarily be capitalised. Taking the second assumption first, they show that the costs that will be capitalised are the variable cost savings, not fixed costs. However, they fail to point out that it was because of the facilities existing to be used, that future variable costs could be saved, and that the use of the facilities should rightly be charged with an opportunity cost. Working within the conventional framework, the fixed cost charge approximates this opportunity cost. With reference to the first assumption, one finds it hard to follow their reasoning for rejecting the inventorying of fixed cost charges. They maintain that the inventorying of fixed costs requires additional assumptions beyond that of the going concern. This is so because conventional accounting generally opposes the formal capitalisation of future savings and profits. But conventional accounting in attempting to inventorise fixed cost charges has got nothing to do with future cost savings. It is based on the assumption that such costs do enhance the value of the product and contribute towards future revenue benefits. The authors mentioned conclude:

"The only general justification we can see for inventorying fixed factory overhead is the assumption that there is a perpetual lag; that is, without constant replenishment of inventory, the unfilled pipeline will result in missed sales. But this special assumption is again in addition to that of going concern. Making this special assumption carries with it an imposing measurement problem: determining the minimum levels needed to avoid disruption of operations. Only these minimums can justifiably carry a fixed factory overhead cost component. If this measurement problem is ignored, there is an implied assumption that all inventory at all times is not excessive. The latter assumption is probably unrealistic." 48

The above view ignores several characteristics of business operations. Firstly, it is inevitable that firms will find themselves in situations where demand exceeds supply and vice versa. This is largely a cyclical and to some extent, trend phenomena. To overcome this situation firms do carry these inventories. It may be that not all the inventories can be fully utilised in a particular period, but this does not mean they are excessive. It is possible that they may be needed in forthcoming periods in large amounts. Thus over the long-run, management ensures its inventory is sufficient to meet the expected situations. If this were so, fixed factory overhead costs do qualify to be inventorised. It may be pointed out here that the authors did change their view of direct (variable) costing in a subsequent article, wherein they favoured their own concept of relevant costing. 49

Before leaving this section, the implications of using variable costing technique for income measurement must be pointed.

(1) When sales exceed production, the income measured under variable costing exceeds that of full costing. This excess income is equivalent to the fixed cost charges that are absent in the inventories used to meet the lag between sales and production.

(2) When production exceeds sales, the income measured under variable costing is less than that under full costing. The difference is equivalent to the fixed cost charge not carried by the increased inventory arising from the lag between sales and production.

(3) When sales equal production, the income measured is the same for both methods of costing.

Thus, we note, that profits vary directly with the volume of sales under variable costing. This prompts the advocates of variable costing to maintain

that their method is in line with the concept of revenue recognition at point of sales, and that full costing ignores this concept. What the variable costers fail to recognise is that the concept of revenue recognition is accepted by full costers as well. The full costers do not recognise revenue until the sale takes place, and against this revenue they match the full cost of the product sold, which in their opinion represents the 'effort' involved to earn the revenue.

The case for full costing: Whilst the advocates of variable costing as well as relevant costing rely on the cost obviation concept of service-potential to support their theory, the full-costers rely on the revenue production concept of service-potential. This approach distinguishes between expired and unexpired costs according to whether their incurrence will or will not contribute towards the realisation of revenue in the future. It is argued that costs are incurred with the specific objective of bringing about certain benefits or accomplishments. These costs represent the effort involved, in monetary terms, to bring about the accomplishment (revenue).\(^50\) One school of thought maintains that this marshalling of costs does not show or represent value but rather to represent efforts made to give materials and other components additional utility.\(^51\) The total cost so assembled represents the total effort made to bring about a subsequent advantageous sale. The other school of thought maintains that the combination of the factors of production adds value to the factors of production through time and place utility.\(^52\)


\(^{51}\) Paton and Littleton, Ibid.

This school of thought argues on the "value-added" concept of income measurement. By this concept, income is assumed to be earned throughout the process of production and sale. The only difference between this 'value-added' concept and the 'cost-attach' concept of the first school is the timing of recognition of income. However, based on the desire for objectivity in accounting, both schools accept the principle of deferring revenue recognition until the sale takes place. Thus the difference disappears.

It must be stated here that both schools of thought agree that revenue is earned by the entire process of operation. If it can be agreed by both the full costers and variable costers that revenue is not only earned but can be realised at point of production, then there is no difference between the income measured under the different costing methods. Because realisation is accepted to be at point of sale, the problem of placing a money value on the closing inventory arises. Thus arises the difference between full costers and variable costers. Whilst the variable costers would argue that the expired service potential of costs can only be associated with the product if they can pass the 'cost obviolation' test, full costers would maintain that:

"Once the service potential of costs are used up in the production of income, such costs must be related to the income produced. If the recognition of income is delayed, the recognition of costs related to that income must also be delayed." 54

Variable costers maintain that product costs should be costs that vary with the volume of production. All fixed costs are period costs because they are incurred on a time basis. This view maintains that the fixed variable cost dichotomy is a valid proposition. Fullcosters, however, maintain that:

"the dichotomy of fixed and variable costs does not exist at the theoretical level. In other words, it is submitted that fixed-variable classification of manufacturing costs is more of a fiction than a reality. The nature of manufacturing costs indicates no significant difference between fixed and variable manufacturing costs which would warrant difference in accounting treatment." 55

The only basic difference between these fixed and variable manufacturing costs is the matter of timing. 56 Time period in accounting is merely a convenience required for reporting. It does not change the fact that the costs are incurred as efforts involved to gain certain benefits. 57 It is true that the opportunity for using the capacity provided and maintained by these costs expire over time, but that does not necessarily mean that the benefits derived from the use of such facilities expire in the same way. 58

To summarise, the case for full costing showed:

(i) that the conflict between variable costing and full costing is caused by the problem of periodicity. It was shown that this period concept in accounting is merely fictitious. It is a convenient device to breakdown into definite periods the indefinite life of the business enterprise.

(ii) that a business acquires production factors with the specific objective of utilising these for a profit. The argument that the fixed costs of these factors will expire with time independent of the production function, ignores three Important points:

(a) The purchase of these production factors are based on sound judgment as to the usefulness and relevancy in the company's long-run operation.

58. Walker and Mulcahy, op. cit. p. 25.
To consider costs arising from such decision as irrelevant seems to be inconsistent with management's rational decision making ability.

(b) It is assumed that the fixed costs are unavoidable. This again is contrary to reality wherein production factors can be purchased in a form flexible enough to allow cost avoidability. The degree of avoidability of such fixed costs is greater than what some people may assume.

(c) The argument of Horngren and Sorter, previously cited, is purely of short-run duration. Inventory is built up not just to meet next period's demand. Inventories can be carried for several years before becoming used up to meet demand. Management does not accumulate inventory for the sake of filling up empty warehouse. They do so, because they see the necessity for it in the long-run.

Conclusion: The usefulness in knowing the behaviour of costs to volume of activity for internal management reporting and short-run analysis is not denied by the full costers. However, it is maintained that such information can be acquired within a more detailed framework of accounting for overhead costs. Furthermore, it must be emphasised that over simplification of the use of the fixed-variable cost dichotomy for management decisions can be dangerous. For management, the costs relevant for its decisions are the future incremental or avoidable costs and opportunity costs. This point is emphasised because there is a danger that the lack of precise knowledge of cost variability and avoidability may result in an understatement of costs that do vary. 59

Finally, in applying the concept of full cost to product costing, a capacity measure must be selected. Here, in line with the discussion in Chapter 3, it is suggested that the fixed overhead cost related to planned utilisation of capacity be charged to products produced within this measure of capacity.
CHAPTER 5

CONTROL OF OVERHEAD COSTS

Purpose of this chapter: The purpose of this chapter is to evaluate the usefulness of traditional techniques of standard costs, flexible budgeting and responsibility accounting for managerial cost control and to note some of the recent suggestions of the use of statistical techniques in the control process. In particular, this chapter looks into the following:

(i) the usefulness of the fixed-variable dichotomy of overhead costs;
(ii) the control of capacity utilisation and related costs;
(iii) the limitations of flexible budgeting allied with the system of responsibility accounting;
(iv) application of statistical techniques for cost control.

Some brief historical notes: The evolution of standard costing can be related to the 'scientific management' movement of F.W. Taylor. On this, Solomons comments:

"No one can read Taylor's famous paper on 'Shop Management' of 1903 without seeing that many of the essential elements of standard costing are there, including what is perhaps the first reference to 'management by exception'."60

However, the credit for the earliest and detailed exposition of standard costing goes to the American, John Whitmore, in a lecture delivered before the New York University School of Commerce in February, 1908.61


The concern over fixed and variable costs was engaged by economists of the nineteenth century and even earlier, but Solomons maintains that the refinement of techniques to relate cost to size of output in the short-run did not come about until the late 1930's. On this topic one must not forget the significant contribution of J.M. Clark's book - The Economics of Overhead Cost, 1923.

The practice of using budgets for the control of costs was introduced in the early part of the 20th century. The concept of flexible budgeting currently used was first explained by Henry Hess in an outstanding article of 1903. On this, Solomons comments:

"... the harnessing for control purposes of the distinction between fixed and variable expenses... shows Hess to have been well in advance of most of his contemporaries." 65

It should be noted that the early developments of standard costing was for the purpose of determining product costs. However, as the emphasis changed from product costing to cost control, standard costing together with flexible budgeting and responsibility accounting became the tools of control. No question was asked as to the validity of using a single concept of standards for the two purposes of product costing and cost control. This was a later development.

Limitations of 'traditional' cost control techniques: One of the basic essentials in the control process is the separation of costs into fixed and variable components. It is assumed, in the traditional concepts of control, that variable costs are controllable and fixed costs are generally, in the short-run, devoid of control. However, this fixed-variable dichotomy of overhead costs is quite inadequate a classification.

62. Ibid. p. 36
63. Ibid. p. 44
64. Ibid.
65. Ibid. p. 46
for control. This classification purely establishes, on a short-run basis, the relationship of total costs to volume of activity. For control purposes, costs should be studied as to their degree of avoidability. Though most variable costs are avoidable, some fixed costs can also be subject to this. Management must know what costs it can avoid by its decisions. To do this a more detailed classification of overhead costs is needed based on the principle of cost avoidance.

A further limitation of the control tools traditionally used is the way standards have been developed. Under the influence of the 'scientific management' movement, standard costing was developed with the aid of work study techniques. These studies involved (i) the finding of the best way of doing a job or performing an activity and (ii) the standard time that should be allowed to perform the job. Where work study techniques were not applicable, estimates were developed based either on a simple analysis of past data or on statistical correlation analysis. Thus standard variable overhead costs were calculated and related to some form of activity index such as machine hours, labour hours, etc. What was missing in the process of setting such standards was the fact that actual variable costs may vary from such standards from causes both controllable and non-controllable. No attempt was made to include in the traditional approach control limits for these variable costs. It was only over the past decade that writers have advocated the use of statistical techniques for the control of costs.

With reference to the fixed category of overhead costs, standards were based on several concepts of capacity. As previously noted, the early developments of predetermined overhead rates were for the specific purpose of product costing. However, the volume variance or idle capacity variance
calculated on these various concepts of capacity were later used as indicators of capacity utilisation. As subsequent discussion will prove, this attempt is an erroneous one. For the purpose of control over capacity utilisation, different concepts of capacity have to be used simultaneously to bring out different causes. Thus the use of a single concept of capacity is inadequate for control of capacity utilisation.

Flexible budgeting, based on the principle that actual costs should be compared with the budget adjusted for the actual volume of operation, is another technique which has several limitations. Firstly, the difference between the actual costs and the budgeted costs, that is, the variance, can be the result of several causes emanating from two sources — (i) price variations of overhead items and (ii) inefficient (or efficient) use of overhead cost items. To a large extent, price variations are beyond the control of the person in charge of the cost centre reported on. Thus it may be more useful to adjust the actual cost by eliminating price variations. This is elaborated later in the chapter. Secondly, flexible budgets tend to emphasise only on the control of variable costs. Fixed costs are considered non-controllable by the cost centre and its manager. This again is another area of debate on the concept of responsibility. It is suggested that both fixed and variable costs can be subject to control.

The concept of responsibility accounting based on the principle that only controllable costs and revenue should be identified to responsibility centres is far too simple a technique. Traditional concept of responsibility accounting is based on direct responsibility. However, the realities of business operation do not render responsibility to be classified simply on a direct basis; indirect responsibility exists more than is recognised. Thus the responsibility accounting system must be modified accordingly.
Finally, traditional control tools ignore the behavioural problems that exist in business operation. The human side of business operation must be carefully interwoven into the control tools to make cost control meaningful and realistic.

**Classification of overhead costs**: In order to overcome the limitations of the fixed-variable dichotomy of overhead costs, the following classification based on the principle of cost avoidability rather than cost variability is suggested:

A. Committed costs
B. Managed costs
C1. Variable costs as per time
C2. Variable costs as per unit of activity, such as machine hours, labour hours, etc.

Committed costs—these costs, in general, pertain to the technical capacity of the plant. Examples of such costs would be those related to machine depreciation, property tax and depreciation on building. These costs tend to remain constant for a long period of time. Once a decision is made to incur these costs, it would be difficult to reverse the decision without great losses being incurred.

Managed costs—these costs are subject to management's policies which are reviewed periodically. Examples of these costs are research and development, advertising and sales promotion, market research, management remuneration and other expenses and staff employment. The decisions on these costs can be reversed, and costs avoided without any great difficulty, e.g. management may reduce the amount initially planned for research and development.
Variable costs that vary with the length of time — these costs generally are a period of charge, e.g. fire insurance and rent. To a large extent these costs are subject to management's decision. Therefore they can be classified under managed costs. However, we must note that these costs differ from many of the managed cost items because the latter do not generally vary with time - market research, research and development and promotional costs vary with the functional activity.

Variable costs that vary with the volume of activity — there are two categories of such variable costs. One category is related to costs that vary with volume of output, e.g. manufacturing supplies, certain costs of materials handling and maintenance of equipment, royalties, inspection costs. Another category is related to costs that vary with volume of input, expressed in such terms as machine hours, man-hours, etc.

Examples of such costs are heating, lighting and repairs. Thus, regard must be given to costs that vary with both inputs and outputs. With reference to these variable costs, Solomons states:

"This points to the need to make the flexible budget flexible in more than one direction, taking each expense separately and making appropriate adjustments to the original budget figures in the light of what is known, at the end of the period, about the number of man-hours worked and the level of output achieved." 66

Traditional use of standard costing and flexible budgeting in cost control:
The technique of flexible budgeting together with standard costs is widely used for analysis of cost variances into (i) spending or budget variance,


67. ibid.

68. ibid.
(ii) efficiency variance, (iii) volume variance, and others. To illustrate the use of standard cost and flexible budgeting, the following illustration is given:

Example:

Normal or standard capacity - 10,000 man hours
Budgeted capacity utilisation - 9,000 man hours
Budgeted production - 9,000 units
Budgeted fixed factory overhead costs - $10,000
Budgeted variable factory overhead costs - $9,000
Actual total factory overhead costs incurred - $19,500
Actual production - 9,000 units
Actual capacity utilised - 9,500 man hours.

Two-variance analysis

Actual costs incurred

Budgeted costs for actual production $19,500
   fixed - $10,000
   variable- 9,000 19,000

Controllable (Budget) variance, unfavourable $500

69. The survey of the N.S.W. companies revealed that 39 firms out of 68 which replied to the questionnaire used standard costing techniques and 67 firms prepared overhead cost budgets. 51 of these 67 firms prepared budgets on a departmental basis, whilst 16 only prepared the overall factory overhead budget.

Although 49 firms said they separated their overhead costs into fixed and variable categories, only 39 used the flexible budgeting techniques.

Majority of the firms (52) calculated the budget variance. However, only 29 calculated the efficiency variance and 24 the volume variance. This is understandable since only 39 firms admitted using standard costs. Surprisingly, a few of the firms which indicated using standard costs said they based their standards on budgets!
Standard costs for actual production

fixed $9,000
variable 9,000 $18,000

Volume variance, unfavourable $1,000
Total variance, unfavourable $1,500

Three-variance analysis, Method I

Actual costs incurred 19,500
Budgeted costs for actual hours worked
fixed 10,000
variable 9,500 19,500

Budget (spending) variance Nil

Standard costs for actual hours worked
fixed 9,500
variable 9,500 19,000

Volume variance, unfavourable $500

Standard costs for standard hours worked
fixed 9,000
variable 9,000 18,000

Efficiency variance, unfavourable 1,000
Total variance $1,500

Three-variance analysis, Method II

Actual costs incurred $19,500
Budgeted costs for actual hours worked
fixed 10,000
variable 9,500 19,500

Budget (spending) variance Nil
Budgeted costs for standard hours worked

<table>
<thead>
<tr>
<th></th>
<th>fixed</th>
<th>10,000</th>
<th>variable</th>
<th>9,000</th>
</tr>
</thead>
</table>

Efficiency variance, unfavourable

<table>
<thead>
<tr>
<th></th>
<th>500</th>
</tr>
</thead>
</table>

Standard costs for standard hours worked

<table>
<thead>
<tr>
<th></th>
<th>fixed</th>
<th>9,000</th>
<th>variable</th>
<th>18,000</th>
</tr>
</thead>
</table>

Volume variance, unfavourable

<table>
<thead>
<tr>
<th></th>
<th>1,000</th>
</tr>
</thead>
</table>

Total variance, unfavourable

<table>
<thead>
<tr>
<th></th>
<th>$1,500</th>
</tr>
</thead>
</table>

Four-variance analysis: the calculations are the same as that of three-variance analysis, method I. However, the efficiency variance of $1,000 is split into two components -

1. Effectiveness variance, that is, the fixed costs related to the extra hours worked above standard

   $500 U.

2. Efficiency variance, that is, the variable costs related to the extra hours worked above standard

   $500 U.

The volume variance and the control of capacity utilisation: The term 'capacity' used here refers to the production capacity of the firm. Control of capacity utilisation refers to the physical use of the capacity. However, it is necessary that we express the idle capacity in some monetary terms so as to convey the value of such idleness to management. In the short-run almost all of the fixed production capacity costs are committed. Within the context of conventional accounting we may be tempted to use this historical cost for reporting idleness (if it has any value). However, attempts must be made to report the value of idleness in relation to its opportunity costs. In order to evaluate the use of the volume variance arrived at by traditional standard cost analysis let us refer to the results of the Illustration given.
Referring to our illustrated example, we note that there are two different figures for the volume variance and the efficiency variance as calculated by the different methods -

<table>
<thead>
<tr>
<th>Methods of Analysis</th>
<th>Volume Variance</th>
<th>Efficiency Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Two-variance analysis</td>
<td></td>
<td>$1,000</td>
</tr>
<tr>
<td>2. Three-variance analysis, Method II</td>
<td></td>
<td>$500</td>
</tr>
<tr>
<td>3. Three-variance analysis, Method I</td>
<td></td>
<td>$500</td>
</tr>
<tr>
<td>4. Four-variance analysis</td>
<td></td>
<td>$1,000</td>
</tr>
</tbody>
</table>

Efficiency variance can be defined as the additional costs incurred or saved as the result of the efficiency of actual production activity. Thus methods of analysis 1 and 2 would consider that as the result of taking 500 excess hours over standard, $500 of variable (avoidable) costs have been incurred. This represents the cost of inefficiency. Methods of analysis 3 and 4, however, would consider not only the variable costs that have been incurred, but also the fixed costs of $500. The latter amount represents the cost of misused capacity. Thus the cost of inefficiency, in this case, is $1,000. Volume variance has been interpreted in several ways. The common interpretation is that it measures the cost of physical idleness. Several writers, however, have criticised this common interpretation. It is maintained by these writers that the volume variance is a function of the capacity measure used in absorbing fixed costs, and not the costs incurred because the plant is idle. This is an appropriate criticism in the light of current practice of using only a single measure.

of capacity for product costing and control of capacity utilisation.\(^\text{70}\)

"Statements that the volume variance is a measure of the cost of idle capacity or the loss due to idle capacity, and that the effectiveness variance is a measure of the cost of misused capacity can be objected to on grounds that the amounts recorded in these variances are only allocations of cost and that they do not represent any increase in costs incurred because of the existence of idle capacity or of the misuse of capacity. The contention that these variances provide useful information for control purposes can be criticised on the ground that the variances result from the application of an absorption rate determined for product costing purposes, and in most cases, this absorption rate is based on a concept of capacity which is unsatisfactory for control purposes.\(^\text{71}\)

Referring to our illustrated example we note that methods of analysis 1 and 2 show a volume variance of $1,000. This represents the underabsorbed fixed costs as a result of idleness. This idleness is measured by the difference between the standard capacity and the standard hours used for the production. Thus, these methods express idleness in effective terms based on standard performance. This according to De Coster is consistent with the standard overhead rate's philosophy.\(^\text{72}\) Methods 3 and 4, however, express idleness in physical terms. Thus the volume variance of $500 represents the cost of actual hours of idleness, i.e. 500. This, according to Middleton, represents the cost of unused capacity, whilst the other 500 hours represents misused capacity costing another $500.\(^\text{73}\) He thus labels this cost of misused capacity either as an efficiency variance or an effectiveness variance.

The question that we have to answer is 'which is the true or correct

\(^{70}\) Refer to Chapters 3 and 4 on the discussion of using different measures of capacity and also the recommendations made.

\(^{71}\) Kerr, Jean St. G., op. cit. p. 253.

\(^{72}\) DeCoster, op. cit. p. 301.

Arguments put forth by DeCoster, Horngren, Kerr and Burke and Smyth tend to indicate that the figures derived by using the three-variance analysis, Method I and the four-variance analysis, can have significance only if there was an opportunity forgone because of the misuse of available capacity. There is no doubt in the case of variable costs that working inefficiently will result in additional costs being incurred. However, in the case of fixed costs, additional costs (as measured by its opportunity) can be incurred as a result of inefficiency only if by misusing the physical capacity orders were not filled or planned inventory not achieved. The question raised should apply not only to misused capacity but also to unused capacity. Horngren maintains that the volume variance representing idleness can be given an opportunity cost. Historical cost does not measure the cost of idleness. It is merely the result of overhead cost allocation.

The criterion of opportunity and its cost as the measure of volume variance is very commendable and its use will enhance the value of information given to management. However, it is necessary that we define the term opportunity. If it is defined as a short-term concept, and idleness exists, then the question of efficiency cost of using idle capacity that has no opportunity cost, does not arise. In this case, the volume variance as calculated by the three-variance analysis, Method II, is more appropriate. Note that the volume-variance here represents underabsorption of fixed costs as the result of idleness. It does not represent the opportunity cost which is zero.

74. Twenty-four firms from the survey indicated calculating the volume variance. Of these, 8 used effective hours for capacity utilised, 12 used actual physical hours, and 4 indicated using both.
75. Re footnote 66.
If opportunity cost is construed in terms of the long-run period, then, noting the fact that management installed the plant for its long-term utilisation, it becomes relevant to record the cost of expired service potential resulting from inefficient use as an efficiency or effectiveness variance. The volume variance thus represents cost of services provided for but not fully utilised. In this case, the three-variance analysis, method 1, is appropriate. Note again, that the volume variance and the effectiveness or efficiency variance are reported in historical cost terms, not in terms of opportunity cost. No doubt, it is possible to represent opportunity cost in terms of fixed historical cost. Horngren, however, prefers to use the contribution margin to approximate cost. 78

The volume variance so far discussed, is quite inadequate as a measure for controlling capacity utilisation. We have noted that the volume variance is based on the difference between some measure of standard capacity and the capacity utilised. By so doing, the volume variance is an aggregation of the results from various causes. The variance may be due to such causes as lack of business opportunity, poor marketing and sales promotion, strikes at the factory, production hold-up resulting from machine breakdowns, inefficient supervision by the foremen, poor production and a horde of others. Each of these causes could have been checked and avoided at different levels in the organisational hierarchy if proper reporting procedures had been established. Take the illustrated example given earlier. In that example, available capacity is geared for the production of 10,000 units, whilst the budgeted production is only 9,000 units, i.e. 90% of available capacity. Who should be responsible for this planned idleness? Apparently it depends on the reasons for the idleness. It could be due to poor marketing efforts, or the poor general trend in

78. ibid.
business.

For effective control of capacity utilisation, it is suggested we follow what was outlined in Chapter 3, that is, express capacity in the following terms – (i) practical attainable capacity, (ii) planned utilisation of capacity, (iii) budgeted capacity (i.e. sales budget plus changes in inventory), (iv) scheduled production capacity, (v) actual capacity. To illustrate the control procedure, let us assume we have the following information:

1. practical attainable capacity - 20,000 units
2. planned utilisation of capacity - 15,000 units
3. budgeted capacity - 14,000 units
4. scheduled production - 13,000 units
5. actual production - 12,500 units

Traditional approach would have compared capacity measure 1 or 2 with 5 and thus resulting in an idle capacity of 7,500 units or 12,500 units respectively. This, as we discussed earlier, is quite inadequate. The following approach is therefore suggested:

(1) The difference between practical attainable capacity and planned utilisation of capacity reveals the extent of reserve capacity carried. If this reserve capacity was the result of management's design and not because of some unavoidable reasons, it is recommended that the carrying of this reserve capacity be charged an opportunity cost (may be the interest forgone on the investment tied up). If the planned utilisation of capacity is subsequently revised upwards (as it is hoped it will) then the carrying of this reserve capacity will be justified in the light of high gains resulting from its use.

79. Re footnote 38, Chapter 4.
If, however, planned utilisation of capacity is not revised, or is revised downwards, then management must initiate moves to reduce the capacity or seek technical assistance to use it for other purposes. The reporting of reserve capacity and its utilisation helps management to control the investment tied up.

(ii) The difference between the budgeted capacity and the planned utilisation of capacity has to be expected in the light of cyclical changes. However, if the budgeted capacity does not meet up with the original long-range plan, that is, when the plant was being installed, then marketing management will be held responsible for not trying to keep up with the original long-range plan. It is possible that a downward trend is occurring. In this case, the planned utilisation has to be revised and reserve capacity be reduced or eliminated. However, if a favourable upward trend takes place, then again a revision of planned utilisation is needed, and reserve capacity becomes valuable. The reporting to marketing management should therefore consider both cyclical and trend changes. Marketing management should be held responsible if factors contributing to the changes are within their control. If this were so, marketing management should be charged the opportunity costs for its inefficiency or the additional gains for its efficiency.

(iii) The difference between scheduled production and the budgeted capacity is definitely the marketing management's responsibility. If scheduled production is less than the budgeted capacity, it represents marketing management's failure to 'bring home its goods'. The loss arising from such inefficiency is the expected contribution margin of lost sales orders.
(iv) The responsibility for the difference between actual production and scheduled capacity is that of production management. The difference reveals the extent to which scheduled orders have been met without delays or loss. This production variance can be costed again on the basis of contribution margin lost on failure to meet orders (that is, if the order is withdrawn) and also the cost of loss in long-term goodwill (that is, the customer may not return again).

It can be seen that by using the various measures of capacity, capacity variances can be analysed more usefully for control purposes.  

We may therefore consider whether it is worthwhile arguing about the volume variance under traditional standard cost analysis. Would it not be better if we made a detailed study of the volume variance to identify its causes and decide the appropriate actions needed?

Another approach to control capacity utilisation is to work out an index for capacity utilisation. This view was put forth by joint authors De Coster, Powers and Prater. The following illustration is extracted from their article:

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80. The survey questionnaire revealed that 63 firms out of 68 considered the utilisation of plant capacity as a significant factor. However, only 41 firms included in their regular reports the extent of plant utilisation. As stated earlier, effective control of capacity utilisation depends on a proper reporting scheme based on responsibility. The survey revealed that companies held their top management and sales and production managers either fully or partially responsible for capacity utilisation. Foremen and supervisory-level personnel were generally considered not responsible, or only partially responsible.

Fig. 2.  

**Plant Operating Cost Characteristics**

<table>
<thead>
<tr>
<th>Activity Level (units)</th>
<th>Total Average Cost per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>$0.40</td>
</tr>
<tr>
<td>14,000</td>
<td>0.35</td>
</tr>
<tr>
<td>18,000</td>
<td>0.32</td>
</tr>
<tr>
<td>22,000</td>
<td>0.30</td>
</tr>
<tr>
<td>26,000 - Effective or minimum cost level</td>
<td>0.29</td>
</tr>
<tr>
<td>30,000</td>
<td>0.30</td>
</tr>
<tr>
<td>34,000</td>
<td>0.31</td>
</tr>
<tr>
<td>38,000</td>
<td>0.33</td>
</tr>
<tr>
<td>42,000</td>
<td>0.38</td>
</tr>
</tbody>
</table>

The company expects to operate within the range of 18,000 to 34,000 units. The average unit cost is achieved at the level 26,000 units. This is the lowest point in the average cost curve and the output can be defined as the 'effective rate' of activity.

Fig. 3.  

**Calculation of capacity utilisation index**

<table>
<thead>
<tr>
<th>Expected lower limit of activity</th>
<th>Effective level of activity</th>
<th>Expected upper limit of activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number of units</td>
<td>18,000</td>
<td>26,000</td>
</tr>
<tr>
<td>2. Total average unit cost</td>
<td>$0.32</td>
<td>$0.29</td>
</tr>
<tr>
<td>3. Minimum total average unit cost</td>
<td>0.29</td>
<td>0.29</td>
</tr>
<tr>
<td>4. Cost difference</td>
<td>$0.03</td>
<td></td>
</tr>
<tr>
<td>5. Expected Capacity Utilisation Index</td>
<td>($$540)</td>
<td>0</td>
</tr>
</tbody>
</table>

The above information can be presented in the following manner:
Fig. 4: Average cost curve for a given scale of operation:

[The shaded area represents the expected costs disadvantage arising from operating within the expected range of activity.]

This index is purely a summary information of utilising the plant at other than its most economical level. If the actual level of activity is either below the lower limit or above the upper limit, it may be appropriate for management to consider changing the scale of operation. This will only be carried out if the future levels of activity are expected to be in line with current levels of activity. Thus, this index is based on the economics of scale. It is useful as an index of overall plant utilisation. However, it is still necessary for us to use other more detailed control procedures to control capacity utilisation.

Flexible budgets and the control of variable costs of capacity: As mentioned in the commencement of this chapter, variable costs can be classified into (i) costs varying with time and (ii) costs varying with level of activity. The former class includes such items as fire insurances telephone bills and other rentals. These costs in the short-run are

82. De Coster et al. op. cit. pp. 15-16.
relatively fixed. For control purposes, these costs can be so identified together with other fixed capacity costs, provided they are separately grouped. This separate sub-classification allows management to know that these costs can be avoided or changed without any great difficulties.

The second category of costs, that is, those varying with volume of activity, have generally been controlled through the use of standards and flexible budgets. The standards are used to represent the rate of change of an item of cost to a unit of activity. Thus, heat and light may be costed to vary directly with machine hours used at the rate of X cents per machine hour. The flexible budget is merely an ex-post estimate of what it should have cost based on actual hours worked. Thus, the budgeted costs based on expected hours of work is altered on the basis of ex-post information.

Illustration: Assume that the budgeted variable cost of overhead for Department A for the month of January 1971 is as follows:

<table>
<thead>
<tr>
<th>Expected level of activity in standard direct labour hours</th>
<th>10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budgeted costs based on standard:</td>
<td></td>
</tr>
<tr>
<td>Indirect labour</td>
<td>$10,000</td>
</tr>
<tr>
<td>Maintenance</td>
<td>1,000</td>
</tr>
<tr>
<td>Lubricants</td>
<td>500</td>
</tr>
<tr>
<td>Heat and Light</td>
<td>200</td>
</tr>
<tr>
<td>Cutting tools</td>
<td>300</td>
</tr>
<tr>
<td><strong>Total variable costs</strong></td>
<td><strong>$12,000</strong></td>
</tr>
</tbody>
</table>

| Standard variable rate per direct labour hour            | $1.20 |

Now, the actual hours worked for January were 9,300 and the total variable costs amounted to $11,650. The standard hours allowed for the activity are 9,000. The performance report based on ex-post information would be as follows:
Fig. 5.

XYZ Company Limited

Performance Report, Variable Factory Overhead

Department A

For month ended 31st January 1971

Actual direct labour hours worked 9,300
Standard direct labour hours allowed 9,000
Excess direct labour hours taken 300

<table>
<thead>
<tr>
<th>Cost item</th>
<th>Budget based on standard hours</th>
<th>Actual</th>
<th>Variance</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect labour</td>
<td>$9,000</td>
<td>$9,500</td>
<td>$500 U.</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>900</td>
<td>1,050</td>
<td>150 U.</td>
<td></td>
</tr>
<tr>
<td>Lubricants</td>
<td>450</td>
<td>500</td>
<td>50 U.</td>
<td></td>
</tr>
<tr>
<td>Heat and Light</td>
<td>180</td>
<td>250</td>
<td>70 U.</td>
<td></td>
</tr>
<tr>
<td>Cutting Tools</td>
<td>270</td>
<td>350</td>
<td>80 U.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$10,800</td>
<td>$11,650</td>
<td>$850</td>
<td></td>
</tr>
</tbody>
</table>

U denotes unfavourable.

It is maintained that the flexible budget permits more meaningful comparisons because the level of activity underlying the comparison is the same. 83 Is this really so? It was stated that costs that vary with volume of activity can be sub-classified into (i) those that vary with input and (ii) those that vary with output. In the example, cost of heat and light may vary with actual hours, whilst cutting tools' cost may vary with output.

Now, the flexible budget is based on a single variable, that is, standard input hours or actual output. It may, therefore, be necessary to note the criticism of Solomons:

"Another criticism,... is that the budget allowance for overheads as set by the flexible budget, is regarded as a function of a single variable. All expenses are regarded as varying either with the man-hours worked (as in the three-variance system) or with the level of output produced (as in the two variance system), whereas the facts of cost behaviour clearly make any such simple assumption unrealistic." 84

Another criticism that can be levied at the flexible budget as currently presented, is that, not all the variable costs of overhead items vary with a single variable (whether this be direct labour hours, machine hours, etc.). The use of a single variable rate factor (in our example, $1.20 per direct labour hour) is thus inadequate. It is suggested that multiple rates be developed. This would involve the grouping of variable overhead cost items according to the major causal variable factors. Thus a rate may be developed for machine hours, labour hours, completed units and so on. The extent of such classification for control no doubt depends on the benefit/cost ratio. Another point that has not been well argued or debated, is the actual cost figure shown in the performance report. The unfavourable variances are the direct responsibility of the production supervisor, others, the responsibility of purchasing, sales or other personnel, and still others beyond control of any of those except top management. Cases can also exist where joint responsibility prevails, for example, cutting tools' cost are in excess because of poor quality of tools used (purchasing or some other personnel's blunder) and insufficient supervision by the supervisor. These cases tend to reduce the significance of the performance report and the variance analysis for cost control. It is, however, suggested that the budget or price variances of overhead items be dealt with at a different

level (maybe at the purchasing level) and that the production supervisor be reported of the efficiency variances alone. This suggestion assumes (i) that a majority of the budget or price variances are beyond the control of the production supervisor and (ii) efficiency variances are generally the result of the performance by the supervisor and his department. No doubt when trying to explain the variances, no stones should be thrown at the wrong corner.

In the preparation of the performance report on the basis of a flexible budget, it can be seen that no fixed overhead cost is charged or shown in the report. The general argument for doing so is that fixed costs are beyond the control of the production supervisor. It can be argued that the concept of controllability is not dictated by the fixed-variable dichotomy of overhead cost. However, this will be discussed subsequently under the heading of responsibility accounting. Furthermore, because of this fixed-cost dichotomy, the problem of semi-fixed cost is ignored or assumed to be easily overcome.

The use of statistical techniques: The next point to note in the use of standards and budgets for control of variable overhead cost items is that variances are calculated from an expected mean.\textsuperscript{85} However, questions can arise as to whether the variations are large enough to warrant investigation. Generally, there is a tendency to investigate all unfavourable variances from the standard and to ignore the favourable ones. In other cases, a rule of thumb approach such as "investigate all variances of five percent or higher" may be adopted. These sort of practices can lead to heavy costs incurrences. Investigations may be carried on variances having very little significance for control, whilst other variances of high significant value could be overlooked. In recent years there has been a vast quantity of literature about the use of probability statistics to improve budgets and standards as control devices.

\textsuperscript{85} The mean represents the desired level of efficiency which could have been arrived at by averaging the observations of a random sample.
In applying probability theory, the general approach has been to adopt a normal distribution. Normal distribution can be briefly explained in the following manner. If a sufficiently large number of observations or measurements are made of a single phenomena, the observation or measurements will tend toward a normal frequency distribution. The curve drawn to represent this distribution will be perfectly symmetrical, i.e. bell-shaped. A majority of the values will concentrate around the mean and thin out toward both the higher and lower values. The area under this normal curve is 1.0 and it is found that the total area under the curve between \(-\sigma\) and \(+\sigma\) is approximately 0.6826. This means that there is a probability of 68.26 per cent that the random observation \(x\) will fall within one standard deviation of the mean \((\mu \pm \sigma)\). Similarly it is found that the area under the curve is 0.9545 for \(\mu \pm 2\sigma\), 0.9973 for \(\mu \pm 3\sigma\) and 0.9999 for \(\mu \pm 4\sigma\).

Referring to the discussion on flexible budgets, it was suggested that the production supervisor be held accountable for the efficiency variance. If this view is adopted the following budget report may be prepared:

XYZ Company Ltd.
Performance Report, Variable Factory Overhead
Department A
For month ended 31st January 1971

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Budget based on standard</th>
<th>Variances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect labour</td>
<td>$9,000</td>
<td>$300 u.</td>
</tr>
<tr>
<td>Maintenance</td>
<td>900</td>
<td>30 u.</td>
</tr>
</tbody>
</table>

86. Given the mean of the distribution and the standard deviation \(\sigma\), the normal curve can be fitted by the formula 

\[ y = \frac{1}{\sigma \sqrt{2\pi}} e^{-\frac{(x - \mu)^2}{2\sigma^2}} \]

The greater the standard deviation, the wider is the spread of the distribution.
<table>
<thead>
<tr>
<th>Lubricants</th>
<th>$450</th>
<th>$15 u.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat and Light</td>
<td>180</td>
<td>6 u.</td>
</tr>
<tr>
<td>Cutting Tools</td>
<td>270</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$10,800</strong></td>
<td><strong>$360 u.</strong></td>
</tr>
</tbody>
</table>

As can be seen, unfavourable deviations have occurred. Do we investigate or do we ignore it? In order to do so, we have to know the probability of such variances arising from non-controllable causes. This is necessary in order to avoid two types of errors: (1) making an investigation of random non-controllable deviations and (2) not investigating a controllable deviation. To establish the probability distribution of an expense item past records may serve as a basis (assuming the causes of past deviations are known). However, it is also possible to rely on the experienced judgment of the production supervisor. Let us take the expense item, indirect labour. If, in the opinion of the production supervisor or past records, it is found that there is a 50-50 chance of indirect labour cost deviating by $200 from the expected mean of $9,000.

What this means is that there is a 50% probability for the actual cost of indirect labour to be $9,000 ± $200. Now, approximately .50 of the area under the normal curve lies within ±.67σ. If, as stated, the value of ±.67σ is equal to ±$200, then the standard deviation σ is equal to ±$300. Now we know the mean is $9,000 and the standard deviation is ±$300, we can identify the relevant normal distribution.

---

In the example given, the variance recorded for indirect labour amounts to $300. We can compute the probability of such a variance arising from random non-controllable causes as follows:

\[
Z = \frac{\text{Actual cost} - \text{Mean cost}}{\text{Standard deviation of the distribution}}
\]

\[
= \frac{9,300 - 9,000}{300} = 1
\]

\(Z\) represents the number of standard deviations, the actual variance is from the mean. In this case it is one. Referring to the table on normal distribution, it is found that a standard deviation of ±1 covers an area of .68 of the normal curve. Therefore the probability of a variance ±$300 arising as a result of random non-controllable causes, (given a mean of $9,000 and a standard deviation of ±$300) is \((1 - .68) = .32\) or 32 per cent.

Management must decide whether it is worthwhile to investigate this deviation. The general rule for investigation is that the cost of making an investigation is less than or equal to the expected loss from not investigating. The following table illustrates the cost of making or not making an investigation of an unfavourable deviation:
## Conditional Cost Table

<table>
<thead>
<tr>
<th>State of the System</th>
<th>Decisions</th>
<th>Conditional probabilities of states, given an unfavourable variance has arisen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Investigate</td>
<td>Don't Investigate</td>
</tr>
<tr>
<td>1. Variance due to non-controllable causes</td>
<td>Wrong decision Cost of Investigation $C$</td>
<td>Right decision No cost</td>
</tr>
<tr>
<td>2. Variance due to controllable causes</td>
<td>Right decision Cost of Investigation $C$</td>
<td>Wrong decision Loss from undetected errors $L$</td>
</tr>
<tr>
<td>Expected Cost of Action</td>
<td>$\frac{p(C) + (1-p)C}{C} = \frac{C}{C}$</td>
<td>$(1-p) \times L$</td>
</tr>
</tbody>
</table>

*Note: It is assumed that the cost of investigation $C$ is less than the loss $L$. Otherwise it is not worthwhile to investigate.*

The decision rules that follow from the above table are:

1. If $C > (1 - p) \times L$, do not investigate
2. If $C < (1 - p) \times L$, investigate
3. If $C = (1 - p) \times L$, indifferent to both actions.

It will be noted that the probability value in decision rule (3) is the critical value $pc$ that separates the other two decisions. This value $pc$ can be determined for each and every unfavourable variance, given the value for $C$ and $L$. The value $pc = \frac{L - C}{L}$. Thus, given that the cost of investigation is $100$, and the present value of expected loss from an undetected unfavourable variance of $300$ is $400$, then $pc = \frac{400 - 100}{400} = 0.75$. In this way, a cost control decision chart can be drawn for a whole series of unfavourable variances. Fig. 6 illustrates this:
It was determined earlier that the probability of incurring an unfavourable deviation of $300 or greater, given a mean of $9,000 and a standard deviation of ±$200 would be 0.32. This probability when plotted on the control chart falls into the 'investigation' area. Thus, if $p_c > p$, then the result is $C < (1-p) L$. Therefore, investigation should proceed. If $p_c < p$, $C > (1-p) L$; therefore do not investigate.

The following points should be considered in attempting to introduce the statistical technique described for the control of variable overhead costs:

(1) Whilst the cost of investigation may be easily assessed, the loss arising from undetected errors cannot be determined except by subjective judgment. This is so because it represents an opportunity cost, that is, the savings forgone by not investigating the variances. In order to over-
come subjective judgment, management may decide to use the existing unfavourable variance as representation of the loss. The present value of such variances over time approximates the loss of not investigating.

(2) It is assumed in the illustration that a normal distribution exists for variable overhead costs. In some cases, the characteristics of the cost item may not avail itself to this assumption. In such cases, it is maintained that the analysis could be identified to accommodate other probability distributions. It can be argued, however, that in setting the standards (from which budgets are prepared) for variable overhead items, we follow the philosophy of "best attainable under known constraints".

This approach allows most cost items to have the characteristics of normal distribution or an approximate of such distribution. When conditions change, the standards and thus the budget will change, resulting in a different mean and standard deviation. This no doubt will affect the probability of the variances occurring and new control limits will have to be established.

(3) The number of variable overhead items may be far too many for each to have a control chart. It is suggested that either management selects the significant cost items to be controlled or regroup the cost items according to more general functional classifications for control.

Although we have used an unfavourable variance for the discussion, it should be noted that favourable variances may also be investigated. This is necessary because there is always the possibility that favourable variances may be due to errors in the initial stages of standard setting and budgeting. It can also indicate that the system is not applicable any longer as the result of changes in the process or skill of the operators. We can also develop a cost control decision chart for favourable variances by setting the following rules:
(i) If \( pC + G(l-p) > 0 \); investigate.
(ii) If \( pC + G(l-p) < 0 \); do not investigate.
(iii) If \( pC + G(l-p) = 0 \); indifference prevails.

[Note: \( G \) represents the net gain as the result of an investigation. However, this net amount could also be negative, that is, cost of investigation exceeds the gain from such investigation. \( C \) represents cost of investigation, and \( p \) represents the conditional probability of a favourable variance occurring, given the mean and standard deviation of the distribution.]

**Control Charts:** Another technique that can be used to control variable overhead cost items are the control charts \( \bar{X} \) and \( R \), used for statistical quality control. The \( \bar{X} \) chart measures the variability of the averages of the measurements within a given sample, while the \( R \) chart measures the variability of the range of the measurements within a given sample. It is advisable to use both charts because it is possible that though the \( \bar{X} \) of the sample may not have significantly changed, the variability of the range \( R \) of the measurements recorded in the sample could have significantly changed to warrant a closer look at the operation.

Assume we wish to set up control charts for the overhead cost item, supplies. The following steps can be taken to set the charts:

1. determine the sample size and the period during which the observations are to be made. Thus it may be decided to take 30 samples over a period of 30 days. It may be further decided that each sample shall consist of four observations or calculations. Thus, each day, for the next thirty days, four observations are made of the unit cost of supplies. The average for the day is recorded as \( \bar{X} \). These 30 \( \bar{X} \)s are then averaged out to give \( \bar{X} \) which
is the mean of the sample size. This is accepted as an approximate of the mean \( \mu \) of the population. In point of fact, this means \( \bar{X} \) should be the standard cost of supplies per unit of activity (where activity can be expressed in terms of machine hours, labour hours, units of output or some other index).

(ii) determine the mean of the range observed for the 30 samples.
Thus \( \bar{R} = \frac{\sum R}{N} \) where \( N \) is the sample size and \( R \) the range for each sample's observations.

(iii) determine the standard deviations for the sample mean \( \bar{X} \) and the mean of the range \( \bar{R} \). This can be approached as follows:

- standard deviation of sample mean: \( s(\bar{x}) = \sqrt{\frac{\sum(x - \bar{x})^2}{N-1}} \)
- standard deviation of the mean of the range: \( s(R) = \sqrt{\frac{\sum(R - \bar{R})^2}{N-1}} \)

where \( N \) is the sample size, 30.

In order to avoid these computations of standard deviations, statistical tables exist, whereby \( s(\bar{x}) \) can be determined approximately from the mean of the ranges \( \bar{R} \). Similarly, tables exist for approximating \( s(R) \) from \( R \).

(iv) management must now decide the extent of variations from the means \( \bar{X} \) and \( \bar{R} \) it will tolerate before deciding to investigate.

In this particular case management may decide to accept variation up to \( \pm3 \) standard deviations from the means. What this amounts to is that management expects and accepts that 99.97 per cent of the variations will fall within \( \pm3 \) standard deviations from the means as long as the production process remains unchanged, that is, as long as the system of chance causes remains stable.

Once this is decided, the following control charts can be drawn for the factory overhead cost item supplies:
Fig. 7. \( \bar{X} \) Chart for the control of factory overhead item-Supplies

\[
\begin{align*}
\text{Cost of supplies per unit of activity} & \\
\text{Upper Control Limit} & = \bar{X} + 3s(\bar{X}) \\
\text{Mean} & = \bar{X} \\
\text{Lower Control Limit} & = \bar{X} - 3s(\bar{X})
\end{align*}
\]

Sample No. 1 2 3 4 5 6 7 8 9 10

Fig. 8. \( R \) Chart for the control of factory overhead item-Supplies

\[
\begin{align*}
\text{Cost of supplies per unit of activity} & \\
\text{Upper Control Limit} & = \bar{R} + 3s(R) \\
\text{Mean} & = \bar{R} \\
\text{Lower Control Limit} & = \bar{R} - 3s(R)
\end{align*}
\]

Sample No. 1 2 3 4 5 6 7 8 9 10

Referring to figures 7 and 8, it should be noted that as long as the variations fall within the control limits, no investigation need be taken. However, management may decide to have a few warning signals built into the control charts. This may help management to be prepared to carry out investigations, if variations fall outside the control limits. These
warning signals are generally drawn between the control limits. Thus management may consider variations of ±2 standard deviations from the means as ample warning to expect further variations very close to or outside of the control limits.

The charts are useful in the sense that they give a continuous check on the cost item. Every day, the cost per unit of activity can be easily calculated and plotted on the chart. There is no need to wait for the week or month to come by before we know the variations from budget reports. To this extent, this approach to overhead cost control may be more effective than the previous statistical technique that was discussed. Furthermore, by re-classifying the costs into groups relevant to various activity index, the cost of operating such as a system could be reduced. Where the system has changed, as for example, the skill of the operators have improved over time, the cost variations will be favourable and may fall below the lower control limit. This will result in drawing up another control chart to reflect changed conditions.

To conclude this section of the discussion on the use of statistical techniques for cost control, it is suggested that for practical purposes, and for a simple understanding by those reported on, the following approach be adopted:

(i) establish in both percentage form and in absolute terms, the extent of deviation management is willing to allow or tolerate. For example, management may set as an upper and lower limit a variation of 2% and not exceeding the budgeted figure by $100. If any or both of these rules are violated, then investigation may proceed.

(ii) a trend analysis of past variances should be conducted. If variances occur continuously and at a constant rate, this may reveal that our
Initial standards and budgets were wrong and a new standard should be set. If the trend is downwards or upwards, investigation should be instituted to reveal the causes. The use of trend analysis is to help management set a standard which reflects current conditions, and thus reveal efficiency on a more accurate basis.

Responsibility accounting, cost allocation and control: To make full use of budgets and standards, an appropriate form of reporting the actual results as compared to these budgets and standards must be designed. The purpose of reporting is three-fold: (i) appraisal of the individual's own performance, (ii) appraisal of the subordinate's performance, and (iii) appraisal of the activity of various divisions. For each of these purposes, relevant accounting information must be transmitted in the form of accounting reports. For about two decades, accounting writers have advocated the 'responsibility accounting' concept as the most suitable form of reporting for control. Responsibility accounting can be briefly defined as the design of the accounting system such that costs and revenue data are classified and identified to appropriate centres of responsibility. The design thus creates responsibility cost-centres and responsibility profit-centres (where such may exist). The distinction between cost and profit centres is fundamental in business organisation and, consequently, in accounting reports. Cost centres are generally given an operating plan and instructed to perform within the budgeted cost. A profit centre on the other hand may be instructed to perform in terms of profit and left alone to make its own production plan and cost budgets. It is maintained that within these centres, costs and revenue are controllable. The basic principle that costs and revenue should only be identified to centres

(and therefore to their responsible managers) to the extent they are controllable, is a very acceptable one for control purpose. However, responsibility is an elusive term and not easily subject to precise definition. The structure and working of business organisations are far too complex to be easily subjected to clear cut definitions of authority and responsibility. Every activity centre in the business network relives on its strength and weakness on other activity centres. Interdependency rather than independency is the general rule. Every action of one activity centre affects the workings of another. As the result of such a complex working structure, it is difficult to follow the rules set out by the traditional view of responsibility accounting.

The allocation of cost is considered to be the antithesis of a good responsibility accounting system and therefore cost control. Cost allocation, it is maintained, was borne out as an instrument of profit measurement and was not intended as a primary tool for cost control. However it should be noted that most costs are joint at point of incurrence. The assignment of costs to centres inevitably involves allocation. If every cost item could be traced to one and only one individual, the problem of assigning costs for control would be simple. However, this is seldom the case. Although the assignment of cost according to responsibility centres is relevant, most overhead cost items carry joint responsibility. To exclude these costs may negate the possibility of control of many overhead items. In order to complete the


structure of responsibility accounting an attempt must be made to measure this joint responsibility. Thus the allocation of cost is a necessary adjunct and not the antithesis of a good responsibility accounting system. Much of the criticisms against cost allocation for control arises from the poor design of the accounting system. A properly designed system should provide information for control even though some of the information is the result of cost allocation. The design of such a system will have to consider controllable costs as per (i) direct responsibility and (ii) indirect responsibility.

Besides the problem of joint responsibility and indirect responsibility other factors have also to be looked into to make the concept of responsibility accounting a workable one. Two assumptions tend to prevail beneath the concept of responsibility accounting:

(i) delegated authority is considered as having been accepted by the delegatee. This need not necessarily be the case. The delegation of authority is conceived as a top to bottom pressure, whilst the acceptance of authority is subject to the nature of the individual. In order to equate delegated authority and accepted authority, the delegator must assess the skills, knowledge and aspirations of the delegatee. It is not worth delegating manager A with the right to make a million dollar decision if he is by nature a person lacking self-confidence and is afraid to take risks. Only accepted authority can lead to the individual accepting responsibility for actions and efforts:

(ii) It is assumed that the sub-goals of the various centres of activity and of their managers are in conformity with the organisational goal.

The organisational goal is generally construed to mean the profit goal.

However, it should be noted that not all centres in the firm can be defined in terms of profit. Even those that are defined as profit centres, e.g. product divisions, face with the difficulties of investment allocation, transfer pricing of intermediate products, and cost allocation. It is therefore necessary to translate the profit goal of the organisation to related sub-goals such as saving costs and increasing revenue. However, in the process of translating organisational goal to sub-goals for activity centres, a problem of co-ordination and compatibility may arise. The optimum for the cost-saving sub-goal of the production department may not necessarily be compatible to the optimum of the sales department which is a revenue-increasing sub-goal. The desired optimum for achieving the sub-goal of the purchasing department may not coincide with those of the production or other related departments. All these problems point towards a state of sub-optimisation. As long as the action taken to achieve the sub-goals of one centre is dependent on another centre's action, optimisation of one centre's sub-goal can only result at the expense of a lower degree of achievement by the others. 93 Another major problem in setting sub-goals is the degree of acceptance of these goals by the individual managers. Unless these sub-goals are accepted, the value of control through responsibility accounting is greatly reduced. The following chapter discusses this in detail.

To conclude this section, it must be emphasised that, to achieve the three-fold purpose of reporting via responsibility accounting one has to give careful thought to the problems of (i) direct and indirect responsibility

(ii) the translation of organisational goals to sub-goals, (iii) the acceptance of these goals by the individual managers, (iv) constraints placed on the actions of activity centres as the result of decisions made by centres on the higher levels of management, as well as by other activity centres on the same level and (v) constraints placed on all activity centres by external non-controllable forces, e.g. the government, supplier, etc.

Control of managed costs: As stated earlier in the chapter, managed costs result from management policy decisions and these are reviewed periodically. The National Association of Accountants Research Report No. 39\(^{94}\) gives a breakdown of these costs into four functions - (1) Production, (2) Administration, (3) Marketing, and (4) Research and Development. Since these costs arise out of management's policy decisions, the evaluation and control of these costs must be related to the goals or objectives for which these costs were incurred. Therefore, though budgeting and responsibility accounting have been frequently suggested as techniques for controlling these costs, not much has been written on how we evaluate these costs incurrence which in my opinion is a significant prelude to cost control. Let us consider the managed costs as per function delineated by N.A.A.

Production costs - herein, management has to consider questions like 'how big a maintenance force should we employ?', 'what should be the size of the inspection department?'. Questions like these, no doubt depend on what management's policies towards quality control, production delay

tolerance, customer delay and dissatisfaction and other ancillary variable factors are. No doubt, each of these factors cannot be dealt with in isolation, since they are interdependent and inter-related. Values have to be placed on these variables and the cost-benefit ratio worked out for a period coinciding with the long-range planning period of the company. However, to determine the values to be placed on customer goodwill, may not be an easy task. To a large extent, guess-work as to the potential contribution towards profits, by improved customer relationship over a period of time is the only value one can place to work out a cost benefit study of the actions to be taken. In the short-run, most of these managed production overhead costs become committed. They are generally reviewed on a periodical basis, and within this period they are of a committed nature. Budgets become useful to the extent that it can place a limit on the expenditure to be incurred. This, to some extent is similar to the other budgeted committed costs. Standards cost variance analysis can be useful to the extent that if, after having provided the facilities such as handling, maintenance, etc., it is found the full capacity has not been utilised, the next period's budget can be revised.

Administrative costs - To a large extent these costs are a function of the type of organisation management wishes to establish. The degree of centralisation or decentralisation desired by management is crucial to the amount of administrative costs that will be incurred. A highly centralised organisation generally may require less number of management personnel. This reduces costs of management. Furthermore, the establishment of separate departments to handle different functions can cause increase in management costs. As the result of general observation, one can conclude that administrative costs generally increase as the organisation
expands. This increase, however, need not necessarily be at a constant or proportionate rate, because more often than not human capacity can be extended far more than physical capacity. Budgets have frequently been used to control these administrative costs. However, budgets can only control the upper limit of expenditure. They do not assist in controlling the effective utilisation of human resources. Work study methods have been introduced to cut down clerical costs and other costs of routine administrative work. We are yet to develop effective ways of measuring the efficiency of management resources. No doubt the rate of return has often been used to measure overall business efficiency but it is inapplicable as a tool for measuring individual performance. The inter-relationships of management personnel are far too complex to be isolated for measurement.

Marketing and distribution costs - Marketing and distribution costs are generally related towards some market objectives. Unlike administrative costs, marketing costs such as advertising, market research and sales promotion are geared towards the objective of enhancing sales volume, or capturing a share of some markets. Thus these costs can be evaluated on the basis of their success in achieving the established goals. However, difficulties do arise in trying to measure success. To what extent can we say that the current increase in sales volume was due to our sales promotional effort? Do we expect our current outlay for such activities to have long-term effects? If so, for how long, and what is the expected benefit? These problems obstruct any approach one may adopt to measure the benefits of marketing costs. Irrespective of these insurmountable difficulties, the following general approach is suggested. First we have to decide our planning period, that is, how long shall it be.

Secondly, we set our desired levels of achievement, e.g. 15% of the market
in the first year, 20% in the second and so on. Thirdly, we ascertain the necessary outlay for each period to achieve the set objectives. Once the objective and budget limits are set, detailed control within the framework based on periodical review can be established. Changes in both environmental and internal factors should be carefully watched and adjustments made of the plan accordingly. Budgets can be used to report the events as they occur. Whilst the marketing costs described are more of the nature of "order-getting" costs, distribution costs are largely "order-filling" costs. Here again, management's policies decide questions on warehouse location and capacity, size of delivery fleet, delay in distribution and other factors. Many of these distribution functions are of a routine repetitive nature. As a result, standards have sometimes been established to control the efficiency of utilising the facilities and its costs. However, difficulties arise in attempting to select work units to base the standards. Though problems exist, it is suggested that we utilise as fully as possible the tools of standards and budgets for the control of distribution costs.

Research and Development costs - There is a general tendency nowadays for large companies to have some form of a research and development department. A large proportion of work done by these research and development departments is of an applied nature. Their tasks are to improve existing products and processes, and to apply new ideas in the development of new products and processes. Pure or fundamental research is generally left to government organisations or to universities. The allocation of funds for research and development is subject to management's judgment as to how much will be needed to meet the company's objectives. Generally there is a range. The upper limit is set by the company's ability
to finance and utilise the results of the research. The lower limit is
the minimum necessary to ensure that sufficient research is done to keep
the company in a competitive position. Since funds are generally scarce
and therefore carry a heavy cost, management must carefully weigh as to
whether it intends to diversify, to utilise by-products, or to expand
beyond the growth potential offered by present products. 95

Budgets have been used widely to control research and development
(primarily, costs of development). Costs are budgeted as per project.
The project is planned, and appropriate costs are estimated for each
phase of the project development. Production charts have also been used
for control purposes. The actual costs and actual work completed for a
period are compared with the budgeted costs for the work completed.
Revisions are made where necessary. In recent years, the use of network
analysis has been introduced for control of development work.

The control techniques for marketing, and research and development
functions can be similar, in the sense that both have to operate within
given objectives (whether this be in terms of a share of the market, or
improvement of an existing product) and within given budget limits over
a period of time. In the case of production and administrative managed
costs, the objectives are far more difficult to establish and to value.

95. National Association of Accountants, Accounting for Research and
Development Costs, R.A.A. Research Report No. 29, June 1955,
pp. 21-26.
CHAPTER 6

BEHAVIOURAL CONSIDERATIONS IN THE USE OF BUDGETS
AND STANDARDS FOR COST CONTROL

Introduction: In the previous chapter, we discussed the use of budgets, standards and responsibility reporting as tools of control. In this chapter we wish to investigate the impact of budgets, standards, and the use of accounting reports on employees. We wish to establish whether these tools of control do help the managers and employees to perform better or do they affect adversely in the performance of their task. In short, we wish to know whether the use of budgets, standards and accounting reports influence the aspirational level of the budgetees and thus motivate them. Different views have been expressed as to the significance of budgets as a motivating force. Shillinglaw\(^\text{96}\) maintains that the budget itself is not intended to act as a motivating force. Argyris\(^\text{97}\) found that budgets are considered by employees as pressure devices. This results in uniting employees against management, creating tension, and mistrust of the finance staff. Furthermore, the budget tends to create a departmental concept whereby supervisors are only interested in their own departments. Benston,\(^\text{98}\) in his survey of the literature found that the evidence seems to indicate that direct use of budgets can lead to a reduction in effective motivation. Stedry,\(^\text{99}\) in his study showed that it is possible to improve performances by choosing


\(^{98}\) Benston, G.J. "The Role of the Firm's Accounting System for Motivation" The Accounting Review, April 1963

budget levels attuned to the motivation structures of the individual managers. It should be noted that Stedry was trying to establish some relationship between imposed budgets, level of aspiration and subsequent performance. The budgets were used as a strategy for improvement. Thus he advocated 'manipulation' of budgets to suit each individual manager. It is unlikely that Stedry's suggestion could work in practice, largely because managers do have some notion of their performance even if they do not get reports of it. Becker and Green in their study, maintain that participation in budget setting induces proper motivation and acceptance of specific goals and also provides information to associate reward or punishment with performance. Benson and Argyris also support the idea that a participative budget will result in motivating the employees, however, Argyris warns against the possible use of 'pseudo-participation'.

Motivation: It is essential, in order to know whether budgets do motivate individuals to perform better, to determine what are the motivations for work. Earlier assumptions of human behaviour maintain that man has an inherent dislike for work and will avoid it if he can. Thus most people must be coerced, controlled, directed or threatened with punishment to get them to work effectively. He maintains that an average human being prefers to be directed, dislikes responsibility and desires security. However, a more realistic theory was advanced by Maslow in his study wherein he maintained that much of human behaviour is motivated by the satisfaction of basic and universal needs. The needs which have first priority are the physiological ones, the need for food, shelter and rest. These are the

fundamental needs of every human being. When these physiological needs are satisfied, the individual moves up the scale for the next. This is so because 'man is a wanting animal and rarely reaches a state of complete satisfaction except for a short time. As one desire is satisfied, another pops up to take its place'. The second level in the hierarchy of basic needs is the desire for safety and security in his job. The third level relates to the desire to belong to a group and have social contacts. He wishes to identify himself as a member of this group so as not to feel 'an island unto himself'. The next level concerns one of esteem, both by himself and by others. Self-esteem, that is, pride in his own work which brings about such emotional reactions as strength, freedom, achievement and adequacy. He also desires to be recognised and praised by his colleagues, subordinates and superiors for his good work. If these needs are not satisfied, he feels inferior; if they are satisfied, he feels confident and optimistic. The final need in the hierarchy is what Maslow calls 'self-actualisation'. This is the desire for self-fulfilment, that is, to feel one has achieved one's utmost in life. However, this is indeterminable since Maslow himself acknowledges that man's needs rarely reach the state of full satisfaction.

A basic understanding of the above mentioned needs is essential if we wish to motivate individuals. The chance of having these needs satisfied can be the reward for individuals who succeed in their performance and the non-satisfaction can be considered the punishment. If management clearly indicates these rewards and penalties to the employees and genuinely assists them to achieve the rewards, the employees should respond favourably.

103. Ibld. p. 69.
Motivation is the force that moves an individual to perform an act knowing that the reward for such will satisfy some of his needs. Let us see how these needs can be used as rewards and penalties in budget motivation. The first two needs which we discussed were physiological and safety. To a large extent men without skill, or little skill are the ones who feel these needs to be great. Thus the chance of an increase in wage, bonus payments, permanency of employment and being admitted to the staff superannuation scheme are rewards that satisfy these needs. Management should clearly outline its policies on such matters (no doubt, the unions will have a big say in these). The affiliation needs can be initiated by management, both for positive and negative reasons. By the latter, we mean that aggressive and unfair actions and demands by management can force this need for unity and identification by employees to counter management. However, management can also assist positively by providing facilities like staff clubs where the employees can identify themselves.

Earlier on in the previous chapter, we mentioned that the three-fold purpose of budget reports - (i) self appraisal, (ii) appraisal by superior of the subordinate, and (iii) activity appraisal by management. Of these, (i) and (ii) have motivational implications. The needs for self-esteem and esteem from others is revealed by self-appraisal and subordinate appraisal. Self-appraisal is related to assessing one's achievement and this in turn affects the level of aspiration (discussed in subsequent paragraphs). Appraisal by superior can result in achieving not only the esteem needs but also physiological and safety needs (if such are still desired). However, the present structure of our budgetary control system "is strongly biased towards criticisms for insufficient performance, and even unfounded criticism, rather than towards positive recognition."104

Thus the budget system may frustrate rather than assist the need for recognition from others and therefore arouse bitterness.

Goal acceptance through participation: One of the difficulties faced in budgeting is the acceptance of the budget and its goals by the budgetees. In the opinion of the writer, this could be solved if management can create an environment where confidence by employees in management exists. One approach to create this confidence in management is to allow the employees to participate in developing the budget. Participation can be defined as "a process of joint-decision-making by two or more parties in which the decisions have future effects on those making them." It is, thus, a psychological factor. However, participation need not necessarily result in improved performance because it depends on the degree of cohesion amongst the group members and the attitude they take towards an action which, in turn, depends upon the environment and basic needs of the group members. Taking the two variables - cohesion and attitude, Becker and Green suggest the following outcomes could result:

"(a) High cohesiveness with positive attitudes (goal acceptance), a condition of maximally efficient motivation;
(b) Low cohesiveness with positive attitudes, an unlikely but possible condition that probably would result in efficient performance;
(c) Low cohesiveness and negative attitudes, a condition resulting from unsuccessful participation that would tend to depress production within limits of the integrity or conscience of each individual; and
(d) High cohesiveness and negative attitudes, the occurrence most conducive to a production slow-down."


If participation has been successful then the employees have accepted the budget and the goal to be achieved. This then sets their level of aspiration. Level of aspiration has been defined as a goal an individual expects to accomplish in a familiar situation based on knowledge of his past performance in that situation. When the goal is achieved, a subject feeling of success is experienced whilst if the goal is not achieved, a feeling of failure prevails. This affects subsequent level of aspiration.

Here we note the significance of the accounting reports prepared for the various cost centres. These reports convey knowledge of past performance and as such play an important role in motivation. Ammons in his work arrived at the following generalisations about knowledge of performance:

"Knowledge of performance affects rate of learning and level reached by learning.

Knowledge of performance affects motivation: The most common effect of knowledge is to increase motivation.

The more specific the knowledge of performance, the more rapid improvement and the higher the level of performance.

The longer the delay in giving knowledge of performance, the less effect the given performance has.

When knowledge of performance is decreased, performance drops." 108

In a similar vein, Child and Whiting put forth the following hypothesis:

"(1) Success generally leads to a raising of the level of aspiration, and failure to a lowering.

(2) The stronger the success the greater is the probability of a rise in level of aspiration; the stronger the failure, the greater is the probability of a lowering.

(3) Shifts in the level of aspiration are in part a function of changes in the subject's confidence in his ability to attain goals.

(4) Failure is more likely than success to lead to withdrawal in the form of avoiding setting a level of aspiration.

(5) Effects of failure on level of aspiration are more varied than those of success." 109


Although accounting reports to cost centres are expected to convey knowledge of performance and thus affect motivation and aspirational level of the cost centre managers, the acceptance of these reports as representing a true measure of performance by the cost centre managers depends on whether "they were satisfied that the data were accurately recorded, that the standard was reasonably attainable, and that the variables it measured were controllable by them."

Conclusion: It is the writer's view that effective participation could resolve the acceptance problem. Take the case of data being accurately recorded. Here, by effective participation, problems of measurement such as allocation of costs, can be overcome. The persons involved can participate in devising methods of cost allocation and cost responsibility. If this were so, then the questions of what costs are controllable can be overcome as well. As regards standards being reasonably attainable, this again can be overcome by effective participation. Participation in goal setting helps to stimulate the formation and formulation of the level of aspiration of the budgetees. Being allowed to participate in goal-setting imposes a moral obligation as well as the desire for achievement on the part of the budgetees. However, we must note that effective participation depends on several factors such as:


111. In the survey made, it was found that participation in budget preparation of overhead cost was by the accountant and his staff (63 firms), departmental managers (59 firms), top management (57 firms), foremen and supervisors (24 firms). One company indicated that the department managers, foremen and supervisors were only responsible for setting variable overhead budgets. As regards participation in the allocation of service departments' costs to production departments, it was found that 37 firms consulted the production manager whilst 19 did not. In one case, it was found that the factory manager together with the service department managers decide the cost allocation.
(1) Personality traits of the participant. An authoritative or weak and submissive person can hardly contribute towards an effective participative act; whilst on the other hand, an individual with a 'give and take' attitude and with positive objectives will go far in the contribution for successful participation.

(2) The cultural and traditional background of the participant can influence their attitudes towards the significance of direct participation, for example, workers may feel that the union should be the vehicle by which participation should be directed. Any move to involve workers directly may be viewed as going against union rules.

(3) The skill and knowledge possessed by the participants. If the participants have no skill or knowledge they apparently cannot contribute much. This can lead to 'psuedo-participation'.

(4) Budget reports should be honest, fair and speedy. Poor communication and interruptions such as delays, noise and bias can result in ineffective and anti-motivational reports. This can affect the individual's desire to participate and assist in cost control.

All said and done, one must remember that participation is carried out at different levels of management within constraints formulated or decided by participants at a higher level in the management hierarchy. The organisation structure should allow as much participation as possible by lower level personnel on decisions that might constrain their actions. Although flexibility of organisation structure is advocated, we must not lose sight of the need for organisation, otherwise chaos will prevail.
CHAPTER 7

OVERHEAD COST ALLOCATIONS, PRODUCT COSTING AND COST CONTROL — A FRAMEWORK

Some brief historical background to overhead cost allocations. Much of the early attempts (in the late 19th century) to allocate overhead costs to products were crude and generally based on a single rate. The most popular basis was to attach overhead cost to products on a percentage of wages or labour cost. However, because of the different wage payments made to the workers, this method later gave way to labour time. In 1878, Thomas Battersby, whilst surveying the various methods of charging overheads, advocated the use of departmental rates. Later, in 1901, Alexander Hamilton Church promoted the idea of production centres and predetermined overhead rates. He also suggested the use of 'supplementary rates' to overcome the problem of idle capacity costs. Because the items of overhead costs could not be identified to a single activity index, multiple rates were suggested by Dr. William Kent in 1916. Solomons concludes:

"With this development we can say that the process of attaching overhead expenses to units of product had been brought more or less to completion. From the application of a simple percentage to prime costs we have seen the treatment of overhead expenses become more and more complex, first by the replacement of the simple idea of a homogenous works by the more realistic concept of a congeries of production centres; then by a distinction first between works overheads and general overheads, and later between different classes of works overhead."\[113\]

112. This section is based on information provided by Solomons, D., "The Historical Development of Costing", op. cit. pp. 3-49.

As mentioned in the introductory chapter, R.S. Edwards, in an article of 1937, questioned the rationale of overhead cost allocation. He doubted the usefulness of such arbitrarily allocated costs for purposes of price-setting and price-taking. He advocated the use of incremental costs as the only relevant costs for such decisions.\textsuperscript{114} Baxter in an article of 1938\textsuperscript{115} followed up on Edwards' article but emphasised on the problem of overhead cost allocations between departments. He maintained that for the purposes of departmental profit analysis, cost control and price-setting, allocated overhead costs were misleading.\textsuperscript{116} He advocated that only costs that can be directly traced to the departments were valid. These costs were considered as avoidable costs.\textsuperscript{117} However, he did mention that allocated overhead costs may correspond to opportunity costs.\textsuperscript{118} This is a significant point and one that can be used to support the idea of cost allocation.

The criticisms of Edwards and Baxter were not new. Economists of the late nineteenth century were aware of the problem of marginal variations in cost and Hamilton, writing in 1910, questioned the usefulness of allocating general overheds to departments.\textsuperscript{119}

\textsuperscript{114} op. cit. pp. 95-98.


\textsuperscript{116} ibid. pp. 268-269.

\textsuperscript{117} ibid. pp. 273-274.

\textsuperscript{118} ibid. pp. 272-273.

\textsuperscript{119} Solomons, "The Historical Developments of Costing" op. cit. pp. 30-33.
The problem: William J. Vatter probably sums up the problem when he commented:

"All costs are more or less interwoven in a complex fabric; in a large measure costs are joint as to their incurrence, as well as to their associations with various costing units."

The various functions within a business environment are all inter-related and to a large extent, inter-dependent. For example, the extent of service to be rendered by the maintenance department and materials handling department are dependent on the extent of production activity. Again, the activity of one production process is dependent on the activity of the related previous process. Furthermore, changes in labour recruitment and training policies as well as material procurement policies affect product costs. Thus a change in any variable within the business complex affects all and sundry.

In the midst of such an operational complex, the cost accountant is given the task of providing figures that will show: (i) how much it cost to produce a unit of X; (ii) what costs were incurred and how have they varied from the planned costs; (iii) within which department or cost centre have these costs varied; (iv) who should be responsible for these cost variations; (v) what costs are meaningful for various management decisions. The words of J.M. Clark probably sum up the dilemma the accountant faces in performing the multiple tasks mentioned:

"... there are different kinds of problems for which we need information about costs, and that the particular information we need differs from one problem to another."


The information needs of the manager in his everyday task of deciding no doubt will differ from the accountants' need for information to prepare product costs reports and income statements. The problems that management faces are many and varied in nature. The information requirements generally pertain to future occurrences. Thus, for many management decisions the costs needed are future orientated. The accounting system to a large extent only provides past and current costs. These costs can only be a guide to the determination of future costs.

The early criticisms as well as the current ones on overhead cost allocation are the result of the inadequate manner by which accountants have attempted to allocate costs for satisfying their needs. Poor classification of overhead costs, the use of a single overhead rate and activity index, and the oversight of the meaning of responsibility have all contributed towards the raising of such criticisms as mentioned earlier. However, the criticisms themselves can be counter-criticised especially at the naive interpretation of responsibility and the general oversight of the fact that most costs are joint and are subject to the problem of allocation.

It is maintained by the writer, that it is possible to formulate an accounting structure for overhead costs such that the problems of costing and control can be satisfied. All that is needed is: the proper classification of overhead costs (previously discussed in Chapter 5) and a structure flexible enough to provide the various information.

The purpose of this chapter: The purpose of this chapter is to outline a procedure for the allocation of overhead costs to meet the needs of product costing and cost control. In doing so, we adopt a classification of costs that will clearly identify the nature of each cost allocated. This is necessary since it will allow management a fair degree of knowledge of what costs would be relevant for its purpose.
Overhead cost allocation - general: The routine of cost accounting systems has been to identify cost with various centres before finally arriving at product costs. Overhead costs arise from several sources and activities, for example, the production departments wherein indirect materials and labour are directly incurred; service departments such as the power house, tooling and machining whose output are for the requirements of the various production departments and related service departments; general service departments such as accounting, personnel, pay office, etc. whose services are for all the departments. Besides these, there are the overall occupancy costs involving the use of land and building and the ancillary costs that go with such services. In general the accountant has classified these costs into certain functional groups. The survey revealed the following practice:

**TABLE F. Classification of overhead costs by companies**

<table>
<thead>
<tr>
<th>Nature of Classification</th>
<th>Number of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>65</td>
</tr>
<tr>
<td>Selling</td>
<td>48</td>
</tr>
<tr>
<td>Distribution</td>
<td>38</td>
</tr>
<tr>
<td>Financial</td>
<td>41</td>
</tr>
<tr>
<td>General Administration</td>
<td>48</td>
</tr>
<tr>
<td>Selling and Distribution</td>
<td>8</td>
</tr>
<tr>
<td>Financial and General Administration</td>
<td>9</td>
</tr>
<tr>
<td>Research and Development</td>
<td>5</td>
</tr>
<tr>
<td>Quality, Technical and Chemical Control</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Service</td>
<td>4</td>
</tr>
</tbody>
</table>

Majority of the firms included only the manufacturing overhead costs in their product costs. The following table reveals the practice adopted:
TABLE G: Type of overhead costs included in product costs

<table>
<thead>
<tr>
<th>Class of overheads</th>
<th>Number of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>63</td>
</tr>
<tr>
<td>Selling</td>
<td>14</td>
</tr>
<tr>
<td>Distribution</td>
<td>12</td>
</tr>
<tr>
<td>Financial</td>
<td>9</td>
</tr>
<tr>
<td>General Administration</td>
<td>14</td>
</tr>
</tbody>
</table>

As detailed out in Table E, the general practice of companies was to charge overheads arising from production operation departments and related service departments to products. Selling, distribution, administration and financial overhead costs were charged off periodically to the income statement. In line with current practice, the framework to be outlined will deal only with manufacturing overheads.

Some criteria used for departmental overhead cost allocation: In the process of allocating overhead costs to departments, the accountant has used several criteria. The survey revealed the following trend:

TABLE H: Criteria used for allocating departmental overhead costs.

<table>
<thead>
<tr>
<th>Criteria used</th>
<th>Number of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ability to absorb</td>
<td>6</td>
</tr>
<tr>
<td>2. Benefit or use derived</td>
<td>31</td>
</tr>
<tr>
<td>3. Facilities provided, that is, provision</td>
<td>21</td>
</tr>
<tr>
<td>rather than use of facilities</td>
<td></td>
</tr>
<tr>
<td>4. Causal responsibility</td>
<td>4</td>
</tr>
<tr>
<td>5. Benefit plus facilities provided</td>
<td>6</td>
</tr>
</tbody>
</table>

Ability to absorb - The use of this method is erroneous because there is no attempt to correlate overhead cost incurrence and the activity index used for allocation. The general activity index used are net sales or gross margin. Now, if the item sold is highly priced but easy to handle, it would be wrong to allocate handling charges on the basis of net sales.
or gross margin. In fact the method is purely one of expediency rather
than of reasoned judgment. It is therefore heartening to see it is not
widely used in practice.

Benefit or use derived - Since service departments exist for the sake
of providing service of one sort or another to manufacturing and other
service departments, it stands to reason that this is a logical method
to use. However, it is essential that the factors selected to measure
benefit or use be carefully judged, for example, in the allocation of
handling charges to the various departments, should we use weight, volume
or time taken? Apparently, since work is best measured in terms of time
taken, we may select time. But time can be computed in terms of manual
hours or machine hours. This is so when some items can be easily dispensed
with by mere manual handling whilst in other cases fork-lift trucks and
similar mechanical devices may be needed. Thus, different time rates
may have to be computed; in this case, one for manual work and another
for mechanical work. An important point to note is that some service
department costs do not vary with use and are often maintained in
anticipation of use. It would therefore be wrong to allocate all service
department's costs on the basis of benefit derived or use. To overcome
this defect the following criterion is sometimes suggested:

Facilities provided criterion - It was stated in Chapter 2 that the
planning of service departments' capacity was related to service require-
ments expected from the production and related departments. Thus it is
argued that the costs of maintaining this capacity to serve would be more
equitably distributed by the criterion of provision than by the criterion
of use of the service.

In the previous chapters it was recommended that the practical
available capacity be segregated into (i) planned utilisation and
(ii) reserve capacity. Now, if reserve capacity exists, then the cost of this should not be allocated to the other departments. It is best retained at its source and to reveal to management the result of its decision of having reserve capacity. Regarding planned utilisation of capacity, since this was established to meet the planned requirements of production and related service departments, it is suggested that the allocation of such service department's cost be based on this planned use.

Causal responsibility - The use of this criterion attributes to the fact that though certain costs are incurred directly by a service department, the causative factors lie elsewhere. Thus, overtime worked by the repairs and maintenance department could be attributed to an urgent request from a production department. This cost should, as such, be charged to that department and not prorated to others as well. This criterion plus the normal charge for benefit or service derived would be a useful approach because it is related to the indirect responsibility of other departments.

A suggested approach towards the allocation of overhead costs: We have noted several criticisms over the accountants' approach to overhead cost allocation. These criticisms relate to the control aspect of cost which is lost through allocation. Thus we note writers maintaining that overhead cost allocation was not meant to be a tool for cost control and furthermore costs are best controlled at its source. Those who advocate responsibility accounting would support the idea of control at its source. Though the writer accepts the view that the concept of responsibility

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accounting is relevant for cost control, it is maintained that accounta-
ibility should not stop at the source of cost incurrence. Arguments
have been forwarded earlier on this and the following summary is
merely a recapitulation of what was said:

(i) the problem of indirect and causal responsibility reveals the
    inadequacy of traditional responsibility accounting which is
    based on a direct concept;

(ii) the successful use of the system of responsibility accounting
    requires that the manager of each department recognise and
    influence, with all the resources and ability at his command,
    events outside his sphere of activity which will cause variances
    in his cost. The system should be designed to promote the idea
    that the company exists as a whole and not in isolated cost
    centres.

Cost allocation is therefore not incompatible to but a necessary
adjunct of responsibility accounting. As stated earlier, what we need
is a better classification of costs.

The Allocation of Service Department's Cost to Other Departments:

The following classification is suggested:

Group 1. Direct Costs:

- Sub-group A - Total committed costs
- Less committed costs as per reserve capacity
- Committed costs as per planned utilisation of capacity

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123. For more details of the arguments see Brummet op. cit. pp. 141-142;
    Ferrara, W.J., "Responsibility Accounting - a Basic Control Concept",
    In Thomas Jr., W.E., Readings in Cost Accounting, Budgeting and Control,
    (Cincinnati: South Western Publication Co. 1960) pp. 160-162; and
    Gordon, H.J., "Cost Allocation and the Design of the Accounting System
    for Control", The Accounting Review, April 1951.

124. Note: It was maintained earlier in Chapter 5 that in the short-run
    most of the managed costs of production and related service departments
    are committed.
Sub-group B - Variable costs grouped according to the factors with which they vary, e.g. manual hours, machine hours, etc.

Group 2. Allocated costs:

Sub-group A - committed costs from each of the several service departments shown separately.

Sub-group B - variable costs from each of the several service departments shown separately.

In allocating committed costs to other departments we should note (i) that service departments sometimes carry reserve capacity, and (ii) service departments also receive service from other departments. With reference to (i) we should separately identify the cost of carrying reserve capacity so that management has full knowledge of its commitments. With reference to (ii), we must note that departments are inter-dependent as far as capacity planning is concerned. Thus, the committed cost of Department $S_1$ is not only its own direct cost as per planned utilisation, but also the planned assistance from other service departments and their cost of so doing. Therefore, in working out a rate for allocating the committed cost to other departments, $S_1$ must work out a rate for both direct and allocated committed costs on the basis of planned utilisation of capacity. It is necessary to include these allocated costs in working out charge-out rates because they reveal to the supervisor of $S_1$ the extent of the size and usefulness of the necessary organisation supporting him in his activities. Furthermore, it is in line with our argument for full product cost.

In charging out variable costs to other departments, we must again note that these variable costs are made up of (i) direct, and (ii) allocated costs. Direct costs arise from the services rendered whilst
allocated costs arise from requested services rendered by other departments. Because of the inter-dependency of these departments, the costs are a function of the services rendered. Direct variable costs, because they vary directly with services rendered, can be charged-out on the basis of a standard rate worked out either by statistical or engineering methods. However, we must note that these direct variables costs are not homogenous in nature. They respond differently to different activity index. Thus it becomes necessary to class these direct variable costs into appropriate groups as per activity index such as machine hours, labour hours, etc. and then work out the appropriate standard rates. Indirect or allocated variable costs do not lend themselves to these classifications because they cannot be broken down into parts. The most one can do is to identify these variable costs as to the type of services rendered. In the light of such difficulties, it is suggested that we charge-out these costs on the basis of expected actual capacity, i.e. budgeted capacity rate. To illustrate, take service department $S_1$. Assuming its budgeted capacity is 1,000 work units and to perform this, it will need the services of department $S_2$ and $S_3$ costing (based on $S_2$ and $S_3$ charge-out rates for variable costs) $4,000 and $6,000 respectively. Thus the charge-out rate per work unit for indirect variable costs will be $10. Thus, in charging out its variable costs, service department $S_1$ will have several direct variable cost rates (each applicable to certain situations) and a budgeted rate for allocated or indirect variable costs.

Control of Service Department Costs: In attempting to control committed costs, it is necessary to treat direct committed costs separately from allocated or indirect committed costs. With reference to direct committed costs, the analysis should reveal, (i) budgeted idle capacity (i.e.
difference between planned utilisation of capacity and expected actual capacity), (ii) idle capacity as the result of a fall in the service requested (i.e. difference between budgeted or expected capacity and requested capacity), and (iii) difference between requested capacity expressed in work units and actual rendered capacity expressed in work units. The supervisor of S₁ cannot be held responsible for (i) and (ii), but he can be held responsible for (iii) which arises from inefficiency and ineffective utilisation of facilities. The cost for this should be in terms of opportunity cost representing loss of revenue from delay to other departments' operations. With reference to allocated committed costs, these arise from services requested by S₁ from other departments. Although the supervisor of S₁ has no direct control over it, it is necessary to inform him of the cost of such services rendered. It could provide him with further motivation for cost minimisation.¹²⁵

Another point to note in the control of committed costs is that price variances beyond the control of the supervisor should be either eliminated from the report or the original committed costs altered to accommodate the new prices. It is emphasised here that, as far as the control of committed costs is concerned, each department should be responsible for its own direct committed costs. Generally this control is limited to overseeing the efficient use of the facilities.

As for the control of variable costs, the use of flexible budgets is suggested. With reference to the use of flexible budgets, it is suggested a separate budget be prepared for each class of direct variable cost and allocated service department's costs. Furthermore, in the case

¹²⁵. See Brummett op. cit. pp. 142-143; and Ferrara, op. cit. pp. 156-158.
of direct variable costs, control charts may come in handy. Here, in line with the suggestions of classifying direct variable costs according to the appropriate activity index, it is recommended that we can use a similar classification for group control of variable costs. It is also recommended that we eliminate any price variances beyond the control of the supervisor. These price variances are best controlled at their source. The only variance then to be calculated is the efficiency variance.

A point to note at this juncture is who decides on the allocation of the costs between these departments. As stated in Chapter 6, it would be useful if the supervisors of these departments had a say in the manner of cost allocation. The survey revealed that 37 against 19 firms allowed production managers to be consulted over the allocation of service departments' costs to production departments.

Allocation of Production Departments Costs to Products: Having allocated the service departments costs to the production departments, the accountant generally identifies these to the products produced by the department. The following classification, similar to the one prescribed for service departments, is suggested for the production departments:

Group 1: Direct Costs -

Sub-group A - Total committed costs $xxx

Less committed costs as per reserve capacity xxx
Committed costs as per planned utilisation of capacity xxx

Sub-group B - Variable costs grouped according to the factors with which they vary xxx
Group 2: Allocated costs -

Sub-group A - Committed cost from each of the several service departments shown separately

Sub-group B - Variable costs from each of the several service departments shown separately

**Bases for allocating overhead costs to products** - The accountant in practice uses several bases for charging out overhead costs to products. The following table shows the current practice of New South Wales companies as revealed in the questionnaire:

**TABLE 1: Bases of allocating production overhead costs to products - New South Wales companies.**

<table>
<thead>
<tr>
<th>Basis of Allocation</th>
<th>Number of firms</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct labour cost percentage</td>
<td>26</td>
<td>32</td>
</tr>
<tr>
<td>Direct labour hour rate</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>Machine hour rate</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>Direct material cost percentage</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Number of units produced</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>83</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

[*Note: Whilst the number of firms which replied to the questionnaire totalled only 68, the figure 83 is indicated above. This is so because some firms indicated using more than one basis.]*

A comparison of Table 1 can be made with Table J below which shows a similar survey done in Norway and the U.S.A.:
TABLE J: Bases of allocating production overhead costs to products

<table>
<thead>
<tr>
<th>Basis of Allocation</th>
<th>Norway</th>
<th></th>
<th>U.S.A.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of firms</td>
<td>Percent</td>
<td>Number of firms</td>
<td>Percent</td>
</tr>
<tr>
<td>Labour costs only</td>
<td>42</td>
<td>49</td>
<td>101</td>
<td>45</td>
</tr>
<tr>
<td>Labour hours only</td>
<td>10</td>
<td>12</td>
<td>56</td>
<td>25</td>
</tr>
<tr>
<td>Machine hours</td>
<td>5</td>
<td>6</td>
<td>43</td>
<td>19</td>
</tr>
<tr>
<td>Number of products</td>
<td>6</td>
<td>7</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Weight of product</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Value of materials only</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Labour cost plus materials</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>8</td>
<td>9</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>86</td>
<td>100</td>
<td>224</td>
<td>100</td>
</tr>
</tbody>
</table>

This table only shows the frequency of use of bases of allocation which are used as the exclusive or most important basis of allocation. As a supplement to this it may be mentioned that 70 per cent of the Norwegian firms interviewed and 88 per cent of the American firms use more than one basis of allocation. Both investigations are based on questionnaires.

The Norwegian investigation was undertaken by Olav Harald Jensen at the Institute of Business Economics of the Norwegian School of Commercial Science and Economics (1948). The American investigation, which has been recorded by Olav Harald Jensen, was undertaken by the National Association of Cost Accountants: "Practice in Applying Overhead and Calculating Normal Capacity", N.A.C.A. Bulletin, Vol. XIC, No. 15, Sec. III."

From both surveys, it is apparent that firms do use more than a single rate for allocating their overhead costs to products. The reasons for this can be attributed to the following:

(1) The technical nature of activities performed by a production department are varied. Some activities demand greater manual hours whilst others may be highly mechanised.

(2) The department may be producing multiple products and these may have different cause-effect relationship with the various direct costs of the production departments. For product cost information to be meaningful, the various overhead costs charged should be clearly identified. Thus:

(1) In allocating direct variable overhead costs, each product class should be charged with the relevant items of costs. To do so we calculate a separate charge out standard rate for each class of direct variable overhead costs.

(2) For indirect or allocated variable costs, we use the budgeted standard rate based on expected actual capacity. For example, if the budgeted production of department A is 1,000 machine hours and to carry this out it will require the services of departments 1 and 2 at the budgeted variable cost of $2,000 and $3,000. Thus the charge and rate for indirect variable costs for 1 machine hour worked is $5.

(3) In charging out direct committed costs, the charge-out rate should be based on planned utilisation of capacity.

(4) As in the case of service departments, we adopt the same procedure of charging out indirect or allocated committed costs to products on the basis of a standard rate calculated on planned utilisation.

We now have a complete picture of the product cost showing direct and indirect variable costs (useful for those who wish to work out the contribution margin and cost-profit-volume analysis) and the direct and indirect committed costs.
Fig. 9. Diagrammatic presentation of manufacturing overhead cost allocation

Service Dept. 1

- Direct Committed Costs
- Less Reserve Capacity Costs
- Planned Utilisation Capacity Costs
- Allocated Committed Costs
- Total Committed Costs

- Direct Variable Costs:
  - Class 1
  - Class 2
  - Class 3

- Allocated (Indirect) Variable Costs
- Total Variable Costs

Service Dept. 2

- Direct Committed Costs
- Less Reserve Capacity Costs
- Planned Utilisation Capacity Costs
- Allocated Committed Costs
- Total Committed Costs

- Direct Variable Costs:
  - Class 1
  - Class 2
  - Class 3

- Allocated (Indirect) Variable Costs
- Total Variable Costs

Production Dept. A

- Direct Committed Costs
- Less Reserve Capacity Costs
- Planned Utilisation Capacity Costs
- Allocated Committed Costs: S1, S2
- Total Committed Costs

- Direct Variable Costs:
  - Class 1
  - Class 2
  - Class 3

- Allocated Variable Costs: S1, S2
- Total Variable Costs

Production Dept. B

- Direct Committed Costs
- Less Reserve Capacity Costs
- Planned Utilisation Capacity Costs
- Allocated Committed Costs: S1, S2
- Total Committed Costs

- Direct Variable Costs:
  - Class 1
  - Class 2
  - Class 3

- Allocated Variable Costs: S1, S2
- Total Variable Costs
Fig. 10.  Product A Cost Statement (Single Process Manufacture)

<table>
<thead>
<tr>
<th></th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials costs</td>
<td>xxx</td>
</tr>
<tr>
<td>Direct labour costs</td>
<td>xxx</td>
</tr>
<tr>
<td>Prime cost</td>
<td>xxx</td>
</tr>
<tr>
<td>Direct variable costs:</td>
<td></td>
</tr>
<tr>
<td>Class 1</td>
<td>xxx</td>
</tr>
<tr>
<td>2</td>
<td>xxx</td>
</tr>
<tr>
<td>3</td>
<td>xxx</td>
</tr>
<tr>
<td>Allocated variable cost</td>
<td>xxx</td>
</tr>
<tr>
<td>Total variable cost of production</td>
<td>xxx</td>
</tr>
<tr>
<td>Direct committed cost</td>
<td>xxx</td>
</tr>
<tr>
<td>Allocated committed cost</td>
<td>xxx</td>
</tr>
<tr>
<td>Total committed cost of production</td>
<td>xxx</td>
</tr>
<tr>
<td>Total cost of production</td>
<td>xxx</td>
</tr>
</tbody>
</table>

Problem of joint products - it may seem evasive not to mention the case of joint products. Here the answer to this problem is as follows:

(a) Where the joint products are technically separable, that is, we can vary their proportions, then it is possible to determine the cost for each product by methods of linear programming.

(b) Where the joint products are technically inseparable, that is, their proportions cannot be varied, then it is suggested we treat them as a single unit for costing and pricing.

Control of Production Costs: It is maintained that for the control of production department's costs, the product as the final unit of cost centre cannot help promote cost control. The reasons are as follows:
(a) costs are most effectively controlled at point of incurrence;
(b) the production centre may produce multiple products of different characteristics. For control, these characteristics have to be brought down to common activity indices like machine hours, labour hours, etc.
(c) the aggregation of the product costs tends to homogenise the overhead costs, thus making control ineffective.

In controlling the committed costs, it is suggested that only the direct committed costs be looked into. This is so because the indirect or allocated committed costs are already being checked and controlled at their own source. As far as the supervisor of the production department is concerned, he should be held responsible for the effective utilisation of the production centre's facilities. He should not be responsible for any idle capacity which is the result of management policies (such as reserve capacity and budgeted idle capacity) or the inefficiency of the marketing personnel in not being able to meet budgeted sales.

In controlling variable costs, it is suggested that we follow the same procedure as outlined for service departments, that is, use flexible budgets for each class of direct variable costs and indirect or allocated variable costs. Furthermore, for direct variable costs we could use a control chart for each class. However, there is another point worth considering for control of service departments as well as production departments' indirect or allocated costs. Because inter-dependency exists between departments, the question of inter-related responsibility arises. To avoid any conflicts, it is suggested that a committee be formed comprising the various departmental supervisors of the factory, with the factory manager as chairman. The function of this committee
would be to (i) sort out the problem of allocating costs between departments, and (ii) sort out the parties responsible for control of the cost incurred. For this to be effective there must be genuine participation. In so doing it may be possible for the production supervisor to be given some responsibility over the control of allocated variable costs, that is, the efficient use of services rendered by the other departments.

Summary of chapter: The purpose of this chapter was to formulate a framework of accounting for manufacturing overhead costs. In so doing the following points were noted:

(i) Overhead costs should be classified into direct and allocated groups and further sub-grouped into committed and variable costs.

(ii) The direct variable costs should be classified according to the activity index to which they react and vary.

(iii) In charging out committed costs to production and related service departments, and finally to products, the capacity concept used should be the planned utilisation. Reserve committed capacity costs should not be charged unless such capacity is used.

(iv) In charging out direct variable costs to production and related service departments and finally to products, a standard rate should be calculated for each class of direct variable costs.

(v) In charging out indirect or allocated variable costs to production and related service departments and finally to products a budgeted rate based on the expected cost of per work unit of service rendered should be used.

(vi) In controlling committed costs, each department should only consider its own direct committed costs. Even here, the supervisor of each department should not be held responsible for any price variances over which he has no control. Furthermore, he
should not be held responsible for the carrying of reserve
capacity, budgeted idle capacity or idle capacity arising from
marketing division's inability to carry out its sales budget.
The supervisor should only be responsible for the efficient and
effective use of the facilities.

(vii) Control of direct variable costs can be carried out by means of
a flexible budget taking into account price variances for which
the supervisor may have no control. Furthermore a flexible
budget should be developed for each class of direct variable
costs. Besides the use of flexible budgets, control charts can
also be developed for each class of direct variable costs.

(viii) Control of indirect or allocated variable costs can also be
carried out by means of flexible budgets.

(ix) Because the departments are inter-dependent, it is suggested that
a committee be formed comprising of the heads of various depart-
ments in the factory, with the factory manager as chairman. The
purpose here is to (a) determine methods of allocating costs and
(b) decide who is responsible and to what extent, for the various
costs incurred.

(x) Costs should be controlled by departments and not by products.

It may appear that the framework is cumbersome and too detailed.
However, this need not necessarily be so because with present day use
of computers we can programme and record these data without great
difficulty. What is important, is the significance of such detailed cost
accounting and analysis for product costing, pricing and control.
CHAPTER 8

PRODUCT PRICING AND OVERHEAD COSTS

Introduction: One of the most outstanding debates between accountants and business economists has been the relevance of fixed overhead costs in pricing decisions. One of the primary reasons for allocating overhead costs to products in the late 19th and early 20th centuries was to ascertain the cost of products for pricing purposes. However, this approach of cost allocations for pricing was severely criticised by economists and by advocates of the new school of accounting thought - variable costing.

The purpose of this chapter is to ascertain how costs play a role in product pricing and to determine the relevance of overhead cost in this process. In attempting to accomplish this, it is first necessary to discuss and understand how pricing policies are developed and the relevance of economic price theory and organisational goals in establishing these policies. It is within the context of these price policies that the role of cost and the relevancy of overhead costs will be discussed.

Pricing Policies: The price a company charges on its products or product line is a significant strategic variable in the company's operation. The price charged helps to a large extent to create a volume of sales, which in turn affects volume of production and the financial resources of the company. Price policies therefore play a vital role in the growth of a business. However, what must be emphasised at the outset is that these policies are not static and do not "imply some formula which can consistently be enforced against the market but serves as a guide to
pricing decisions which is rested on an appraisal of underlying market forces. These policies should be clearly written down and underlying purpose of the policies indicated.

Organisational goals and pricing policies - The pricing policies that will be followed at any point in time will to a large extent depend on the goals that management, on behalf of the corporation, considers as relevant and be given priority. Thus a new firm desiring to establish itself in the industry will follow a pricing policy that will assist in gaining this objective. In such circumstances a penetration price policy (that is, pricing the product at a low competitive price) assisted by effective sales promotion and advertising policy may be desirable. However, in the case of a company well established in the industry, the objective may be to maintain its place in the industry and make a sufficient rate of return on capital invested. The price policy of such a firm no doubt depends on the nature of competition that presently exists, the relative strength of the firm in the competitive market (that is, is it strong enough to maintain its own price differentials or does it simply accept price as given) and the type of product it is marketing.

It is generally accepted in current management literature that an organisation has more than a single goal to achieve. If there is an overall objective, it may be the desire to survive and prosper. Peter Drucker, the well-known economist and management consultant, outlined eight areas in which objectives of performance and results have to be set: market standing, innovation, productivity, physical and financial resources, profitability, manager performance and development, worker performance

and attitude; public responsibility. 128

Traditional economic price theorists have to a large extent based their analysis on the objective of profit maximisation and it is not uncommon to assume that price policies were determined with this objective in mind. However, many modern writers have modified this concept of profit maximisation to one of a satisfactory rate of return on investment. The move towards a satisfactory return as a profitability measure is largely attributable to the existence of uncertainty of demand, costs and competitors' reactions. Firms have to operate within such constraints and rationalise their actions within this boundary of constraints. This is referred to by H.A. Simon as "bounded rationality". 129

Neil Chamberlain expresses the following view which can be considered as representing a consensus of opinion on profit objective and pricing:

"The posing of such a profit objective, and the determination of a general price policy designed to assist in achieving it, implies a degree of managerial discretion, an area within which management can freely move around to decide how price can best be manipulated to gain its goal. The posing of a profit objective does not, of course, itself provide discretion in pricing. It constitutes a challenge to management to move within the market forces which bound its discretion, the competitive elements which constrict its judgment, with as much ingenuity and skill as it can muster, to come as close to the target as it can." 130

He raises another interesting point with regard to target rates of return which confirms the view that profit need not necessarily be the objective in pricing policies:

"The profit objective may be held to, but actions other than those in the field of price may be undertaken to realise it - a new promotional program, redesign of the product, substitution of


130. op. cit. p. 192.
one product line for another, pressures for radical cost reduction, at times a target rate of return may be set which cannot possibly be achieved at going prices, not in any expectation that price levels can be altered, but to spur the organisation to greater efficiency. In these instances the continuing failure of price levels to yield target rates of return cannot be construed as a failure of price policy. The intent is for the organisation to become efficient enough to realise the rate sought at the prices prevailing.  

Irrespective of the existence and significance of other goals, the profit objective is generally well featured in the hierarchy of goals largely because it serves three major purposes which according to Drucker are:

1. it measures the net effectiveness and soundness of a business's effort;
2. it is the 'risk premium' that covers the costs of staying in business - replacement, obsolescence, market risk and uncertainty. Seen from this point of view, there is no such thing as 'profit'; there are only 'costs of being in business' and 'costs of staying in business'. And the task of a business is to provide adequately for these 'costs of staying in business' by earning an adequate profit;
3. profit ensures the supply of future capital for innovation and expansion either directly, by providing the means of self-financing, or indirectly through providing sufficient inducement for new outside capital in the form in which it is best suited to the enterprise's objectives.

In some cases volume goals guide the pricing policy. The desire to be a market leader, by occupying a large share of the market, may induce a company to follow a price policy where profit objective becomes secondary and is lower than can be achieved at some lower volume of sales. However, this policy may still be within the constraints of the profit objective mentioned above. Firms that seek share expansion through price must consider demand, competitors' reactions, governmental attitudes and the

effect on the channel of distribution. Inelastic demand can make the effort futile, competitive matching can cancel out share increase, and price discrimination charges not infrequently follow successful price promotions. A non-price strategy via sales promotion, or indirect price strategy via increase in dealer discounts could be a way towards increasing market share.

Another goal often sought by companies is one of establishing 'a good name' for the company. Here both existing customers and the public who are potential customers, have to be convinced of the good image of the company. Thus customers have to be satisfied that their interests are being well served by fair deals, good deliveries, good quality, etc.

The desire to fully utilise the physical and management capacities may also shape the price policy. The existence of idle capacity can be viewed unfavourably on the part of management. Thus the price policy should be such that will fully utilise the plant's capacity. However, such price policy will have to consider the constraints placed by other goals such as profit.

Another factor which guides price policy is the scarcity of resources used. In New Zealand because of the import restrictions placed on the acquisition of raw materials, prices of manufactured goods using these raw materials reflect this constraint.

Stable price policy - It is not uncommon to find that firms are reluctant to change prices frequently. As long as there are no marketing difficulties and a satisfactory profit is earned, firms are inclined not to make any major and significant changes in their prices. If difficulties occur, the tendency is more towards adopting non-price actions. Some of the reasons for this attitude can be explained as follows:
1. Fear of competitor's reaction, resulting in a price-war, which finally benefits none of the producers.

2. Lack of knowledge of demand elasticity - if the reduction in price does not succeed in bringing a sufficiently large share of the market, it would be quite difficult to revert to old prices, thus resulting in lower profits or even losses.

3. Fear of consumer's reaction which can result in loss of confidence in the company. Generally, consumers become wary of firms that change prices frequently, e.g. if a firm had high initial prices, and subsequently begins to lower it, consumers may feel that they have been exploited initially and may react by abandoning the company's product, though it is priced low.

4. Administrative problems and the expense incurred to alter prices may also deter frequent price changes. Price lists, packs and outers of all kinds, and often promotional materials and catalogues have to be printed with new information and prices. The cost of doing all this plus the cost of waste resulting in abandoning existing literature and other promotional material, could conceivably exceed the advantages of making a price change.

5. Retailers generally don't like frequent price changes as this upsets their existing pattern of mark-ups and also the cost of changing price labels and, most important of all, explaining to customers the new prices and having to endure mild abuses, etc. from them.

Irrespective of the reluctance of the producers to change prices, sometimes necessity may force the issue on to them. This necessity arises when there is a general increase in costs of labour, materials and other services. Since this general increase in costs will be felt by all producers, it can be assumed that sooner or later all producers will have to revise their prices.
Product life cycle and price policies - Every product introduced into the market has a life cycle. Some of the products may have a very short period of popularity whilst others take some time before they reach the stage of maturity. Throughout this life cycle of the products, changes occur in demand, cost and promotional strategies. The price policy developed for the products has to consider these changes.

Products with qualities of lasting distinctiveness usually have a long life period. Such products are introduced to the market with the hope that the consumers' preference will grow with time. To achieve this, a penetration price policy may be adopted. This price policy is desirable under the following conditions:

(i) when sales volume of the product is very sensitive to price even in the early stages of introduction;

(ii) when you can achieve substantial economies in unit cost of manufacturing and distributing the product by operating at large volume;

(iii) when your product faces threats of strong potential competition very soon after introduction;

(iv) when there is no 'elite' market - that is, no class of buyers willing to pay a higher price to obtain the newest and the best.\textsuperscript{133}

The low penetration price is used to discourage your competitors as well as to attract your customers. However, we must be cautious of the life expectancy of the product. If the product's life is shorter than expected, then the revenue from it may not be sufficient to cover your initial high investment in research and development and other capital investment incurred.

Products with qualities which last for only a short period are generally marketed on the basis of a skimming price policy. The uniqueness

may be shortlived because the production costs may be low and the functional value novel rather than being real. Thus competitors can easily move in with very close substitutes. In order to recover your costs, and to be rewarded for your idea, high initial prices are necessary to reap the profits while the 'going is good'. This price policy can be pursued if:

(i) sales of the product in the initial stages is less sensitive to price (that is, price-inelasticity exists in the early period) than in later stages when it has grown fully;

(ii) uncertainty of demand in the long-run exists;

(iii) technological development will soon turn the product obsolete.

As mentioned earlier, products go through a cycle of (i) initiation, (ii) acceptance, (iii) maturity, and (iv) decline. When products reach the stage of maturity, the firm will have to reconsider its price policy if it wishes to continue the product. Generally, at this stage, extensive promotional efforts are carried out to prolong the maturity period. In other instances, firms will have to withdraw the products when their demand declines, and introduce new products in their place.

Economic theory and pricing policies - The role of economic price theory is to throw some light on the social and economic desirability of various price policies. However, many of the strategic variables basic in any price policy formulation are often not incorporated in the theoretical price models. This sometimes leads businesses to dismiss economic price theory as irrelevant to business reality. To do so, however, is to lose much of the knowledge that can be gained through a study of economic price theory. The concept of price leadership, product differentiation

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134. Dean, op. cit. p. 166, defines maturity in terms of (a) technical, (b) market, and (c) rivalry.
and its effects, demand analysis, and marginal analysis elucidated in economic theory are useful in the formulation of practical price policies. The following are brief summaries of different market situations that influence economic price theory:

(i) perfect competition - here the assumption is that there are many firms selling a homogenous product and there are many buyers who are knowledgeable of the prices. Thus no single seller or buyer can influence the price. Price is determined by the market and is taken as a given factor. To maximise profits, the seller sells up to the point where his marginal cost equals the marginal revenue. If marginal cost is lower than average cost excess profits will be made, thus attracting more firms to the industry. This finally results in marginal cost being equal to marginal revenue and to average revenue (that is MR = MC = AR = AC). This kind of market structure has very little application to the world we live in and therefore will be ignored in our study.

(ii) monopoly - here a firm is assumed to have a firmly entrenched position in the market and sells a product with few, if any, close substitutes. Here the monopolist will produce up to the volume where his marginal cost equals marginal revenue. Beyond this volume, his profits will decline. The practical application of this theory is again limited under present circumstances where governments have instituted laws against large cartels or combines. Furthermore, the assumption of a few, if any, close substitutes is seldom valid since technological development of recent times have introduced a variety of products which are close substitutes.
(iii) monopolist competitors - here the assumption is that there are many small firms operating in the market offering products with varied differentiation, for example, brand names, quality, packaging, etc. The existence of differentiation allows the firm a certain degree of freedom in setting prices and any change in price by an individual seller may not result in similar actions by others and thus not affect his sales volume significantly. However, an important aspect of monopolistic competition is not the use of price as a vehicle for increasing sales revenue, but the use of non-price strategies such as advertising, promotional activities and after sales service. Effective advertising brings forth to the public the existence of product differentiation and an attempt to sell the non-price factors of the product is generally the theme of such activities. One has only to view some of the television and newspaper advertisements to realise this. This sort of market structure lends heavily to the application of varied marketing strategies. Here again profit is maximised at the point where marginal cost equals marginal revenue. The theory of monopolistic competition most probably approximates and reflects the majority of our market operation.

(iv) oligopoly - the assumption here is that there are a few sellers in the market, and though their products are differentiated, each seller is fully conscious and takes serious notice of his competitors' actions.

(v) price leadership in the market - it is quite common to notice how the actions taken by one seller regarding his price is quickly followed by others in the market. This reflects the existence of a price leader who attains this position either by his large size and dominance or by the excellence of his management which is
reflected by the ability to notice significant changes in demand and supply conditions. The latter type of leadership is commonly known as 'barometric price leadership'.

It is admitted that economic theory is not prescriptive for business decisions. Its value lies in its logical analytical exposition of basic fundamentals. However, here are certain limitations in the simple exposition of price theory that one has to be aware of:

(i) the objective of profit maximisation is a primary assumption in the theory. As was pointed earlier, this is a non-operational concept in a world of uncertainty and continuous change. To maximise, you must have a clear knowledge of demand, supply, costs and various psychological factors that influence consumer's preference. Perfect knowledge of such variables are unknown to exist. Thus economists like Baumol\(^{135}\) have attempted to structure a theory based on maximising sales subject to the constraint of some minimum necessary profit. Besides maximising sales as a goal, other theories can be built on different goals depending on how far the company has progressed in its growth and within constraints that may exist;

(ii) generally, a single product is assumed in the economic analysis. However, this is far too simple a situation when in reality multi-product firms exist. Problems of joint costs, changing production and sales-mix, and changing technology have to be considered. The existence of such problems have brought into the study of price the use of linear programming and game theories;

(iii) marginal analysis is the basic fundamental tool for economic price theory. However, in reality it is hard to ascertain marginal cost

and marginal revenue with varying output. On this issue, Samuelson comments:

"Realistically speaking, we must recognize that modern business firms - even the largest - cannot accurately determine marginal revenue and marginal cost. They cannot determine their optimum price and output with nice exactitude. Yet the day's work must somehow get done. Prices must be set on the products. Here is where average or unit costs often play an important role." 136

Role of cost in pricing policies: We have noted in the past sections of this chapter that pricing policies are to a large extent a function of organisational goals, product characteristics and market structure. These constraints, whether they be self-imposed or originating from external factors, restrict the price policy and pricing method to adopt. Although it may be argued that prices are set independently of cost, knowledge of cost is still primary information in deciding whether certain prices are acceptable. All will recognize that if a business is to survive in the long run, the revenues must be sufficient to cover all costs, plus a return on investment. This return should be sufficient to cover risk that may be experienced in the business plus a margin representing the profit forgone on a riskless investment. The National Association of Accountants Research Report No. 24 on Product Costs for Pricing Purposes, maintains that:

"Costs are an important aid to management in making pricing decisions even though the costs by themselves do not constitute all the information needed. Moreover, the importance of product costs in pricing depends upon the circumstances." (p.3)

There are different ways by which cost can influence pricing decisions. Furthermore the significance of cost is valid for both the price-setter and the price-follower. Some of the instances in which costs play a part in pricing are as follows:

(i) where an established market price for the product does not exist, cost plus the mark-up aids in establishing the price. However, it must be noted that besides cost, volume of sales desired and the elasticity of demand for the product have to be considered when establishing the price. What has to be kept in mind is that the price will have to cover both direct and indirect costs in the long-run as well as a profit margin sufficient to compensate the risk taken and a return on a riskless venture;

(ii) cost may set the lower limit to price. If the costs cannot be recovered, the product will not be offered;

(iii) where price is established by custom or competition, cost helps to tailor the type of product that can be offered at the prevailing price. This is often referred to as 'product tailoring';

(iv) where price is established by custom or competition, knowledge of costs will help management to decide how best to direct its efforts to better the profit goal.

(v) measure the effects of proposed prices on costs in the short-run.

Here the essential role of cost in pricing is based on cost-profit-volume analysis.

Overhead costs and pricing policies\textsuperscript{137} - The relevance of overhead costs to pricing can be explained by reference to two schools of thought: (a) marginal or variable cost pricing and (b) full-cost pricing. Both schools accept the usefulness of variable overhead costs in pricing, but they contest the relevance of fixed (committed) overhead costs.

\textsuperscript{137} With reference to the relevance of overhead costs for setting product prices the survey questionnaire revealed 48 firms considering it to be very significant whilst 16 considering it to be partly relevant. This confirms that firms do take seriously the allocated overhead costs for price setting.
Accountants using the variable costing approach have tended to rely on the economist's concept of marginal cost. This is fallacious to the extent that:

(i) the economist's concept of marginal cost is one related to rate of change. It is the slope of the total cost curve of the firm. It may be that this rate of change may reflect changes in variable costs, but it could also include certain costs which are defined as fixed costs by the advocates of variable costing;

(ii) the economist's marginal cost includes both explicit and implicit costs, whilst that of the variable costers includes only the explicit items.

Irrespective of the above differences, accountants have approximated their variable costs to be representative of the economist's marginal cost. This, within a limited range of activity, is a valid assumption. Some of the assumptions underlying the marginal cost price theory can be said to be as follows: 138

(i) the firm aims to maximise profits,

(ii) it produces a single and differentiated product,

(iii) the plant capacity is considered to be indivisible, and production is increased by increasing variable factors thus resulting in the law of diminishing returns,

(iv) firm has a perfect knowledge of cost and demand conditions, hence no problems of risk and uncertainty.

Based on these assumptions, the economist maximises profits at a point where marginal revenue equals marginal cost. Similarly the accountant will

establish his price at the level of output where his contribution margin, that is, the difference between revenue and variable costs, is at its peak. Most marginal and variable costers would look at their theory as being very useful for short-run pricing policy. However, John Sizer\(^{139}\) suggests the following reasons for the use of marginal costs and its significance for both long-run and short-run pricing policies:

(i) The prevalence of multi-product, multi-process and multi-market concerns makes the absorption of fixed costs into products absurd. Changing market conditions, product-mix, etc. are best met with by marginal cost pricing;

(ii) In many businesses the dominant force is innovation combined with constant scientific and technological development; thus the long-run situation is often highly unpredictable. Therefore to argue that normal capacity absorption costing is more satisfactory for long-run pricing is to miss the point, for it is doubtful whether it is useful to think in terms of the long-run in view of these characteristics of modern business. Only by maximising in each short-run will profit be maximised in the long-run.\(^{140}\)

(iii) Many branded products go through a product life cycle. At each stage of this cycle management meets with problems of changing demand as a result of product differentiation and other factors. Management must have relevant cost information to assist it in determining the correct combination of price, advertising, product improvement, product differentiation, etc. for each stage of the cycle. They require short-run marginal cost and separable fixed cost data relevant to that stage of the cycle, not long-run absorp-


\(^{140}\) Also see Laimon, S. "Cost Analysis and Pricing Policies" in Cost and Management, September 1961, p. 360.
It appears that Sizer's first reason would warrant a cost-price analysis for the firm as a whole and not on a product basis (because of the existence of multi-products) but then the third reason supports the need to know variable product cost and separable fixed costs. Here we must point out that the problem of allocation exists for some of these variable costs and any criticisms levied by marginal or variable costers over the allocation of fixed costs tends to fall aside. Sizer overcomes the criticism levied by advocates of absorption costing who suggest the need for allocating fixed costs, by suggesting that with marginal costing the fixed costs can be allocated to products or product groups at least once a year for profit planning purposes. Direct and common fixed costs are distinguished and allocated in total to the planned volume and sales mix. They are never unitized. These allocated costs shown in total are expected to be sufficiently informative for decision making.

It should be noted that the framework as shown in Chapter 7 would suit the information requirement of Sizer's suggestion.

The following cautions must be observed in adopting marginal cost pricing -

(i) the general adoption of marginal cost pricing may lead to a situation where products or jobs are being priced below their full cost, thus resulting in a practice which may be hard to forgo and causing long-run losses rather than profits.

(ii) accountants who use variable costs to approximate marginal costs of the economists may classify certain variable costs as fixed, thus resulting in inadequate recovery of total costs incurred. What should be considered is the incremental costs. The difference between variable and incremental costs is that some of the cost items in the incremental category are considered as fixed by the variable costers.
(iii) overemphasis by accountants on the contribution margin may result in an oversight of the utilisation of plant and management capacity. These vital resources may be occupied by uneconomical products and possible further increase in overheads may arise to meet increasing demand.

(iv) the objective of long-term profitability may be ignored for reasons given in (iii) above. However, the variable costers may counter this argument by saying "we do consider the profit objective by ensuring that the contribution margin covers the fixed costs and leaves a sufficient margin for return on capital (variable, fixed or total?)." If the capital considered is variable, then there seems to be no necessity to have incurred fixed capital in the first place! If the capital is defined as both fixed and variable then this reverts to the full cost concept.

(v) constant price changes to exploit changes in demand may prejudice the firm's long-term interests: Barton, on the theory of marginal cost pricing, succinctly concludes:

"The marginal theory is patently unrealistic and as a result its power to make prescriptions for the operation of firms in reality is somewhat limited. Its major value lies in some of the principles of rational analysis which it demonstrates such as the use of the marginal principle in weighing up costs and benefits of a particular decision, cost-price-volume relationship, and the significance of both cost and demand conditions in price and output policies. However, the theory can be extended to cover more realistic conditions which involve many products, time, uncertainty and retaliation by competitors. The same principles of rational analysis can be applied in these situations, although the analysis does lose much of the precision that is characteristic of simple marginal theory." 141

The debate over the validity of full cost pricing came into prominence with the work of Hall and Hitch\(^{142}\) wherein the authors, after questioning businessmen, came to the conclusion that full-cost rather than marginal cost analysis was used for pricing by the business world.

The full-cost principle maintains that firms when setting their prices use average unit cost of products as the base. When discussing this principle there are two methods of full-cost pricing that can be looked into - (i) rigid full-cost pricing, (ii) flexible full-cost pricing.

Under rigid full-cost pricing, firms add an established mark-up on the calculated full-cost. Generally this full-cost is comprised of direct costs plus an allocated portion of manufacturing overhead cost (refer to Table E). The mark-up is thus expected to be sufficient to cover non-manufacturing costs plus the desired profit margin, that is, return on capital investment. The advantage of this method is that it is simple and expedient to the price-setter. Furthermore, top management or the top marketing management, having established this policy and the mark-up percentage, can leave to the junior staff the job of charging prices. Again, where firms have no notion of their individual demand curves (for example - an entirely new product) this approach seems justifiable.

This method is a direct challenge to the principles of the generally accepted economic theory of price. Thus the method is criticised because (i) it fails to consider demand and supply conditions; (ii) it considers price as a function of cost; (iii) it overlays the precision of allocation of overhead costs; and (iv) it ignores the goal of profit maximisation.

These criticisms can be overcome if we look at the environment in which the company operates, the nature of the products sold, and the significance of fixed overhead costs.

The criticism that it ignores profit maximisation has already been dealt with earlier. It was maintained that firms in general work out their desired rate of return as the profit goal and use this in their pricing formula. The mark-up on cost is generally calculated as follows:

(i) establish a 'normal' rate of production based on the long-run potential of the business.

(ii) establish the annual total costs involved for the 'normal' rate of production. Total costs involves all costs in the production and distribution of the product.

(iii) work out the 'normal' capital employed.

(iv) the ratio of (iii) to (ii) gives the rate of capital turnover.

(v) determine the desired return on capital employed. This is a difficult task and involves an analysis of opportunity cost and risk.

(vi) the rate of capital turnover multiplied by the desired return on capital gives the mark-up per centage on unit cost.

In applying the above approach to a multi-product firm, problems of allocating common costs to products arise. This is one obstacle in attempting to arrive at a mark-up for different product-line and one has to be conscious as well as cautious when allocating the common costs. Besides the existence of multi-products, the question of ignoring competition and demand for the product arises. To overcome this, flexible mark-ups on full-cost has been suggested.

Flexible mark-up on full-cost involves the separate calculation of mark-up on cost for each product or product-line. These mark-ups can be varied for each product or product-line by taking into account different
market situations for the products or product-line. It may be that manage-
ment finds it can earn more on Product A to cover the lower return on
Product B and so on. Management thus uses this approach to achieve its
desired over-all return. If competitive situations are such that the profit
goal may not be achieved, management may revise the goal accordingly. What
must be stressed here is that though the method involves cost allocations,
management is fully aware of this and the formula pricing is used as a
guide rather than an established price. Furthermore, with the aid of
cost-reduction techniques, product redesigning and other innovations,
management can attempt to achieve sufficient sales revenue from which it
can deduct the costs and thus achieve its profit goal.

One of the significant points to note in multi-product firms is the
use of fixed factors of production which are frequently divisible. Further-
more, many of these fixed factors of products may be of general purpose
rather than of specific purpose. Without much difficulty many of the
equipment could be altered to produce different lines of product. In
fact, in some cases this is necessary since demand for a particular
product may not be sufficient to warrant the installation of a specific
purpose equipment. The divisibility of the factor production allows cost
savings and thus some fixed costs can be avoided. Barton comments:

"The fixed factors may, therefore, have an opportunity cost which
is external to the firm as in the first instance where outlays
can be avoided, or internal as in the second instance where they
can be used on alternative project within the firm."\textsuperscript{143}

It should be noted that fixed factors of production need not
necessarily have opportunity cost in all circumstances.\textsuperscript{144} In the
following circumstances fixed overheads have opportunity costs and should b
be considered together with other variable costs in the pricing formula:

\textsuperscript{143} op. cit. p. 118.

\textsuperscript{144} See Barton \textit{ibid.} pp. 118-123.
(i) when a multi-product firm is producing to capacity and the fixed factors can be used for the various products. Here it is necessary that management be fully conscious of the opportunity cost of the fixed factors and should concentrate on products that bring in the greatest revenue with least use of the fixed factor;

(ii) when a firm is operating in an oligopolistic or monopolistic market condition and finds it relevant to follow a long-run pricing policy. Many of the fixed factors of production during this long-run can be avoided or used for alternative needs;

(iii) when excess capacity is needed and additional fixed factors are purchased.

However, where the above conditions do not exist as in the case of:

(i) where the multi-product firm has an over-all excess capacity due to general demand conditions;

(ii) where the firm operates as a monopolist and can set its own prices;

(iii) where the firm is unable to set prices and has to accept prices set by a price-leader.

(iv) where production and distribution period is shorter than the contract period of hiring and committing fixed factors, then the company then the company should not blindly use full cost for pricing.

Since fixed overhead cost may or may not be valid for pricing, it is essential that management be supplied with product cost information showing clearly the direct variable costs, allocated variable costs, direct committed (fixed) costs and indirect or allocated committed (fixed) costs. Management thus will be well equipped to decide on the pricing policy and price to set on the various products and product-line.

Summary - Product pricing is a complex task. There are so many variables to be considered that no single formula or policy can be adopted. The formulation of pricing policies has to be considered both within the
context of organisational goals and market peculiarities prevailing for each product or product line.

Within these constraints pricing policies are formulated and prices set. However a significant factor that does decide whether the prices set are acceptable or not, is cost. Cost must be recovered before profits can be accounted for. But what is the cost of the product for ascertaining whether the price set is acceptable or not? Should it be the marginal (incremental) cost or the full cost which includes the share of fixed overheads? The answer to this question depends on whether the fixed overhead cost allocated to the product has any opportunity. Where an opportunity exists, the fixed overhead cost is a relevant product cost for ascertaining the acceptability of product price. Thus it becomes necessary that when providing information of the average unit cost of a product, the average cost is broken down to show (i) direct variable costs, (ii) indirect variable costs, (iii) direct fixed costs, and (iv) indirect fixed costs. Knowledge of these does assist management to know the relevant cost for its decision, whether it be to accept or reject an order price from a customer, or a make or buy decision. Management needs to know both avoidable as well as opportunity costs for its decisions. It is maintained that the overhead accounting framework presented in Chapter 7 does give assistance in knowing these information.
CHAPTER 9.

SIGNIFICANCE OF FIXED OVERHEAD COSTS IN INVENTORY VALUATION FOR EXTERNAL REPORTING

Introduction: The valuation of inventory for financial reporting is part of the overall problem of valuation in accounting. Accountants have traditionally maintained that their financial statements are not based on values but on costs as recorded in their books — that is, the historical costs. However, these financial statements have come under severe criticisms from business economists, many accountants and businessmen. The criticisms cover a wide range of topics such as (i) the lack of information to shareholders, (ii) manner of presentation, (iii) non-disclosure of information necessary for investors and investment analysts, (iv) the failure to give appropriate emphasis to the future, (v) the use of conflicting accounting rules, (vi) the failure to reflect value of assets etc., (vii) the failure to reflect the significance of price-level changes.

All these criticisms can be simply stated as a criticism of the Information provided by the financial statements. It should be noted that published financial statements are governed by the Companies Act and to a large extent the information provided is the result of applying certain accounting principles' or rules, which at times conflict with one another.

It is not the purpose of this chapter to formulate a general theory or any theory of accounting. To do so is presumptuous on my part. Furthermore, there has yet to be an agreement by writers of accounting that there is a single applicable theory to follow. Thus what will be done in this chapter is to discuss within the traditional boundaries of accounting the significance of fixed overhead costs in inventory valuation for external reports. In order to do so, the following discussion will ensue:
(i) the need for external financial reports;
(ii) the nature of information to be provided by these financial reports;
(iii) the effect of 'going concern' and 'realisation' assumptions on the information presented;
(iv) valuation in accounting and its effect on accounting;
(v) cost or market rule;
(vi) price-level changes.

The need for external financial reports: One of the requirements by the Companies Act of a public company is the publication of the annual balance sheet and profit and loss statements. The traditional purpose of these financial statements is to provide shareholders with the following information - (i) the trading results or profitability of the company during the period reported on, and (ii) the company's financial position. However, it is not only shareholders who are interested in the company, but others as well - creditors, employees, the government's revenue department, investors and investment analysts. All these people need financial information for certain special purposes of their own and their needs cannot be ignored.

The nature of information to be provided by the financial reports: We noted in the previous section that besides shareholders, there are others interested in the company. Thus a discussion on the nature of information to be provided by financial reports depends on the needs of the users.

The shareholder is expected to be interested in how well the company has performed in the last period, what dividends the company intends to declare, what earnings per share were earned, what reserves are being accumulated for future growth, what are the company's future policies.
Thus the shareholder is interested to know the future potential of his shareholdings. The information should be orientated towards the assessment of the future potential. It may be questioned as to whether the value of assets of the company has any relevance to the shareholder who holds fully paid shares. It is suggested that the only vital information a shareholder as an investor should look for is the earnings per share and his expectations of the company's future potential based on information provided. However, it may be argued that the valuation of assets is an integral part of income (earnings) measurement, and therefore is vital to the shareholder's decision to hold his shares. The question of valuation will be deferred to a subsequent section.

Company creditors are generally interested in the security of their loan. As such, the vital information for them is the current value of the assets held. This current value could mean the liquidating value.

Employees and tax authorities are generally interested in the earnings of the company. Thus we see trade unions negotiating for a fair share of the company profits and trying to tie up their wages to company's profits.

Considering the above classes of users of published accounting information, it may be stated that the information these reports should provide are the earnings and the current value of the company.

The effect of the 'going concern' and 'realisation' assumptions on accounting information provided in the external reports: If one were to survey any introductory text on accounting, it will be found that all of them assume the firm or accounting entity as a going concern. However, no exact definition or clear explanation has been forwarded as to what is meant by going concern. The American Accounting Association maintains "in the absence of evidence to the contrary, the entity is viewed as
remaining in operation indefinitely."145 However, this statement has
been critically evaluated by two writers - Fremgen146 and Sterling147.
Fremgen maintains that to assume continuity of an entity because of lack
of evidence of liquidation is sterile. He maintains that it is necessary
to establish evidence that a firm will continue rather than merely
assuming it to be so (p. 650). Sterling, similarly, maintains that the
going concern concept ought to be changed from an assumption to a
prediction (p. 494). The assumption of 'going concern' immediately
discounts all probability of liquidation, and that this must be recognised.
If going concern is a prediction, it may be questioned whether such should
be allowed in accounting which traditionally attempts to avoid futurity
in its framework. For this reason, Chambers148 in his book, argues in
favour of an orderly liquidation as being a more useful assumption. On
the other hand, several other writers have considered that firms do
replace their assets and grow and that this is compatible with the going
concern assumption.149 However, Sterling maintains that the replacement
of assets itself is a liquidation process (p. 487) even if the firm as a
whole may be assumed to continue.

145. Accounting and Reporting Standards for Corporate Financial Statements
and Preceding Statements and Supplements, (American Accounting
148. Chambers, R.J., Accounting, Evaluation and Economic Behaviour (Engle-
149. See Ladd, Contemporary Corporate Accounting and the Public, (Richard D.
Irwin Inc.) pp. 55-56; Sprouse, "The Measurement of Financial Position
and Income: Purpose and Procedure" in Jaedicke et al, Research
Accounting Measurement (American Accounting Association 1966) p. 113
It can be noted from the brief survey that no single definition has been clearly accepted. Most writers have defined the going concern to suit their own arguments for asset valuation. Traditionally, accounting writers have tried to justify the use of historical cost with reference to the going concern assumption. There seems to be no logical connection between historical cost and going concern. Fremgen maintains that the two notions of historical cost and going concern are essentially separate and there is no causal relationship between them (p. 65). Sterling maintains that the arguments for historical cost valuation are confused and unsound when put in the context of a going concern (p. 489).

It appears that one of the vital factors for valuation in accounting is the need to assume the life of the firm or accounting entity in question. Thus Moonitz in his Basic Postulates of Accounting considers business continuity as a postulate; Chambers, in his book, cited earlier, relies on an orderly liquidation; and Sterling in his article relies on the liquidated firm as necessary to measure the true income and position of a firm. Thus it appears that we can not simply reject one and accept the other. It has been argued in management studies that the overall objective of the firm is to survive and prosper. It appears to be a rational assumption especially when one considers that most managers owe their existence to the survival of the organisation, not liquidation of it. Chambers' idea of an orderly liquidation is not contrary to the idea of other writers who maintain that going concern is compatible to the replacement process carried out in business. Thus it is maintained that the going concern is a rational assumption to be considered for valuation in accounting.

Another assumption that is brought into accounting measurement is that
of realisation. Storey\textsuperscript{150} maintains that this assumption is of more recent development than that of going concern. The realisation assumption affects the revenue measure and thus the profit. How the realisation assumption is interpreted affects not only the profit measure but also the value of inventories in the balance sheet. A point to note at this juncture is the difference between revenue realisation and revenue earning. It is maintained by several writers that revenue is earned throughout the process, but the realisation of it is something different. Realisation means the formal recording of the revenue into the books of accounts. Thus if revenue is realised at point of sale, then the inventories will be valued at cost. If revenue is realised throughout the production or when production is completed, then inventories will be valued at net realisable value, that is, sale price less expected cost of disposal. However, net realisable value could mean the current prevailing market price less cost of disposal, or the price in the anticipated market less cost of disposal.\textsuperscript{151} Where inventories are valued at cost, the traditional approach has been to interpret cost to include all costs incurred to bring the product to its present state. However, when cost is lower than the market price, it is recommended (based on the rule of conservatism) that the inventories be valued at market price. Here market price means the net realisable value.

It can be noted from the above discussion that both the going concern and realisation assumptions affect the information provided for external reports. Traditionally historical cost has been tied to the going concern assumption. However, it has been shown that there is no logical connection


between the two, though going concern is a rational assumption relevant for 
accounting valuation. The realisation assumption affects both the income 
measure and the balance sheet, through the measure of revenue and the 
value of inventories.

Storey maintains:

"The area of complementarity between the realisation and going concern 
convention lies in the area of fixed assets, whereas the area of 
basic conflict lies in the area of current assets. ........ 
Inventories, marketable securities and other current assets can be 
valued at net realisable value under the going concern rule and at 
cost under the realisation rule. ........ 
It is the realisation convention and not the going concern convention 
which requires valuation of inventories at cost. Realisation is, 
therefore, the most important convention in the determination of 
income and the valuation of assets at the present time."152

At this point, we will turn to the next section on value concepts and 
attempt to establish a cost basis for valuation of inventories.

Valuation in accounting and its effect on accounting information: Valuation 
in accounting is dependent on the concept of value that is adopted. There 
are several concepts of value, each with its own assumptions. Value can 
be expressed in psychological, economic or ethical terms. To illustrate 
the above statement, let us take a nude painting of a well known artist. 
To some, the possession of this painting gives them immense pleasure which 
cannot be expressed in any economic scale. To someone else, the painting 
has immoral and evil overtones and thus the ethical value creeps in. To 
another person, the painting is considered an investment and has an economic 
value which is far more important than the psychic or ethical values. The 
concept of value that will be discussed are economic ones since valuation 
in accounting is the process of assigning numerals (monetary units of value) 
to the object or event according to certain assumptions in order to express 
preferences with regard to particular action.153

152. op. cit. pp. 237-238.
153. See Mattessich, R., Accounting and Analytical Methods, (Homewood, 
Exchange values: Hendriksen maintains that for accounting, the valuation should be based on exchange or conversion values. Mattessich clearly outlines why the subjective value theory of traditional economics has been rejected by accountants and business economists as a general valuation basis. He points out the various criticisms over the assumption of profit maximisation which features paramountly in the theory. Furthermore, the failure of various direct measures of marginal utility resulted in reverting to an indirect measure - that is, to use price as a measure of value. Thus, instead of using marginal utility to explain price, price is used as a measure of marginal utility.

Exchange or conversion values can be expressed in terms of output values or input values. Taking output values first, this can refer to (i) discounted future exchange value, or (ii) current exchange value. Discounted future exchange value of an object is the present value of future earnings discounted by probability and interest factors. To make this process of valuation operational, we have to know the length of life of the object, the future earning and the discount rate. Uncertainty affects all three factors. Furthermore, what discount rate to use is another unsolved problem. If we could overcome these problems the method of valuation is conceptually sound, since it maintains that the value placed on an object should reflect the present value of its future earnings. Some writers would recognise this as the going concern value. However, criticisms have been levelled at this method of valuation because (i) the sum of the value of individual parts of the firm need not equate the value of the firm as a whole, (ii) it is difficult to separate and identify what earnings are contributed by each of the various parts of the firm. This value concept is

154. op. cit. p. 199.
155. op. cit. Chapter 5.
not applicable to inventory largely because inventory is classified as a current asset.

The more relevant output exchange value for inventories is the current exchange value. This current exchange value is generally referred to as the net realisable value. We have pointed out earlier that net realisable value is subject to two interpretations. The general interpretation is the sale price less disposal costs in the anticipated market. This method of using current exchange value for inventory valuation has been greatly emphasised by many modern writers. Sprouse and Moonitz recommended that:

"Inventories which are readily salable at known prices with negligible costs of disposal, or with known or readily predictable costs of disposal, should be measured at net realisable value (i.e. anticipated sales proceeds less costs of completion and disposal)... Measurement of inventories at net realisable value is the preferred method whenever the measurement is objectively determinable." ¹⁵⁶

However, the use of current exchange value results in recognising profit before the goods are sold. There are writers who criticise this valuation process because it violates the realisation assumption. Thus Morton Backer comments:

"It is very doubtful that businessmen or their accountants would be willing to recognise revenue, except under very special circumstances, prior to the sale of products .... Under this method, income also would tend to be relatively higher during periods of depression when large stocks of unsold products are on hand... Finally, if the argument that revenue accrues throughout the production cycle is valid, consistency would seem to dictate that accrual revenue should commence with outlay of research and development." ¹⁵⁷

A point to note is that Sprouse and Moonitz recommend their method whenever the measurement is objectively determinable. Where it can not be done, they recommend the use of current replacement costs. ¹⁵⁸


recommends the use of net realisable value, although he uses the term current cash equivalent based on an orderly liquidation process. With reference to finished goods inventory he says:

"It may seem, therefore, that the current cash equivalent of finished goods may be obtained by applying the ruling resale price at the balancing date159......
... But the ruling price will, if the goods in question are sold at a profit, include the profit margin which will become income only when the goods are, in fact, sold......
... The resale price of the goods will therefore necessarily be reduced by any amount which represents this margin. But this margin is strictly a residue, it may on sale be greater or less than the expected margin. This uncertainty makes it necessary to attempt the measurement from a different direction. Resale price less the expected margin represents the current cost of the product or of the services embodied in it. This is the sum of money which at the time the firm would have to hold if it had not the goods on hand, but was in a position to acquire those goods; it represents the opportunity cost at that time of a decision already taken to hold goods. We may, therefore, take as the current cash equivalent the initial prices or services sacrificed in production, transformed to contemporary prices, and aggregated. If this sum exceeds the prevailing price of the finished goods, of course, the latter will be used, for in this case case, there is no doubt about the profit margin; there is no margin."160

It appears that Chambers' suggestions are similar to those who advocate "current replacement cost or net realisable value whichever is lower."161

Reviewing the ideas of these various writers, one cannot avoid feeling that the accountant's traditional preference for objectivity and realisation assumption constrains any 'revolutionary' recommendation of inventory valuation based on output values.

159. It appears that Chambers adopts the price prevailing in the current market rather than the anticipated market for calculating his c.c.e. It therefore appears to conflict with his idea of an orderly liquidation concept which implies the anticipated market in the ordinary course of selling the goods.

160. op. cit. p. 232.

161. See Bennet et al., Topics in Business Finance and Accounting, (Melbourne: Cheshire, 1964) p. 79 who advocate this approach.
"Input values are often assumed to be more appropriate than output values because they are possibly more objectively determined or because they do not permit the recognition of revenue before it is realised."

Accountants have traditionally accepted input values as the acceptable valuation process. However, they have interpreted input values to mean historical or original cost of input factors used in production. There are, besides historical costs, two other input value concepts - (i) current replacement cost based on the assumption that we replace the unit by buying it from another manufacturer, or (ii) current costs of each of the factors used in the production process. Both these input value concepts can be used to explain "the value to the firm" basis of inventory measurement. No doubt if the firm can purchase its finished goods at a lower cost than it can produce for itself, the management of the company may decide to stop the production of it and buy direct instead. However, in reality, the problem is far more complex than this, and it will therefore be assumed that the term current replacement costs represents the cost of input factors of production. If this were so, what cost of input factors should be used?

Chambers, cited earlier, states that the resale price less the profit margin represents the current cost of services embodied in the commodity produced. He interprets this current cost to be the direct costs of material and labour. He then outlines three classes of cost calculations:

"(i) Unit costs of material and labour directly used in the production of each product will be ascertained in terms of contemporary prices; these may be called the direct costs.

(ii) Divisional, short-run, service costs, specific to particular facilitative operations will be ascertained.

(iii) All costs which are fixed regardless of the level of operations of the period in contemplation will be ascertained."

162. Hendriksen, op. cit. p. 204.
163. op. cit. p. 250-251.
164. ibid., p. 310.
The objective of these calculations is to allow different decisions to be made:

"Direct costs, then, will be significant present knowledge as indicating the avoidable costs, in the event of abandonment of any particular product or for comparison with the avoidable costs of alternative products, given that the same ancillary services will be employed. Divisional short-run service costs will be significant as indicating the costs of facilitative services, and the avoidable costs of these services in the event of contemplating alternative ways of providing them or of substituting for them. Fixed costs will be significant as indicating the avoidable costs in the event of the consideration of long-run adaptation of processes or scale.

These separate types of decisions are in some ways linked, but they are nevertheless separable in any specific case ...

If it were to calculate all-inclusive unit product costs, it would be necessary to recalculate these costs for every possible alternative course of action ...

... A system producing total unit costs confuses the distinction between the avoidable or alternative costs in the short-run, the medium-long-run, and the long-run."165

The classification of costs and of the objectives by Chambers are useful but he oversimplifies management decisions and information needs. For example, the use of direct costs alone is insufficient to suggest the abandonment or otherwise of a product. The service facilities, both particular to the product process and common to all processes have to be considered. Product A may incur $10 direct costs, but it uses two machine hours, whilst Product B may cost $15 but uses one machine hour. Assuming both products bring in the same unit price, it would be better to produce more of B than of A. Thus direct costs alone are insufficient. Furthermore Chambers misses out the variable costs of service facilities. Furthermore to consider that only short-run avoidable costs are relevant for determining the costs of a product is to ignore the conversion value of the service as well as production facilities. It cannot be denied that these fixed facilities have an opportunity cost both in the short-run as well as in the

165. ibid. pp. 310-311.
Unitisation of these costs serves to indicate to management an approximate of opportunity costs tied up in the production process.

Cost or market whichever is lower - A further point to note regarding the cost of sacrifices incurred in manufacturing a product is that some of these costs can be lost due to a low value presented by the market price. The rule of 'cost or market whichever is lower' tends to take this loss into account. However "this loss concept has been adopted within the body of generally accepted accounting principles with little or no study concerning its basic implications to cost accounting." 167

Losses can arise from two major sources - (i) the inefficient use of material and labour resources and (ii) inefficient use of capacity. The former source of loss is well taken care of by the use of standards and standard cost techniques. Here, it is suggested that such losses from inefficient use of raw materials and labour be charged to the income of the period in which these losses were incurred. The second source of loss, that is, use of capacity, is more difficult to account as it is attributed to error in management's initial decision to install capacity. Staubus suggests that the excess supply of capacity be written off -

"It is the fixed facilities ... that should be written down below full cost. The plant embodies a bundle of potential services which based on the forecast of idleness, will expire without having a favourable economic effect on expected future costs or future revenues." 168

If the losses mentioned are dealt with in the manner suggested, then the loss difference between cost and market merely represents losses arising from (i) the product being damaged (which can be dealt with as loss arising from handling after deducting any reimbursements from the insurance company);

166. See Barton op. cit. p. 124.
(ii) the product being obsolete, in which case management may decide to abandon the product, or (iii) the result of seasonal fluctuations in the market price. Where the latter is the reason for the 'loss' reflection, it is suggested (to be consistent with the revenue realisation concept being interpreted at point of sale) that this loss be deferred until the market actually realises this at time of sale.

Problem of price-level changes — The problem of changes in the standard scale used in measurement is not uncommon to accounting or economic problems. It prevails in other social sciences as well. However, to overcome the problem of changes in the purchasing power of the monetary unit, different methods have been advocated. If we intend to account for the firm, it is suggested that we convert the historical cost of the product to current cost by converting all the resources or factors of production to a current basis. With reference to the use of current cost Gynther comments:

"If the concern is going to survive, accounting for the concern must be carried out in costs which are real and specific to it, and not in costs which are intended to reflect the general purchasing power of money." 169

With regard to the recommendation made, 170 it may be noted that current costs of materials, labour and other variable items can be ascertained quite readily from our suppliers, the labour market, service charges from public utility bodies etc. However, the current cost of capacity utilised is entirely a different matter. The calculation of current costs of capacity will involve revaluation of cost benefits derived from the use of the various capital assets. The process of doing this can be complex and

170. Note: by using this method, holding gains and losses are not recognised.
subjective. A method that may be recommended is to use the current opportunity cost of the facilities available. Thus if you had the materials, what would it cost you to convert that into a completed product by another manufacturer? The cost so charged less the labour cost and variable overhead items that would normally be incurred, will leave a balance representing the cost of facilities used by the manufacturer, plus a profit margin to him. Here again there are problems in the sense that the cost of facilities so worked out by the second manufacturer may include cost of inefficiencies and most of important of all, the overhead charge could have been based on different capacity concepts. Most probably, an average of quotations from several such manufacturers may help in overcoming these problems.

Another approach to current cost, is to adopt the current replacement cost of the product by buying it from another supplier. This we had discounted for reasons given earlier. Still another approach is to deduct the normal profit margin from the net realisable value to give us the cost. This again is inadequate representation of the company's cost to produce. Furthermore, it does not give a breakdown of the cost elements.

Summary and recommendation: The purpose of this chapter was to ascertain whether the framework outlined in Chapter 7 could be used for valuation of Inventories for external reporting. It was noted that the vital information useful to the shareholders and other interested parties were the earnings and the current value of the firm. However, in the process of calculating earnings and value, we had to consider the influence of the going concern and realisation assumptions. Furthermore, different value concepts exist. As stated early in the chapter, no attempt was to be made at formulating an accounting theory. The discussion was to be within the framework of the existing accounting system. It is maintained that though the existing framework of accounting and that discussed for overhead in Chapter 7 record only historical costs, we can use this to convert the data to current cost.
basis. However, this information based on current cost may not suit the creditors who need the current value of the assets to ascertain the security of their loan. It is therefore recommended that the external reports be prepared first on current cost basis, and in addition current values of the assets be given in the balance sheet with appropriate probability notations. When incorporating the cost of fixed production facilities, it is necessary to ascertain whether these facilities have any opportunity. Where opportunity exists, these costs should be incorporated in the current cost data.
CHAPTER 10.

CONCLUSION

The preceding chapters have shown that there is a significant role for overhead cost allocation in the areas of:

(i) product costing and income determination (including valuation of inventories for external reporting);
(ii) product pricing; and
(iii) cost control.

It is maintained that allocation of costs, revenue, assets, etc. is a major function of the accounting system which attempts to provide financial information for various needs. The lack of refinement in the process of allocation has been the major cause for criticisms of overhead cost allocation. Refinement requires:

(i) a proper and more detailed classification of overhead costs to be informative for the various needs; and
(ii) a better understanding of organisational problems of control and the role of accounting in such.

It is maintained that the preceding chapters have attempted to do these within the traditional accounting framework.

Some possible criticisms - Some readers may feel that nothing new has been said, or what has been said is rather like 'old wine in a new bottle' and not revolutionary. However, the ideal accounting system has yet to be developed and judging from the vast literature that floods professional and academic accounting journals it is questionable whether it will ever be developed. Thus the best one can do is to overcome deficiencies in the present accounting system within its general framework, rather than overthrow the whole system. The fact that information needed varies with individual decisions, it may be questioned whether the single-valued
information from the accounting based on past data will be useful. This is a valid doubt, but as long as the accountants' double-entry system survives, economic transactions will be recorded to become historical with passage of time. What can be done is to convert this systematically-recorded data to different value concepts outside of the double-entry system.

A further doubt that could raise the old criticisms is whether all the allocations and re-allocations in such detailed manner could not lead to even greater subjective and thus arbitrary information. It cannot be denied that subjective assessment will prevail, but this need not result in arbitrary information being processed. As long as the information processor is fully aware of the various constraints, and communicates the degree of subjective error that may arise from allocations to the information receiver, the question of arbitrariness can be ignored.

An area for further research - One significant problem that has to be further researched into is the procedure for ascertaining causal and joint responsibilities. The use of more participation by managers and supervisors in budget preparation and costs allocation may contribute significantly to make these individuals realise that causal and joint responsibilities exist.

In the meanwhile, the following quote from Brummett seems relevant:

"Many, if not most, overhead costs carry joint-responsibilities. In providing over-all cost consciousness and maximum efficiency motivation, it is better to allow cost assignments to be based upon partial responsibility or even to allow some overlapping of responsibility centres than to exclude overhead costs because of joint responsibility situations. The danger of employee frustrations (and reactions not in the interest of over-all cost control) resulting from the assignment of overhead costs based on partial responsibility may be offset by informal higher level management interpretation of reported performance data. To exclude joint responsibility items from functional and product costs negates the possibility of control of many types of costs." [171

Q. 1. According to Rydge's 1969 Year Book the following information of your company was given:

(i) Activities ....
(ii) Paid-up Capital ....
(iii) Number of employees ....

Is the above information substantially correct?

Yes...
No ...

If not, could you indicate the necessary amendments ....

Q. 2. Do you classify your overhead items in your accounting system?

Yes...
No ...

Q. 3. If you classify, which of the following classifications do you use for overhead costs?

(i) Manufacturing
(ii) Selling
(iii) Distribution
(iv) Financial
(v) General administration
(vi) Others ... please state ....

Q. 4. (a) To derive your product cost for use in the preparation of financial statements do you include an allowance for overhead costs?

Yes....
No ...

Please comment ....

(b) If you do not include any overhead costs in your product cost calculation please ignore questions 5, 6, 7 and 8.

Q. 5. If you include an allowance for overheads in your product cost please signify the class of overhead included:

(i) Manufacturing
(ii) Selling
(iii) Distribution
(iv) Financial
(v) General administration
(vi) Others, please state ....
Q. 6. Please indicate how the overhead costs of the following functions and activities are accounted for, e.g. the overhead costs incurred by the processing departments may be charged wholly to the products manufactured (i.e. product cost) whilst the costs incurred by the personnel department may be charged to the profit and loss account as an annual recurring cost (i.e. period cost). If a particular cost is charged to both product and period, please indicate the approximate percentage for each category.

<table>
<thead>
<tr>
<th>Charged as:</th>
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<tr>
<td>Period Cost</td>
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(a) Processing departments
(b) Service departments:
   1. Power supply
   2. Maintenance and repair
   3. Stores - at factory
      - at field warehouse
   4. Cost department
   5. General accounting departments
   6. Purchasing departments
   7. Receiving department
   8. Timekeeping department
   9. Personnel department
  10. Pay-office
(c) Order getting:
   1. Advertising
   2. Sales promotion
   3. Direct selling
   4. Marketing administration
(d) Order filling:
   1. Packaging - at factory
      - for shipment
   2. Outward freight
   3. Transportation:
      - Inter factory
      - Factory to warehouse
   4. Clerical costs, e.g.
      - typing invoices and delivery docket
   5. Credit collection and control
(e) General administration:
   1. Salaries of top management
   2. Other administration costs
(f) Special items:
   1. Research and development
   2. Royalties paid
   3. Adjustment for application of lower cost or market rule for inventory
   4. Writing-off for shortages and obsolescence, etc.
      in inventory
(g) Others not included:

....
Q. 7. Please indicate the method used to charge overhead costs to products:
   (i) by use of departmental rates, i.e. rates are calculated for each department
   (ii) by use of a rate for each general class of overheads, i.e. a rate for the factory activity, a rate for the general administration activity, etc.
   (iii) by use of a single general overhead rate for the whole company
   (iv) any other method or comments ....

Q. 8. In arriving at the rates used as in Question 7, please indicate the base used:
   (i) Direct labour cost
   (ii) Direct labour hours
   (iii) Machine hours
   (iv) Direct material cost
   (v) Number of units produced
   (vi) Any other, please state ....

Q. 9. Do you classify your overhead costs into fixed and variable categories?
   Yes ...
   No ...

Q. 10. If you do not classify your overhead costs into fixed and variable categories please indicate the reasons:
   (i) not convinced of the benefit derived from such classification
   (ii) difficult to determine
   (iii) expenses of so classifying not justified
   (iv) any other reasons, please state ....

Q. 11. Do you prepare budgets for your overhead costs?
   Yes ...
   No ...

Q. 12. If you do not prepare budgets please indicate the reasons:
   (i) expense of budget preparation not justified
   (ii) budgets have not been considered
   (iii) not convinced of benefits derived from budgeting
   (iv) other reasons, please state ....

Q. 13. If you do prepare budgets, are they:
   (i) fixed (not subject to revision)?
   (ii) flexible (revised to suit actual volume of activity)?
   (iii) for the factory as a whole?
   (iv) for each individual department?
Q.14. Do you use standard rates to prepare your overhead cost budgets?
   Yes ...
   No ...

Q.15. If you do not use standard rates for your overhead cost budgets
   please indicate reasons:
   (i) company does not operate a standard cost system
   (ii) costs incurred to arrive at standards outweigh the
        benefits to be derived by use of the standards
   (iii) it is difficult to determine reliable standards
   (iv) any other reasons or comments, please state ....

Q.16. If you do use standard rates for overhead costs please indicate the
   class of overhead costs for which standards are developed:
   (i) Manufacturing
   (ii) Selling
   (iii) Distribution
   (iv) Financial
   (v) General administration
   (vi) Others, please state ....

Q.17. If you do use standard rates as in Question 14 please indicate the
   activity you assume when fixing the rate:
   (a) next year's expected sales
   (b) a long-run average of several years' expected sales
   (c) the plant's practical capacity to produce
   (d) any others, please state or comment ....

Q.18. Please indicate how you account for the difference between actual
   applied cost of manufacturing overhead:
   (a) charged wholly to cost of sales
   (b) charged in proportion to cost of sales, work in process
        and finished goods on hand
   (c) charged to the annual profit and loss account as a separate
       item
   (d) other ways, please state ....

Q.19. Do you analyse the difference between actual and applied
   manufacturing overhead costs?
   Yes ...
   No ...

Q.20. If you do not analyse (as in Question 19) please indicate reasons:
   (a) expense not justified
   (b) not convinced of the benefits
   (c) other reasons, please state ....
Q.21. If you do analyse (as in Question 19) please indicate how you classify the variances:
(a) spending variance (difference between actual cost and budgeted cost)
(b) efficiency variance (cost of difference between hours taken and hours allowed)
(c) volume variance (based on difference between normal plant capacity and standard hours allowed for actual production)
(d) volume variance (based on difference between normal plant capacity and actual hours taken on actual production)
(e) others, please state ....

Q.22. In preparing these overhead budgets please indicate the people involved:
(a) departmental managers
(b) foremen and supervisors
(c) accountant and his staff
(d) top management
(e) others, please state ....

Q.23. Is there any consultation with the production departments' managers with regard to the allocation of service departments' overhead costs to production departments?
Yes ...
No ...

Q.24. In allocating the service departments' overhead costs to production departments please indicate criteria used:
(a) ability to absorb
(b) benefit or use derived
(c) facilities provided, i.e. provision rather than use of facilities
(d) causal responsibility
(e) others, please state ....

Q.25. (a) Are departmental managers advised of the budgeted overhead costs for their departments?
Yes ...
No ...
Any comments ....
(b) Are foremen and supervisors advised of the budgeted overhead costs for their departments?
Yes ...
No ...
Any comments ....
Q.26. Are reports of actual overhead costs compared with budgets given to the following:

   (a) departmental managers
   (b) foremen and supervisors
   (c) top management

   Yes  No
   ...  ...  
   ...  ...

Q.27. Are allocated service department overhead costs shown in the periodical reports prepared for each production department?

   Yes ...
   No ...
   Any comments ....

Q.28. If answer to Question 27 is 'No', please indicate reasons:

   (a) service department overhead costs are reported directly to the service department manager
   (b) do not consider the reporting of allocated service department overhead costs to production department managers as contribution to effective control
   (c) control is best instituted at point of cost incurrence
   (d) other reasons, please comment ....

Q.29. How often are these reports prepared and conveyed:

   (a) half yearly?
   (b) quarterly?
   (c) monthly?
   (d) fortnightly?
   (e) weekly?
   (f) other times, please state or comment ....

Q.30. Please indicate which of the following techniques you use for allocating service departments' overhead costs:

   (a) simple percentages - arbitrarily derived
   (b) simultaneous equations
   (c) correlation analysis
   (d) matrix algebra
   (e) linear programming
   (f) others, please state or comment ....

Q.31. Is the extent to which your plant capacity is utilised regarded as significant in your company?

   Yes ...
   No ...
   Any comments ....

Q.32. Do you include in your regular reports the utilisation of plant capacity?

   Yes ...
   No ...
Q.33. In reporting on capacity utilised do you indicate:
(a) idleness in physical terms, e.g. hours
(b) idleness in money terms
(c) both (a) and (b)
Any comments ....

Q.34. (a) To what extent is the top management considered responsible for the control over plant utilisation?
   Fully ...
   Partially ...
   Not at all ...
   Please comment on the responsibility ....

(b) To what extent are the sales manager and production manager considered responsible for the control over plant utilisation?
   Fully ...
   Partially ...
   Not at all ...
   Please comment on the responsibility ....

(c) To what extent are the foremen or supervisors of production centres considered responsible for the control over plant utilisation?
   Fully ...
   Partially ...
   Not at all ...
   Please comment on the responsibility ....

Q.35. Does your firm deliberately carry reserve capacity?
   Yes ...
   No ...

Q.36. Please indicate reason(s) for the deliberate carrying of reserve capacity:
   (a) Cost of increasing capacity outweighs cost of maintaining reserve capacity
   (b) Uncertainty of trend in growth
   (c) Technical problems dictate the maintaining of reserve capacity
   (d) Other reasons, please state and comment ....

Q.37. Who is responsible for deciding on carrying reserve capacity?
   (a) top management
   (b) others, please state and comment ....

Q.38. If reserve capacity exists, is this shown separately in your reports?
   Yes ...
   No ...
Q.39. For profit determination,
   (a) is inventory valued at direct costs?    Yes  No
   (b) is inventory valued at full
       absorption costs.                     ... ...
   Any comments ....

Q.40. Do you impute the following costs for inclusion into your overhead:
   (a) interest on capital               Yes  No
   (b) rental charge on property owned   ... ...
   (c) any others, please state ....

Q.41. In setting the selling price for your products, do you consider
     overhead costs allocated to product to be:
     (a) very significant?                ... ...
     (b) partly relevant?                ... ...
     (c) wholly irrelevant?              ... ...
     (d) other comments ....

Q.42. In setting intra-company transfer prices for your products or
     components do you consider overhead costs allocated to products
     to be:
     (a) very significant?                ... ...
     (b) partly relevant                  ... ...
     (c) wholly irrelevant?               ... ...
     (d) other comments ....

Q.43. When conducting product profitability analysis which may result
     in the elimination of a product from the line or an entire
     product line, do you consider overhead costs allocated to
     products to be
     (a) very significant?                ... ...
     (b) partly relevant                  ... ...
     (c) wholly irrelevant?               ... ...
     (d) other comments ....

Q.44. With reference to Questions 41, 42 and 43, does your company
     consider information other than accounting information to be:
     (a) very significant?                Yes  No
     (a) very significant?                ... ...
     (a) partly relevant?                ... ...
     (a) wholly irrelevant?              ... ...
     (d) other comments ....

Q.45. Could you please nominate an officer in your organisation to whom
     I can direct further enquiries if necessary ....

Q.46. Would you like to receive a copy of the summary of results of this
     survey
     Yes ...
     No  ...
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