

BBA-403

COST AND MANAGEMENT ACCOUNTING



DIRECTORATE OF DISTANCE EDUCATION

SWAMI VIVEKANAND

SUBHARTI UNIVERSITY

Meerut (National Capital Region Delhi)



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BBA-403: COST AND MANAGEMENT ACCOUNTING

Course Code: BBA-403		
Course Credit: 04	Lecture: 04	Tutorial: 01
Course Type:	Core	
Lectures delivered:	30L + 10T	

End Semester Examination System

Maximum Marks Allotted	Minimum Pass Marks	Time Allowed
70	28	3 Hours

Continuous Comprehensive Assessment (CCA) Pattern

Tests	Assignment/ Tutorial/ Presentation/class test	Attendance	Total
15	5	10	30

Course Objective: To acquaint the students with basic concepts used in cost and management accounting and various methods involved in cost ascertainment systems, and use of costing data for planning, control and decision making

UNIT	Course Content	Hours
I	Meaning, Scope, objectives of Cost Accounting and of Management Accounting, Financial Accounting Vs. Cost Accounting Vs. Management Accounting. Advantages and Limitations of Cost and Management Accounting, Elements of Cost, Cost sheet, cost concepts, cost classification.	12
II	TOTAL COST AND MARGINAL COST: Cost-Volume-Profit Analysis, relevant costing for decision-making.	12
III	BUDGETARY CONTROL: Meaning of budget, budgetary control: Objectives, uses Types of Budget-functional, fixed and variable budget.	12
IV	Standard costing and Variance Analysis. Advantages and Disadvantages of Standard Costing, Analysis of Variance: Material, Labour.	12
V	Decision making Costs for decision making, variable costing and differential analysis as aids in making decisions – fixation of selling price, exploring new market, make or buy, product mix, operate or shut down, seller process further.	12

Course Outcomes: After studying this course the student should be able to

1. Understand the conceptual of Cost& Management Accounting and their application in real world.
2. Describe the Cost Accounting standards and its contribution in preparation of Cost Sheet of a company.
3. Analyze and compare cost of various Cost Center.
4. Assess the interlinking of budget and budgetary Control.
5. Compare and use standard costing and Variance analysis.

Text Books: 1. Cost and Management Accounting : S. P. Jain and K. L. Narang

2. Cost Accounting : N. K. Prasad

3. Cost Accounting : B. M. L. Nigam

4. Management Accounting : M. Y. Khan and P. K. Jain

Reference Books:

1. Lal, Jawahar and Seema Srivastava , *Cost Accounting*. Tata McGraw Hill Publishing Co., New Delhi.
2. Nigam, B.M. Lall and I.C. Jain. *Cost Accounting: Principles and Practice*. Prentice Hall of India, New Delhi.
3. Mittal, D.K. and Luv Mittal. *Cost Accounting*. Galgotia Publishing Co., New Delhi
4. Arora, M.N. *Cost Accounting – Principles and Practice*. Vikas Publishing House, New Delhi.
5. Shukla, M.C., T.S. Grewal and M.P. Gupta. *Cost Accounting: Text and Problems*. S. Chand & Co. Ltd., New Delhi.
6. Maheshwari, S.N. and S.N. Mittal. *Cost Accounting: Theory and Problems*. Shri Mahabir Book Depot, New Delhi.
7. Jain, S.P. and K.L. Narang. *Cost Accounting: Principles and Methods*. Kalyani Publishers, Jalandhar.

UNIT – I

INTRODUCTION

Introduction

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STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Concept of Cost Accounting
- 1.4 Need and Scope of Cost Accounting
- 1.5 Nature of Cost Accounting
- 1.6 Evolution of Cost Accounting
- 1.7 Financial Accounting and Cost Accounting
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- 1.21 Summary
- 1.22 Review Questions
- 1.23 Further Readings

1.1 LEARNING OBJECTIVES

After going through this unit, students will be able to :

- understand the meaning, scope and objectives of cost accounting;
- distinguish between financial and cost accounting;
- discuss fundamental concepts of cost and its elements;
- classify cost and explain the methods of costing.

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1.2 INTRODUCTION

Costing is a branch of accounting. It helps us to classify, record, and allocate the expenditure for the determination of costs of product. Expenditure involved in business has to be ascertained to fix the price of a product produced. The expenditure is to be understood in terms of material, labour and other direct and indirect expenses. The major purpose of such classification is to estimate the profit and to understand its relationship with costs and price. The three elements of a transaction *i.e.*, cost, profit and price are necessary components of any business activity.

The management requires all information as seen in the example for each product produced. The above estimation is done for the purpose of planning, cost control and decision-making. The existing system of financial accounting does not provide the necessary information to do similar estimation. Such deficiency of financial accounting has given rise to the need of cost accounting.

1.3 CONCEPT OF COST ACCOUNTING

Traditionally, *cost accounting* is considered as the technique and process of ascertaining costs of a given thing. In sixties, the definition of cost accounting was modified as 'the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and ascertainment of profitability of goods, or services'. It includes the presentation of information derived therefrom for the purpose of managerial decision making. It clearly emphasises the importance of cost accountancy achieved during the period by using cost concepts in more and more areas and helping management to arrive at good business decisions.

Today, the scope of cost accounting has enlarged to such an extent that it now refers to the collection and providing all sorts of information that assists the executives in fulfilling the organisational goals. Modern cost accounting is being termed as management accounting, since managers being the primary user of accounting information are increasingly using the data provided by the accounts, setting objectives and controlling the operations of the business.

DEFINITIONS OF COST ACCOUNTING

The word 'Costing' refers to the technique and process of ascertaining costs. There have been certain rules and principles in the field of costing developed over years by our forefathers. These rules and principles help us to ascertain the cost of products produced. The term 'Cost Accounting' refers to the recording of all incomes and expenditures and ends with the preparation of periodical statements and reports for ascertaining and controlling costs.

Cost accounting is a subset of accounting that develops detailed information about costs as they relate to units of output and to departments, primarily for

purposes of providing inventory valuation (product costing) for **financial statements**, control, and **decision making**.

Introduction

The terminology of cost accountancy published by the Institute of Cost and Management Accountants, London defines cost accountancy as "the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived therefrom for the managerial decision-making."

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On analysis of the above definition, the following features of cost accountancy become evident :

- (a) "Cost accountancy" is used in the broadest sense when compared to "cost accounting" and "costing". This is so because cost accountancy is concerned with the formulation of principles, methods and techniques to be applied for ascertaining cost and profit.
- (b) Having ascertained 'cost' and 'profit', cost accountancy is concerned with presentation of information to management. To enable management to carry out its functions, reports must be promptly made available at the right time, to the right person and in a proper form.
- (c) The information so provided is to serve the purpose of managerial decisionmaking such as introducing a new line of product, replacement of manual labour by machines, make or buy, decisions, etc.

1.4 NEED AND SCOPE OF COST ACCOUNTING

The need for cost accounting arises owing to the following :

To Overcome the Limitations of Financial Accounts

Financial accounting records in an overall manner the results of the operations of a business, using conventional double entry book-keeping techniques. It suffers from the following limitations :

- (i) *It provides only past data* : Financial accounts provide out of date information to management. But management is interested in current data but not past data as it does not serve any purpose to it. Therefore it has been rightly pointed out that financial accounts provide only a post-mortem analysis of past activities.
- (ii) *It reveals only over all result of the business* : Financial accounts does not provide data for each and every product, process, department or operation separately. Instead it provides the financial information in a summary form for the entire organisation as a whole.
- (iii) *It is static in nature* : Modern business is dynamic but not static. Financial accounts does not incorporate the changes that take place within the business.

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- (iv) *It fails to take into account the impact of price level change* : In the modern inflationary conditions the price level has significant impact over financial statement. Under financial accounts, assets are shown at the actual or historical cost. Consequently depreciation is also charged on actual or historical cost. This under charging of depreciation will distort the profit figure.
- (v) *Possibility of manipulation of financial accounts* : Very often financial accounts are manipulated at the whims and fancies of management so as to project better image in the minds of prospective investors. The chief forms of manipulating the financial accounts assume the form of over or undervaluation of inventory, excessive or inadequate provision for depreciation, creation of secret reserves, etc.
- (vi) *It fails to exercise control over resources* : Financial accounts fail to exercise control over materials, labour and other expenses incurred in a business enterprise. As a results, avoidable wastages and losses go unchecked under this system of accounts.
- (vii) *It fails to provide adequate data for price fixation* : Financial accounts fail to provide adequate cost data on the basis of which selling price is fixed. In the absence of fixation of prices in advance, it is not possible to supply quotations to the prospective customers. To that extent the income from such sales diminish.
- (viii) *It fails to provide adequate data for management in carrying out its functions*: Management of every organisation relies heavily on adequate cost data for formulating policies and in decision-making process. But financial accounts fails to provide such useful cost data to management.
- (ix) *It does not provide a basis for cost comparison* : Financial accounts does not help in cost comparison over a period of time or between two jobs or two operations. Thus a basis for judging the efficiency of an year with past year or worthfulness of two different jobs or operations cannot be appraised.
- (x) *It does not make use of control techniques* : Financial accounts fail to make use of certain important cost control techniques such as budgetary control and standard costing. Thus financial accounts do not facilitate measuring the efficiency of the business with the help of control techniques.
- (xi) *It fails to ascertain break-even point* : Financial accounting does not help in ascertaining the break-even point, i.e., the sale or output where the revenue equals the cost. Hence, the point of no-profit-no-loss cannot be made out under financial accounts.

To Ensure Optimum Utilisation of Resources

In today's business world, the resources available are very scarce. Hence every business unit must strive hard to obtain maximum output with the available input. In order to ensure the optimum utilisation of scarce resources, the value of input is measured against the value of output. This implies matching cost per unit of production against the value of output or selling price. But financial accounts do not provide the information relating to cost per unit of production. Hence the need for cost accounting was felt necessary.

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To Achieve Overall Efficiency of Business

Every businessman will make constant effort to improve his business. In order to formulate suitable policy and sound decision, he has to know answers to certain questions such as (a) What is the maximum profit which a business can make? (b) Is the profit earned by it more or less compared to the earlier years? (c) Which product line is making more profit? (d) Has too much capital been blocked in raw materials? (e) Whether the cost of production has gone up compared to earlier years? (f) Should the selling price require revision? Cost accounting serves as a useful tool in the hands of management in this direction. By analysing the cost of production of every unit, it helps management to know the answers to the above questions.

SCOPE OF COST ACCOUNTANCY

The scope of any subject refers to the various areas of study included in that subject. As regards the scope of cost accountancy is concerned, it has vast scope. The following topics fall under the purview of cost accountancy : (1) Costing, (2) Cost Accounting, (3) Cost Control Techniques, (4) Budgeting and (5) Cost Audit.

1. Costing

The terminology of ICMA, London, defines costing as "the technique and process of ascertaining the cost."

The above definition is very significant in as much as it carries the main theme of cost accountancy. This definition emphasises two important aspects, viz.

- (a) **The technique and process of costing :** The technique of costing involves two distinct steps, namely, (i) collection and classification of costs according to various elements and (ii) allocation and apportionment of the expenses which cannot be directly charged to production. As a process, costing is concerned with the routine ascertainment of cost with a formal procedure.
- (b) **Ascertainment of cost :** It involves three steps, viz., (i) collection and analysis of expenses, (ii) measurement of production at different stages and (iii) linking up of production with the expenses. To achieve the first step, costing

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has developed different systems such as Historical, Estimated and Standard Cost. For achieving the second step, costing has developed different methods such as single or output costing. Job costing, contract costing, etc. Finally, for achieving the last step costing has developed important techniques such as *Absorption Costing*, *Marginal Costing* and *Standard Costing*.

The three terms indicated as 'systems', 'methods', 'techniques' are independent factors but co-exist together. Ascertainment of cost of production is based on all these three terms. For example, continuous type of industries may use process costing as a method, using actual cost as a system, under Standard Costing Technique.

2. Cost Accounting

Kohler in his dictionary for Accountants defines cost accounting as "that branch of accounting dealing with the classification, recording, allocation, summarisation and reporting of current and prospective costs."

Mr. Wheldon defines cost accounting as "the classifying, recording and appropriate allocation of expenditure for the determination of the costs of products or services, the relation of these costs to sales values, and the ascertainment of profitability."

The above definitions reveal the following aspects of cost accounting :

- (a) *Cost classification* : This refers to grouping of like items of cost into a common group.
- (b) *Cost recording* : This refers to posting of cost transactions into the various ledger maintained under cost accounting system.
- (c) *Cost allocation* : This refers to allotment of costs to various products or departments.
- (d) *Cost determination or cost finding* : This refers to the determination of the cost of goods or services by informal procedure, i.e., procedures that do not carry on the regular process of cost accounting on a continuous basis.
- (e) *Cost reporting* : This refers to furnishing of cost data on a regular basis so as to meet the requirements of management.

1.5 NATURE OF COST ACCOUNTING

The nature of cost accounting can be brought out under the following headings :

1. **Cost accounting is a branch of knowledge** : Though considered as a branch of financial accounts, cost accounting is one of the important branch of knowledge, i.e., a discipline by itself. It is an organised body of knowledge consisting of its own principles, concepts and conventions. These principles and rules of course vary from industry to industry.

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2. **Cost accounting is a science :** Cost accounting is a science as it is a body of systematic knowledge relating to not only cost accounting but relating to a wide variety of subjects such as law, office practice and procedure, data processing, production and material control, etc. It is necessary for a cost accountant to have intimate knowledge of all these field of study in order to carry on his day-to-day activities. But it is to be admitted that it is not a perfect science as in the case of natural science.
3. **Cost accounting is an art :** Cost accounting is an art in the sense it requires the ability and skill on the part of cost accountant in applying the principles, methods and techniques of cost accountancy to various management problems. These problems include the ascertainment of cost, control of costs, ascertainment of profitability, etc.
4. **Cost accounting is a profession :** In recent years cost accounting has become one of the important professions which has become more challenging. This view is evident from two facts. First, the setting up of various professional bodies such as National Association of Accountants (NAA) in USA. The Institute of Cost and Management Accountants in UK, the Institute of Cost and Works Accountants in India and such other professional bodies both in developed and developing countries have increased the growing awareness of costing profession among the people. Secondly, a large number of students have enrolled in these institutes to obtain costing degrees and memberships for earning their livelihood.

1.6 EVOLUTION OF COST ACCOUNTING

Accounting is a very old profession. Financial accounting is in use with the dawn of civilisation. As soon as counting and arithmetic started, and the use of money replaced the barter system, the financial accounting emerged in some form or other. However, cost accounting is traceable to the earlier part of the seventeenth century. The earliest reference of cost accounting can be found in Robert Loder's farm accounts 1610-20. However, the industrial revolution in the 18th century brought about extensive mechanisation of production system resulting in large scale production. Some sporadic efforts were made in U.K. and U.S.A. to install factory cost systems as far back as 1805. But the concept of prime cost was used around 1875 by some industrialists. Between 1885 and 1901, a number of publications from London and New York explained the cost of manufacture, the distribution of establishment charges, the commercial organisation of the factories, factory accounts – their principles and practices, and finally a complete text book on Cost Accounting Theory and Practice was published by J.L. Nicholson from New York in 1913.

The cost accounting concepts advanced further with the beginning of the First World War. The 'cost plus' concept was introduced during the war time in

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order to avoid delay in executing urgent supplies. The contracts were entered on the basis that the supplier would be reimbursed the cost 'plus' a fixed percentage to cover administration and other overhead expenses and profit. Immediately, two things happened. One, a demand for qualified persons to calculate cost and two, deliberation of cost concepts for identifying the items or elements that enter the cost.

The profession of cost accountancy got a real boost-up. More and more people got interested in the profession. In 1919, the Institute of Cost and Works Accountants was established in U.K., which is now known as the Chartered Institute of Management Accountants (CIMA) at London. Simultaneously, in U.S.A. the National Association of Cost Accountants, which is now known as the National Association of Accountants, was also established at New York. Under the leadership of these two institutes, the profession and the concepts of cost accounting developed significantly. Before the Second World War, the mechanism of standard cost accounting, budgetary control, flexible budgeting and direct costing became known in the U.S.A. and U.K.

In India, prior to independence, there were a few cost Accountants, and they were qualified mainly from I.C.M.A. (now CIMA) London. During the Second World War, the need for developing the profession in the country was felt, and the leadership of forming an Indian Institute was taken by some members of Defence Services employed at Kolkata. Costing profession was in an embryonic stage at that time. However, with the enactment of the Cost and Works Accountants of India Act, 1959, the Institute of Cost and Works Accountants of India was established at Kolkata.

The Institute has grown in stature, having Fellow, Associate and Student Members. The Institute controls its function through its Head Office at Kolkata and four Regional Offices at Mumbai, Kolkata, Delhi and Chennai. Each of the Regional Offices has several chapter Offices to look after the interest of the local members and the profession.

The profession assumed further importance in 1968, when the Government of India introduced selective Cost Audit under Section 233-B of the Companies Act, 1956 and framed Cost Accounting Record Rules, 1968 for this purpose. Although Cost Audit is not compulsory, but selective for a few nominated industries yet the profession was greatly benefited, and more persons are now interested to join the profession. Today, the extensive use of cost accounting techniques has led to new concept of information technology, operational control and performance measurement. The concepts of Activity Based Costing (ABC), strategic control systems, flexible production system etc. are key words for modern cost management.

1.7 FINANCIAL ACCOUNTING AND COST ACCOUNTING

In financial accounts, the monetary transactions of the business are recorded, classified and analysed in an orderly manner, so as to prepare periodic results in the form of profit and loss account or income statement and balance sheet, indicating the financial position of the business at the end of that period. The financial accounting is guided by various rules and regulations, some of which are mandatory. The system cannot normally deviate from the accepted accounting practices.

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The object of financial accounting is to provide information mainly to outsiders such as shareholders, investors, government authorities, financial institutions, etc. The analysis and interpretation of financial data contained in the income statement and the balance sheet enable persons interested in the business to make meaningful judgement about the profitability, liquidity and solvency of the enterprise. Besides, income-tax, central excise, banks and insurance companies rely on the data contained in the financial statements. Cost accounting, on the other hand, deals with the ascertainment of the cost of product or service. It is a tool of management that provides detailed records and reports on the costs and expenses associated with the operations, mainly for internal control and decision making. Cost accounting basically relates to the utilisation of resources, such as material, labour, machines, etc. and provides information like products cost, process cost, service or utility cost, inventory value, etc. so as to enable management taking important decisions like fixing price, choosing products, preparing quotations, releasing or withholding inventory, etc.

Cost accounting is very closely-related to financial accounting. Some authorities on the subject consider cost accounting to be the branch of financial accounting. But it may be said that cost accounts is complementary to financial accounts, *i.e.*, a subject which is necessary to make financial accounts whole or complete. Financial accounts and cost accounts are both similar in certain respects. But in some other respects they differ from one another.

These points of similarities and dissimilarities are enumerated below :

Points of Similarities

- (a) The fundamental principles of double entry is applicable in both the systems of accounts.
- (b) The invoices and vouchers constitute the common basis for recording transactions under both the systems of accounts.
- (c) The results of business are revealed by both the systems of accounts.
- (d) The causes for losses and wastages of a business are provided by both these systems of accounts.
- (e) The determination of future business policy is guided by both these systems of accounts.

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- (f) A basis for comparison of expenses is being provided by both the accounting systems.
- (g) Accuracy of accounts is maintained under both the systems by means of exercising check over errors and commissions which might creep in either of accounts.

The objective of cost accounting is to provide information to internal managers for better planning and control of operations and taking timely decisions. In the early stages, cost accounting was considered as an extension of financial accounting. Cost records were maintained separately. Cost information and data were collected from financial books, since all monetary transactions are entered in the financial accounts only. After developing product cost or service cost and valuation of inventory, the costing profit and loss account is prepared. The profit and loss figures so derived by the two sets of books *i.e.*, financial accounts and cost accounts, would have to be reconciled, since some of the income and expenditure recorded in financial books do not enter into product cost, while some of the expenses are included in cost accounts on notional basis *i.e.*, without having incurred actual expense. However, a system of integrated account has been developed subsequently, wherein cost and financial accounts are integrated avoiding maintaining two sets of books. The basic difference between financial and cost accounting may be summarised as follows:

<i>Financial Accounting</i>	<i>Cost Accounting</i>
1. Accounting of monetary transactions of the business.	1. Accounting of product cost or service cost.
2. Consists of recording, classification and analysis of financial transactions.	2. Consists of developing product or service cost with elementwise cost breakdown.
3. Leads to preparation of income statement and balance sheet at periodic interval.	3. Leads to development of product or service cost, indicating profitability of each product or service as and when required.
4. Aims at external reporting to the shareholders, investors, Government authorities and other outside parties.	4. Aims at internal reporting both routine as well as special reporting to managers for internal control and decision making.
5. The accounting systems are mandatory and structured as per legal and other requirements.	5. The system is much less structured and is not mandatory, except those covered by cost audit required <i>u/s</i> 233-B of the Companies Act, 1956
6. Subject to verification by external auditor.	6. Cost audit is not compulsory but selective to some specific industries/products.

1.8 MANAGEMENT ACCOUNTING

Management accounting is not a specific system of accounts, but could be any form of accounting which enables a business to be conducted more effectively and efficiently. Management accounting in the words of Robert S. Kaplan, is a system that collects, classifies, summarises, analyses and reports information that will assist managers in their decision making and control activities. Unlike financial accounting, where the primary emphasis is on reporting outsiders, management accounting focuses on internal planning and control activities. Therefore management accounting requires the collection, analysis and interpretation not only financial or cost data, but also other data such as sales, price, product demands and measures of physical quantities and capacities. In the process, the system utilises all techniques of financial and cost accounting including marginal or direct costing, standard costing, budgetary control, etc. Management accounting therefore appears as the extension of the horizon of cost accounting towards newer areas of management.

Management accounting is largely concerned with providing economic information to managers for achieving organisational goals. The information flow system is, therefore, extremely important while designing the system. Managers at each level must have a clear understanding about the objectives and goals assigned and receiving flow of relevant information. It is important to note that overabundance of irrelevant information is as bad as lack of relevant information.

1.9 DIFFERENCES BETWEEN COST AND MANAGEMENT ACCOUNTING

The American Accounting Association 1958, committee on management accounting defines management accounting as "the application of appropriate techniques and concepts in processing the historical and projected economic data of an entity to assist management in establishing a plan for reasonable economic objectives and in the making of rational decisions with a view towards achieving these objectives." It includes the methods and concepts necessary for effective planning for choosing among alternative business actions, and for control through the evaluation and interpretation of performance. Its study involves consideration of ways in which accounting information may be accumulated, synthesised, analysed and presented in relation to specific problems, decisions and day-to-day tasks of business management.

The terminology published by ICMA, London, defines management accounting as "the application of professional knowledge and skill in the preparation and presentation of accounting information in such a way as to assist management in the formulation of policies and in the planning and control of the operation of the undertaking."

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If we examine the above two definitions of management accounting it appears that both the systems of accounts serve the same purpose. However, they differ from one another in respect of the following :

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<i>Points of differences</i>	<i>Cost Accounting</i>	<i>Management Accounting</i>
1. Growth of Accounting	The history of cost accounting dates back to fourteenth century.	This system of accounting evolved in the middle of 20th century. Hence it is of recent origin where compared to cost accounting.
2. Object	The main objects of cost accounts is to ascertain and control cost.	The main objective of management accounting is to provide useful information to management for decision-making.
3. Basis of recording	It is based on both present and future transactions for cost ascertainment.	It is concerned purely with the transactions relating to future.
4. Scope	Cost accounts has narrow scope as it covers matters relating to ascertainment and control of cost.	It has a wide scope in as much as it covers the areas of financial accounts, cost accounts, taxation, etc.
5. Utility	Cost accounts serves the needs of both internal management and external parties.	Management accounting serves the needs of only internal management.
6. Types of transactions dealt with	It deals only with monetary transactions. <i>i.e.</i> , it covers only quantitative aspect.	It deals with both monetary and non monetary transactions, <i>i.e.</i> , both quantitative and qualitative aspects.
7. Observation of principles and format	Cost accounts follow a definite principle for ascertaining cost and a format for recording.	It does not follow a definite principle and format. Instead, the data to be presented depends up on the need of the management.

1.10 FUNCTIONS OF COST ACCOUNTANT

The functions of cost accountant may be enumerated under the following:

Traditional Functions

The traditional functions comprise of the routine functions of cost accountant. Such functions are as follows :

- (a) To establish various cost centres in the organisation.
- (b) To ascertain the cost of every product, job or process both in terms of total and per unit of product.
- (c) To design suitable system for defining responsibilities and controlling cost.
- (d) To provide necessary data to enable management in fixing the price.
- (e) To prepare reports on wastages of material, loss of labour time, idle capacity of machines so as to improve profitability of business.
- (f) To implement cost control techniques such as budgetary control and standard costing.
- (g) To prepare cost schedules to assist management in making decisions and in formulating policies.
- (h) To design suitable forms for organising an effective system of reporting which ensures provision of adequate cost data to all levels of management.
- (i) To assist management in the valuation of closing stock of raw materials and work-in-progress so that too much of capital is not locked up in unnecessary inventories.
- (j) To prepare periodical cost statements and profit and loss account.

Modern Functions

In recent times the functions of a cost accountant are not only confined to ascertain and control cost but extend far beyond these functions. This is on account of the additional responsibilities arising from the various branches of accounting, works organisation, office management and administration, methods of statistical analysis, systems analysis, O and M studies, modern principles of management, use of computers, etc. These modern functions are as follows :

- (i) Supervising the functions of mechanised accounting.
- (ii) Organisation of internal audit in the field of accounting.
- (iii) To work in close co-ordination with various departmental managers so as to implement cost reduction programmes and methods of improvement.
- (iv) To undertake cost audit programmes as per the directives issued by the government and the provisions of the Indian Companies Act of 1956.

As regards the role of cost accountant in an industry, it has been beautifully summarised by Mr. Wilmot in his article on "the cost accountant's place in management". According to him, the role of cost accountant is "that of a historian,

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news agent, and prophet". As historian he must be meticulously accurate, i.e., while supplying cost information to management he has to furnish in greater detail with carefulness and exactness. As news agent, he must be up-to-date, selective and provide full cost information to the needy person. As a prophet he must combine knowledge and experience with foresight and courage.

1.11 REQUISITES OR ESSENTIALS OF COST ACCOUNTING SYSTEM

The following are the essentials of an ideal cost accounting system :

1. **Accuracy** : The system of cost accounting must provide for accuracy in terms of both cost ascertainment and presentation. Otherwise it will prove to be misleading.
2. **Simplicity** : Cost accounting system involves detailed analysis of cost. To avoid complications in the procedure of cost ascertainment an elaborate system of costing should be avoided and every care must be taken to keep it as simple as possible.
3. **Elasticity** : The cost accounting system should be capable of adopting itself to the changing situations of business. It must be capable of expansion or contraction depending upon the needs of the business.
4. **Economy** : The costs of operating costing system must be less. It must result in increased benefit when compared to the expenditure incurred in installing it.
5. **Comparability** : The records to be maintained must facilitate comparison over a period of time. The past records must serve as a basis to guide the future.
6. **Promptness** : An ideal costing system is one which provides cost data in an analytical form to the management. So all the departments of a factory must analyse and record the relevant items of cost promptly in order to furnish cost information on a regular basis to various levels of management. This helps in checking up the progress of the business on a regular basis.
7. **Periodical preparation of accounts** : With a view to facilitate the comparison of results frequently, it is desirable to prepare accounts periodically. Constant comparison of actual result with standard result enables to spot out areas of inefficiency. This can be set right by taking remedial measures.
8. **Reconciliation with financial accounts** : The system of cost accounts must be capable of reconciling with financial accounts so as to check accuracy of both the system of accounts.
9. **Uniformity** : The various forms and documents used under costing system

must be uniform in size and quality of paper. Printed forms must be used to avoid delay in the preparation of reports. This also reduces the burden of clerical staff. Forms of different colours can be used to distinguish different documents.

10. **Equity** : The basis of apportioning indirect expenses to products, departments or jobs must be fair and equitable.

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1.12 ADVANTAGES AND LIMITATIONS OF COST ACCOUNTING

A good costing system serves the needs of a large sections of people. The advantages of cost accounting are discussed below.

Advantages of Cost Accounting to Management

1. **Fixation of responsibility** : Whenever a cost centre is established, it implies establishing a kind of relationship between superior and subordinates. Thus responsibilities are fixed on every individual who is concerned with incurrance of cost.
2. **Measures economic performance** : By applying cost control techniques such as budgetary control and standard costing it helps in assisting the performance of business.
3. **Fixation of price** : By providing cost data it helps management to fix the selling price in advance. Hence, quotations can be supplied to prospective customers to secure orders.
4. **Aids in decision-making** : It helps management in making suitable decisions such as make or buy, replace manual labour by machines, shut down or continue operations based on cost reports.
5. **Helps in the preparation of interim final accounts** : By the process of continuous stock taking it enables to know the value of closing stock of materials at any time. This facilitates preparation of final accounts wherever desired.
6. **Helps in minimising wastages and losses** : Cost accounting system enables to locate the losses relating to materials, idle time and under utilisation of plant and machinery.
7. **Facilitates comparison** : It facilitates cost comparison in respect of jobs, process, departments and also between two periods. This reveals the efficiency or otherwise of each job process or department.
8. **Assists in increasing profitability** : Costing reports provide information about profitable or unprofitable areas of operation. The management can discontinue that product line or that department which are responsible for incurring losses. Thereby only profitable line of activities alone are retained.

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9. **Reconciliation with financial accounts :** A well maintained cost accounting system facilitates reconciliation with financial accounts to check the arithmetical accuracy of both the systems.
10. **It guides future production policy :** Cost data help management in determining future production policy. Any expansion or contraction of production for the future is based on past cost data.

Advantages to Employees

1. Cost accounting system enables employees to earn better wages through overtime wages and incentive systems of wage payment.
2. By providing better facilities it ensures job security to employees.
3. Employees benefit by merit rating techniques which is conducted by scientific process.

Advantages to Creditors

1. It increases the confidence of creditors in the capital employed in the business.
2. The frequent preparation of reports and statements help in knowing solvency position of the business.

Advantages to the Government

1. It helps government in formulating policies regarding export, import, taxation, price control measures, wage fixation, etc.
2. It helps in assessing excise duty, sales tax and income tax of the business.
3. Costing information helps in preparing national plans.

Advantages to Society

1. Cost reduction and cost control programmes go to minimise cost of production of goods and services. A portion of the reduced cost of production is shared by customers by paying less price for goods and services.
2. It offers employment opportunities in the cost accounting department in the capacity of cost accountants and cost clerks.

LIMITATIONS OF COST ACCOUNTING

1. **It is expensive :** The system of cost accounting involves additional expenditure to be incurred in installing and maintaining it. However, before installing it, care must be taken to ensure that the benefits derived is more than the investment made on this system of accounting.
2. **The system is more complex :** As the cost accounting system involve number of steps in ascertaining cost such as collection and classification of expenses, allocation and apportionment of expenses, it is considered to

be complicated system of accounts. Moreover the system makes use of several documents and forms in preparing the reports. This will tend to delay in the preparation of accounts.

3. **Inapplicability of same costing method and technique** : All business enterprises cannot make use of a single method and technique of costing. It all depends upon the nature of business and type of product manufactured by it. If a wrong technique and method is used, it misleads the results of business.
4. **Not suitable for small scale units** : A cost accounting system is applicable only to a large-sized business but not to a small-sized one. Hence, there is limitation to its application to all types of business.
5. **Lack of accuracy** : The accuracy of cost accounts get distorted owing to the use of notional cost such as standard cost, estimated cost, etc.
6. **It lacks social accounting** : Cost accounting fails to take into account the social obligation of the business. In other words, social accounting is outside the purview of cost accounts.

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1.13 COST CONCEPT AND COST OBJECT

The dictionary meaning of cost is "a loss or sacrifice", or "an amount paid or required in payment for a purchase or for the production or upkeep of something, often measured in terms of effort or time expended". *CIMA Terminology* defines cost as 'resources sacrificed or forgone to achieve a specific objective'. Cost is generally measured in monetary terms.

Cost is the amount of expenditure (actual or notional) incurred on or attributable to, a specified thing or activity. Thus, material cost of a product will mean the expenses incurred in procuring, storing and using materials in the product. Similarly, labour cost will represent that part of payment made to the workmen for time spent on the product during its manufacture.

Again, the term 'cost' can hardly be meaningful without using a suffix or a prefix. The cost is always ascertained with reference to some object, such as, material, labour, direct, indirect, fixed, variable, job, process, etc. Thus, each suffix or prefix implies certain attribute which will explain its nature and limitations.

Cost object is defined by Charles T. Horngren as 'any activity for which a separate measurement of cost is desired'. It may be an activity, or operation in which resources, like materials, labour, etc. are consumed. The cost object may be a product or service, a project or a department, or even a program like eradication of illiteracy. Again, the same cost may pertain to more than one cost objects simultaneously. For example, material cost may be a part of product cost as well as production department cost.

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1.14 COST MANAGEMENT

The techniques and process of ascertaining cost involve three steps, viz.

- (i) Collection of expenditure or cost data,
- (ii) Classification of expenditure as per cost elements, function, etc. and
- (iii) Allocation and apportionment of expenditure to the cost centres and cost units.

The system accumulates and classifies expenditure according to the elements of costs, and then, the accumulated expenditure is allocated and apportioned to cost objects *i.e.*, cost centres and cost units. We should, therefore, know what are cost elements, cost centres and cost units.

ELEMENTS OF COST

For the purpose of identification, accounting and control, breakup of cost into its elements is essential. Elements are related to the process of manufacture *i.e.*, the conversion of raw materials into finished products. Costs are normally broken down into three basic elements, namely, material, labour and expense. Material cost includes all materials consumed in the process of manufacture up to the primary packing. Labour cost includes all remuneration paid to the staff and workmen for conversion of raw materials into finished products. Expenses consist of the cost of utilities and services used for the conversion process including notional cost for the use of owned assets.

Each of the cost elements can be further divided into direct and indirect cost. Direct costs are those which can be identified with or related to the product or services, so much so that an increase or decrease of an unit of product or service will affect the cost proportionately. Indirect cost, on the other hand, cannot be identified or traced to a given cost object in economical way and are related to the expenses incurred for maintaining facilities for such production or services. Thus, the elements of cost may be summarised as follows – (a) Direct materials and indirect materials, (b) Direct wages and indirect wages, (c) Direct expense and indirect expense.

The aggregate of direct materials cost, direct wages and direct expense is called **Prime cost**, while indirect materials cost, indirect wages and indirect expenses are collectively called **overhead cost**.

Overheads are classified into production overheads *i.e.*, indirect costs relating to manufacturing activities, administration overheads *i.e.*, costs relating to formulating the policy, directing the organisation and controlling operations and selling and distribution overheads *i.e.*, indirect costs relating to the activity of creating and stimulating demand and securing orders as well as operations relating to distribution of goods from factory warehouse to customers. Factory cost, cost of production and cost of sales are arrived at by adding respective overheads to prime cost, factory cost and cost of production as indicated in the chart below :

	Rs.
Direct materials cost	x
Direct wages	x
Direct expenses	x
Prime Cost	
Factory overhead	x
Factory Cost	x
Administration overhead	x
Cost of Production	x
Selling and distribution overhead	x
Cost of Sales	x

NOTES**ALLOCATED AND APPORTIONED COST**

Cost allocation is the allotment of the whole items of costs to cost centres or cost units. *Cost apportionment* refers to the allotment of proportions of item of cost to cost centres or cost units. A cost which is allocated to a cost centre is a direct cost of that cost centre, whereas the cost which is apportioned to different cost centres on suitable basis is an indirect cost of that cost centre. Thus, direct costs are allocated, since they can be directly identified with a cost centre or cost unit, and indirect costs are apportioned expenditure. The concept of direct and indirect cost is very important for costing purposes.

COST CENTRE

Cost centre is defined as a location, person or item of equipment (or group of them) in respect of which costs may be ascertained and related to cost units for the purposes of cost control. It is the smallest segment of activity or area of responsibility for which costs are accumulated. Thus cost centres can be of two kinds, viz.

- Impersonal cost centre* consisting of a location or item of equipment (or group of these) such as machine shop, and
- Personal cost centre* consisting of a person or a group of persons such as factory manager, sales manager, etc.

Cost centres are also classified in manufacturing concerns into production and service cost centres. Production cost centres relate to those centres where production or manufacturing activities take place. Service cost centres are those, which are ancillary and render services to the production cost centres, so that manufacturing activities can take place. In a biscuit manufacturing company, making, baking and packing are production cost centres while personnel, purchase, stores, canteen, accounts are service cost centres.

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The main purpose of cost centre is two fold :

- (i) *Recovery of cost:* Costs are collected, classified and accumulated in respect of a location, person or an item of equipment and then the costs are distributed over the products for recovery of incurred cost, and
- (ii) *Cost control:* Cost centres assist in making a person responsible for the control of expenditure incurred by the cost centre. Manager of each cost centre shall control costs incurred in his area of responsibility.

The size of the cost centre depends on the activity and operation, and feasibility of cost control. Sub-cost centres are created if the size of the cost centres become too big from control point of view.

COST UNIT

While cost centres assist in ascertaining costs by location, person, equipment, operation or process, *cost unit* is a unit of product, service or a combination of them in relation to which costs are ascertained or expressed.

The selection of suitable cost unit depends upon several factors, such as, nature of business, process of information, requirements of costing system, etc. but usually relates to the natural unit of the product or service. For example, in steel and cement industry, the cost unit is 'tonne', while in transportation services, the unit may be passenger-kilometre or tonne-km, etc. It may be noted that while the former is a single cost unit, the latter is a composite unit, i.e., a combination of two units. A few examples of cost units are given below :

<i>Industry or product</i>	<i>Cost unit</i>
Automobile	Number
Biscuit	Kilogram
Bread	Thousand loaves
Breweries	Barrel
Bricks	Thousand bricks
Cigarettes	Thousand cigarettes
Chemical	Litre, gallon, kilogram
Coal, cement	Tonne
Cotton textile	K.G. of yarn or metre of cloth
Gas	Cubic foot or cubic metre
Hospital	Patient day
Hotel	Guest-day, guest room, etc.
Power and electricity	Kilowatt-hour
Steel	Tonne
Transport	Passenger kilometre, Tonne-kilometre

1.15 COST CLASSIFICATION

Cost classification refers to the process of grouping costs according to their common characteristics, such as nature of expense, function, variability, controllability and normality. Cost classification can be done on the basis of time, their relation with the product and accounting period. Cost classification is also made for planning and control and decision making. Thus, classification is essential for identifying costs with cost centres or cost units for the purpose of determination and control of cost :

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- (a) **By nature of expenses:** Costs can be classified into material, labour and expenses as explained earlier.
- (b) **By function:** Costs are classified, as explained earlier, into production or manufacturing cost, administration cost, selling and distribution cost, research and development cost.
 - Production cost begins with the process of supplying material labour and services and ends with primary packing of the finished product.
 - Administration cost is the aggregate of the costs of formulating the policy, directing the organisation and controlling the operations of an undertaking, which is not related directly to production, selling, distribution, research and development activity or function.
 - Selling cost refers to the expenditure incurred in promoting sales and retaining customers.
 - Distribution cost begins with the process of making the packed product available for despatch and ends with making the reconditioned returned empty package available for reuse.
 - Research and development cost relates to the costs of researching for new or improved products, new application of materials, or new or improved methods, processes, system or services, and also the cost of implementation of the decision including the commencement of commercial production of that product or by that process or method.
 - Pre-production cost refers to the part of development cost incurred in making trial production run preliminary to formal production, either in a new or a running factory. In a running factory, this cost often represents research and development cost also. Pre-production costs are normally considered as deferred revenue expenditure and are charged to the cost of future production.
- (c) **By variability:** Costs are classified into fixed, variable and semi-fixed/semi variable costs according to their tendency to vary with the volume of output.
 - **Fixed costs** tend to remain unaffected by the variation or change in the volume of output, such as supervisory salary, rent, taxes, etc.

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- **Variable costs** tend to vary directly with volume of output, such as direct material, direct labour and direct expense.
- **Semi-fixed/semi-variable cost** is partly fixed and partly variable, such as telephone expense, electricity charges, etc.
- (d) **By controllability:** Costs can be classified under controllable cost and uncontrollable cost.
 - Controllable cost can be influenced by the action of a specified member of an undertaking.
 - Uncontrollable cost cannot be influenced by the action of a specified member of an undertaking.
- (e) **By normality :** Costs can be divided into normal cost and abnormal cost.
 - Normal cost refers to the cost, at a given level of output in the conditions in which that level of output is normally attained.
 - Abnormal cost is a cost which is not normally incurred at a given level of output in the conditions in which that level of output is normally attained.
- (f) **On the basis of time :** Costs, may be classified into historical or actual cost and predetermined or future cost.
 - Historical cost relates to the usual method of determining actual cost of operation based on actual expenses incurred during the period. Such evaluation of costs takes longer time, till the accounts are closed and finalised, and figures are ready for use in cost calculations.
 - Predetermined cost as the name signifies is prepared in advance before the actual operation starts on the basis of specifications and historical cost data of the earlier period and all factors affecting cost. Predetermined cost is the cost determined in advance and may be either estimated or standard.
 - Estimated cost is prepared before accepting an order for submitting price quotation. It is also used for comparing actual performance.
 - Standard cost is scientifically predetermined cost of a product or service applicable during a specific period of immediate future under current or anticipated operating conditions. The method consists of setting standards for each elements of cost, comparing actual cost incurred with the standard cost, evaluating the variance from standard cost and finding reasons for such variance, so that remedial steps can be taken promptly to check inefficient performances.
- (g) **In relation to the product :** Costs may be classified into direct and indirect costs.
 - Direct costs are those which are incurred for a particular cost unit and can be conveniently linked with that cost unit. Direct costs are termed as product cost.

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- Indirect costs are those which are incurred for a number of cost units and also include costs which though incurred for a particular cost unit are not linked with the cost unit. Since such costs are incurred over a period and the benefit is mostly derived within the same period, they are called period costs.
- (h) **Cost analysis for decision making:** Here costs are classified under relevant costs (e.g., marginal cost, additional fixed cost, incremental cost, opportunity cost) and irrelevant costs (e.g., sunk cost, committed costs, etc.)

1.16 METHODS OF COSTING

Various methods of ascertaining costs are available to suit the business need. But the basic principles are the same in every method. The choice of a particular method of costing depends on the nature of business of the concern.

There are two basic methods of costing viz. – (a) Specific order or job costing
(b) Continuous operation or process costing.

All other methods are either variation of job or process costing or are just techniques used for particular purpose under specific conditions. Brief description of each of the methods are as follows :

JOB COSTING

Job costing is the basic costing method applicable to those industries where the work consist of separate contracts, jobs, or batches, each of which is authorised by a specific order or contract.

The most important feature is that each job or order can be identified at each stage of production and therefore, costs which can be directly identified with a job or order is charged to that job or order. A share of indirect expenses is also charged to the same. Variation of job costing are contracts costing and batch costing.

- **Contract costing** is the form of specific order costing, generally applicable where work is undertaken to customer's special requirements and each order is of long duration, such as building construction, ship building, structurals for bridge, civil construction, etc. The work is usually done outside the factory.
- **Batch costing** is that form of specific order costing which applies where similar articles are manufactured in batches either for sale or for use within the undertaking. Costs are collected according to batch order number and total costs are divided by total numbers in a batch to arrive at unit cost of each job. The method is applicable in aircraft, toy making, printing industries, etc.

OPERATION COSTING – PROCESS AND SERVICES

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Process costing method is applicable where goods or services result from a sequence of continuous or repetitive operations or processes and products are identical and cannot be segregated. Costs are charged to processes and averaged over the units produced during the period.

Examples are food processing, chemical, dairies, paints, flour, biscuit making, etc. Variations of process costing are found in single or output costing, operation costing, departmental costing as explained below :

- Single or output costing is used when the production is uniform and identical and a single article is produced. The total production cost is divided by the number of units produced to get unit or output cost. Examples are mining, breweries, brick making, etc.
- Operation costing refers to the methods where each operation in each stage of production or process is separately costed. Thereafter, the cost of finished unit is determined. This is suitable to industries dealing with mass production of repetitive nature — for example, motor cars, cycles, toys, etc.
- Departmental costing refers to the method of ascertaining the cost of operating a department or cost centre. Total cost of each department is ascertained and divided by total units produced in that department to arrive at unit cost.

If one product passes through a number of departments for completion, cost of each department will be picked up and the total unit cost will be the aggregate of unit cost of the departments through which the product passes.

SERVICE OR OPERATING COSTING

Operating costing is applicable to service organisation that do not make or sell tangible goods but render services. Examples are transportation companies, hotels, hospitals, schools, electric and gas generation and distribution, etc. Cost of providing and operating a service is ascertained and unit cost is found out by dividing total cost of units of services rendered. Composite units, such as tonne-mile, passenger-kilometre, KWH, etc. are generally used.

Composite or multiple costing: The manufacture of certain products involve a lot of complexities and therefore, any one of the basic methods of job or process costing cannot be used for collecting and presenting product cost. In fact, industries making complex products such as cycles, automobiles, aeroplanes, radios, etc. use combination of various costing methods and the methods are known as composite or multiple costing.

1.17 TECHNIQUES OF COSTING

In each of the costing methods, various techniques may be used to ascertain cost, depending on the management requirement. These techniques may be grouped as follows :

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- A. **Absorption costing** : It refers to the ascertainment of costs after they have been actually incurred. As per this system, fixed as well as variable costs are allotted to cost units and total overheads are absorbed by actual activity level. Absorption costing is termed as total costing, since total costs are ultimately allotted to cost units. It is also termed as historical or traditional costing. However, since costs are ascertained after they have been incurred, and substantial time-gap exists between occurrence of expenditure and reporting off cost information, it does not help to exercise cost control.
- B. **Marginal costing** : It refers to a principle whereby variable costs are charged to cost units and the fixed costs attributable to the relevant period is written off in full against the contribution for that period. Contribution is the difference between sales and variable or marginal cost of sales. Marginal costing is also known as direct or variable costing. It is a valuable aid to management in taking important policy decisions, such as product pricing, choosing product mix, decision to make or to buy, etc.
- C. **Standard costing**: It refers to the technique which uses standards for costs and revenues for the purpose of control through variance analysis. Standards are established for each cost element on a scientific basis for immediate future period, and actuals are compared against the standard. Variances from standards are analysed, reasons established and corrective action taken to stop recurrence of inefficient operation. Thus, standard costing is extremely helpful for cost control. Standard costing is normally used along with budgetary control, which refers to the establishment of budgets relating to responsibilities of executive to the requirements of a policy and the continuous comparison of actual with budgeted results, either to secure by individual action the objective of that policy or to provide a basis for its revision.

Absorption costing system and marginal or direct costing system can be used in conjunction with standard costing system.

- D. **Differential costing**: It is defined as a technique used in the preparation of adhoc information in which only costs and income differences between alternative courses of action are taken into consideration. It considers only the additional costs and additional revenues arising out of the decision regarding addition of a project. Similarly, incremental costing technique considers incremental costs and incremental revenue arising out of a decision to change the level of nature of activity.

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- E. **Uniform costing:** It refers to the use by several undertakings of the same costing system i.e., the same basic methods, principles and techniques. This is not a distinct method of costing. The system is applied by a number of units of the same undertaking or several undertakings within the same industry with a view to promote operating efficiency by comparing inter-unit or interfirm performance data. Trade associations and multinational companies often use this system.

1.18 SPECIFIC COST SYSTEMS

Having discussed the basic methods and techniques of cost, let us look into the other specific types of cost systems developed on the principle of different cost for different purposes. As the word "cost" can rarely stand alone, every prefix or suffix changes its connotation. Some of the frequently used terms not explained earlier are briefly mentioned as follows :

- A. **Opportunity cost :** It is the value of a benefit sacrificed in favour of an alternative course of action. It is the measurable advantage foregone as a result of the rejection of best alternative uses of resources, whether of materials, labour or facilities. This cost does not involve any cash outlay and is computed only for the purpose of comparison in the context of managerial decisions. The concept recognises that resources are scarce and have alternative uses.
- B. **Imputed or Notional cost :** It is a hypothetical cost taken into account in a particular situation to represent a benefit enjoyed by an entity in respect of which no actual expense is incurred. For example, interest on own capital, rent on own premises, etc. are not included in financial accounts, but for determining comparative cost may be included in costs.
- C. **Out of Pocket cost :** It is just the opposite of imputed cost. This is that portion of cost which represents actual cash outlay. Out-of-pocket cost is very much relevant in price fixation during trade depression or when a make or buy decision is to be made.
- D. **Sunk cost :** It represents historical costs, incurred in the past and is irrevocable in a given situation. Hence, a sunk cost is not relevant to current decision making. Generally the book value of an asset is treated as sunk cost, while considering the replacement of the asset.
- E. **Relevant cost :** Costs that are affected by decisions are relevant costs. These are expected future costs, that will differ between alternatives. Future variable costs generally become relevant for decision making, while fixed costs may be irrelevant, if they do not change in total. In the same way if an item of future cost remains same for two or more alternatives, it becomes irrelevant for the decision making.

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- F. **Replacement cost** : It is the current market cost of replacing an asset or a material.
- G. **Policy cost** : Costs incurred as a result of particular policy decision are policy costs. For example, ownership of assets will create a charge for depreciation. Hiring a new office will create a charge for rent. Such depreciation and rent will be policy costs. Policy costs are fixed or period costs.
- H. **Discretionary cost** : Discretionary costs are those which arise from yearly budget appropriation and reflect management policy, having no direct input output relationship between their costs and activity volume. Example are training expenses, advertisement, Employee welfare expense. This is also termed as managed or programmed cost.
- I. **Engineered cost** : It refers to any cost that has an explicit and specified physical relationship with the selected measure of activity. Such a relationship is established either through engineering analysis or analysis of past data. Examples are direct material, direct labour.
- J. **Avoidable cost** : Costs that are specifically incurred of an activity or sector of a business and can be identified with the activity and such costs would be avoided, if the activity or the sector of the business does not exist are avoidable costs. For example, the cost of a machine hired specially to make a particular product will be avoided by discontinuing production of that product, and therefore, is an avoidable cost.
- K. **Unavoidable cost** : Common costs apportioned to a particular activity or a segment of a business are usually unavoidable cost, because total common costs cannot be avoided or even reduced even if that activity or sector does not exist. For example, rent of factory premises apportioned to various activities is unavoidable cost for a particular activity, say machine shop, because a decision to discontinue the machine shop will not help reducing rent of the factory.
- L. **Common cost** : These are costs which are incurred collectively for a number of cost centres and are required to be suitably apportioned for determining the cost of individual cost centres. For example, rent of the factory premises may be apportioned over production and service cost centres on the basis of area.
- M. **Traceable cost** : This is cost which is easily identifiable with a department process or product. This is just the opposite of common cost.
- N. **Joint cost** : Joint cost is the cost incurred up to the split off point between individual joint products arising out of a production process. When joint

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products and/ or by products are processed from the same material and common conversion costs are incurred for these products, the main problem is to apportion joint costs incurred up to the split off point to joint products.

- O. **Step cost** : Step costs are those costs which increase in steps. These costs remain constant over small ranges of output but the cost increases by discrete amounts as activity moves from one range to the next. For example, supervisory expenses, light and heating, etc. will increase when a second shift is started to cope up with additional orders.

1.19 COST DEPARTMENT AND ITS RELATIONSHIP WITH OTHER DEPARTMENTS

In the organisation chart, the cost department occupies a very important position. The cost department is responsible :

- (a) for keeping records connected with material, labour and expenses,
- (b) for analysing all costs of manufacturing, marketing and administration, and
- (c) for issuing control reports and data for decision making to the executives, department heads, section heads and foremen. When management is provided with useful reports, they assist in controlling and improving cost and operations. Such information data are, again, used for making new decisions.

The effectiveness of the control of cost depends upon proper communication through control reports from the cost accountant to the various levels of operating management. Accounting and control reports are directed to these levels of management, i.e., top management, middle management and lower level or shop floor level of management. Each management level requires data for deciding and solving various problems.

The cost accountant must devise a cost system into which data are marshalled to fit the numerous problems confronting management. Therefore, the chart of accounts, which is the accountant's means of classifying costs and expenses must be closely associated with the organisation chart showing principal management position with the line of delegation of authority, responsibility and accountability.

Thus, an organisation chart is essential to the development of a cost system. Analysis of costs and preparation of reports are greatly facilitated by proper division of functions generally listed under cost department. Proper coordination is also necessary with other functions closely allied with cost accounting, such as budget

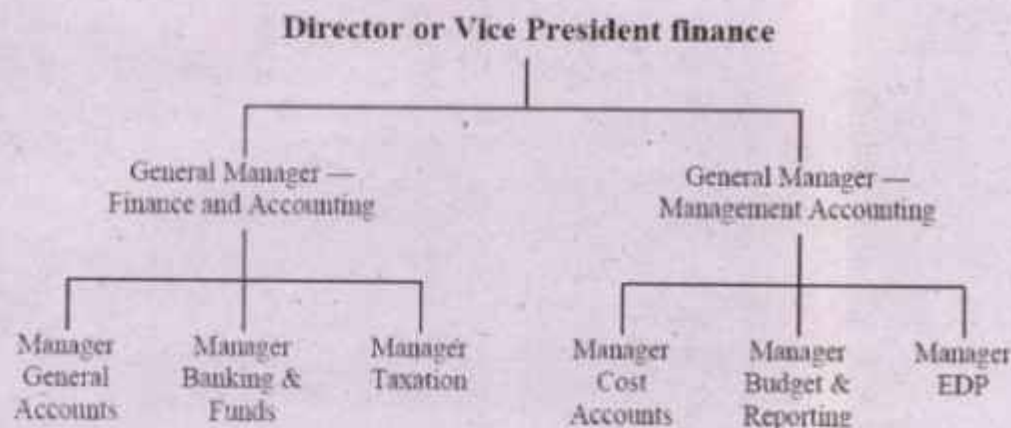
and data processing. These functions should come under the supervision of the finance chief unless they report to the chief of operation directly for other reasons.

The cost department is intimately connected with the other departments in the organisation. Their relationship can be briefly established as follows :

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- A. **Manufacturing departments** control the scheduling, manufacturing and inspection of each job or processed products to their finished stage in terms of efficiency norms established. Costs incurred at each stage are measured and compared with the norms.
- B. **Production planning, research and design department** involve cost department for cost estimates needed for each type of material, labour and machine process before a decision can be reached in accepting or rejecting a design.
- C. **Personnel department** is interested to maintaining employee cost up-to-date. The wage rate and methods of remuneration agreed with the employees form the basis for computing payroll. Cost department provides all data.
- D. **Marketing department** needs a good product at a competitive price. While cost cannot determine price, it can influence fixation of price. Besides, accurate cost data help sales manager distinguish profitable with nonprofitable products and compare cost of marketing against sales volume.
- E. **Public relation department** establishes good relations with the public in general and customers, creditors, shareholders, and employees in particular. The cost department provides information concerning price, cost, etc.
- F. **Legal department** finds cost department helpful in keeping many affairs of the company in conformity with the law, specially excise, customs, sales tax and other legislation regarding maintenance of accounts and cost records.
- G. **The finance department** relies on the cost department for accounting, valuation of inventory, cash flow statements, C.A.S. data for banks, etc. Where finance department is composed of general accounting and cost accounting, besides taxation and funds management departments, it is usual to consider cost accounting department providing unit cost of goods manufactured and sold to general accounting department. The organisation chart of a finance department usually takes the following form.

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1.20 INSTALLATION OF COSTING SYSTEM

Having established the need for a cost department in an organisation, let us find out the method of installation of a cost system. Obviously, it will depend on the objectives of costing, the nature of business and information flow system.

The system will be simple, if object is simple like only price fixing. It aims at controlling cost and measuring efficiency of operations, the requirements will be different. If it is installed as per legal requirement, then it must satisfy the legal needs. The nature of the business will again indicate the degree of complexity of the system. The information flow will depend on the levels of management, who will receive information and the periodicity of reporting required.

In most industries products, cost accounting record rules as prescribed by the Government are to be maintained. In such cases care must be taken so that prescribed proforma can be filled in from the cost records/books of accounts so maintained.

It is evident that installing a good cost system is quite a challenging task. The three fundamental requirements are as follows :

- (i) *Organisation chart* – showing the lines of authority and delegation of responsibility.
- (ii) *Departmentalisation* – dividing the organisation into production and service cost centres, to which expenses are charged.
- (iii) *Chart of accounts* – showing control accounts for the elements of cost as well as expense items, so as to enable collection and classification of costs both expensewise and cost centrewise.

The system requires total involvement by all the beneficiaries i.e. sales, production, engineering, purchase, personnel, quality control departments. The success of the system will finally depend on the top management which must extend full support to the system.

In actual handling of the installation work, the following technical aspects are to be carefully considered.

- to study the existing organisation chart and layout of the factory.
- to follow the production process right from the production planning, purchase and storage of materials, issues of materials to production, production process from initial till primary and secondary packing and loading on transport for distribution.
- to examine documents and reports prepared and issued by each department, including records maintained for returns furnished with the Government and outsiders.
- to interact with various levels of management to find out their expectations of the system.

Finally, the system has to be developed keeping the following factors in view :

- The system should be simple and easy to operate. Complexity should be avoided.
- The system should give accurate, timely and adequate information.
- The system should be elastic and capable of adopting to changed situation.
- The system should be cost-effective. It should yield a much higher return on capital invested in installing and running the department.

1.21 SUMMARY

- *Cost accounting* is considered as the technique and process of ascertaining costs of a given thing. In sixties, the definition of cost accounting was modified as 'the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and ascertainment of profitability of goods, or services'.
- The earliest reference of cost accounting can be found in Robert Loder's farm accounts 1610-20. However, the industrial revolution in the 18th century brought about extensive mechanisation of production system resulting in large scale production. Some sporadic efforts were made in U.K. and U.S.A. to install factory cost systems as far back as 1805.
- In financial accounts, the monetary transactions of the business are recorded, classified and analysed in an orderly manner, so as to prepare periodic results in the form of profit and loss account or income statement and balance sheet, indicating the financial position of the business at the end of that period.
- Management accounting is not a specific system of accounts, but could be any form of accounting which enables a business to be conducted

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more effectively and efficiently. Management accounting in the words of Robert S. Kaplan, is a system that collects, classifies, summaries, analyses and reports information that will assist managers in their decision making and control activities.

1.22 REVIEW QUESTIONS

1. What one the limitations of financial accounting? How do you overcome item in cost accounting?
2. Define costing. How does it differ from financial accounting? Explain its importance under present circumstances.
3. State the advantages of costing. How it aids the management and what objections are raised against cost accounts?
4. Define costing. Discuss briefly the objectives and advantages of costing.
5. "Cost accounting is an essential tool of management". Give your comments on the statement.
6. What are the basic objectives of cost accounting ? In which way it differs from financial accounting?
7. Can a functional relationship be established between cost accounting and management accounting ? State some of the objectives of management accounting?
8. What are the functions and characteristics of a good costing system ?

1.23 FURTHER READINGS

- Arora, M. N., *Cost and Management Accounting- Theory and Problems*, Himalaya Publisher, New Delhi.
- Jain, S.P. and Narang, K.L., *Cost & Management Accounting*, Kalyani Publishers, New Delhi, 2009.
- Ashton D., Hopper T., Scapens R. W., 1995, *Issues in Management Accounting*, Prentice Hall, London.

TOTAL AND MARGINAL COST

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STRUCTURE

- 2.1 Learning Objectives
- 2.2 Introduction
- 2.3 Basic Concept of Marginal Cost
- 2.4 Marginal Costing vs. Absorption Costing
- 2.5 Cost-Volume-Profit (CVP) Analysis
 - The Basic Principles of CVP Analysis
- 2.6 Profit-Volume Ratio
- 2.7 Break-even Analysis
- 2.8 Application of Marginal Costing for Decision-Making
- 2.9 Relevant Costs for Decision Making
- 2.12 Summary
- 2.11 Review Questions
- 2.12 Further Readings

2.1 LEARNING OBJECTIVES

After going through this unit, students will be able to :

- state the fundamental concept of total and marginal cost;
- know the method of cost-volume-profit analysis;
- discuss the application of marginal cost for decision making.

2.2 INTRODUCTION

The need for a decision arises in business because a manager is faced with a problem and alternative courses of action are available. In deciding which option to choose he will need all the information which is relevant to his decision; and he must have some criterion on the basis of which he can choose the best alternative. Some of the factors affecting the decision may not be expressed in monetary value. Hence, the manager will have to make 'qualitative' judgements, e.g. in deciding which of two personnel should be promoted to a managerial position. A 'quantitative' decision, on the other hand, is possible when the various factors, and relationships between them, are measurable. This chapter will concentrate on quantitative decisions based on data expressed in monetary value and relating to costs and revenues as measured by the management accountant.

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No distinction has been made between fixed and variable components of overheads, and total overheads are absorbed according to the activity level. Absorption costing technique suffers from two basic weaknesses, which renders it useless for taking managerial decisions :

- (i) Costs differ if levels of output vary from one period to another due to the application of fixed overheads. Same product may cost differently on 28th February and 1st March because of variation in output and expense. February have less number of working days than January, and fixed overheads have been distributed over a lower volume of output.
- (ii) Carry-over a portion of fixed overheads from one period to subsequent period along with closing inventory, which makes comparison between two periods useless. Besides, under this technique, profit and loss in the accounts are related to production and sales, i.e., including unsold stock. But profit is earned only when sale is effected.

Absorption costing technique is useful, if :

- (i) there is only one product,
- (ii) there is no inventory, and
- (iii) overhead recovery rate is based on normal capacity, instead of actual level of activity.

We have, therefore other techniques of costing, which serve the purpose of cost control and both strategic and tactical decision-making, such as, marginal costing, standard costing, budgetary control, differential costing, etc.

2.3 BASIC CONCEPT OF MARGINAL COST

Marginal costing is a technique of ascertaining cost used in any method of costing. According to this technique, variable costs are charged to cost units and the fixed cost attributable to the relevant period is written off in full against the contribution for that period. Contribution is the difference between sales value and variable cost. Thus, all expenses are classified under two groups, variable and fixed. Variable expenses are those which vary in sympathy with increase or decrease of unit production or sales.

Variable expenses are direct materials, direct labour, direct expenses, variable factory overheads and variable administration, selling and distribution overheads. Fixed expenses include fixed factory overheads, administration overheads and fixed selling and distribution overheads.

Fixed expenses have no effect on the volume of activity and are written-off to the profit and loss account at the end of the period. It is, therefore, called period cost. Variable cost, on the other hand, relates to the product, and hence, termed as product cost.

Marginal costing technique is based on the segregation of fixed and variable costs. Fixed costs or period or time costs arise from policy decisions of the top-management to provide and to keep in readiness a given capacity to produce and sell, regardless of the current actual volume of production or sales. Most of the fixed costs are determined by the volume of business expected rather than by the volume of business actually done.

Variable costs or product or output costs, on the other hand, vary directly or tends to vary directly with current volume without need for managerial decision. Time has no effect on this type of cost.

However, it is important to note that fixed costs tend to remain unchanged only within a given range of activity and within a relevant time-period. If activity level fluctuates from zero level to full capacity, naturally fixed expenses cannot remain constant. Similarly, fixed cost cannot remain unchanged over a long period of time. Even within a short period, say, one year, there may be changes in salary and wages for normal increments or change in Dearness Allowance rates or price increase due to inflation. Such changes are inevitable even within a short period, say, one year. Hence, the concept of fixed cost as envisaged in marginal costing holds good within a relevant period. Variable costs normally remain unaffected by the change in activity level or change in the period, unless there is operational changes.

Income Statement

Under marginal costing technique, Income Statement is presented in the following format :

Sales

Less: Variable manufacturing cost —
 Direct material
 Direct labour
 Direct expenses
Variable factory overhead
Variable admn., selling and distrn. overhead
Variable cost of sales

Contribution or Gross Margin

Less: Fixed costs —
 Manufacturing overhead
 Administrative overhead
 Selling and distribution overhead
Total fixed costs

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Net Income or Net Margin

It is evident from above that contribution is an unit concept, and relates to cost units, so much so that given volume of output, the total contribution can be worked out. For example, if sales value of a Product A is Rs. 10 per unit, variable cost of sales Rs. 4 and total output is 200 units, then total contribution will be Rs. 1200 i.e. $200 \times (10 - 4)$. If another Product B sells at Rs. 12 per unit having variable cost of sales Rs. 5, and total output is 300 units, then contribution of Product B will be Rs. 2100 i.e., $300 \times (12 - 5)$. If fixed cost for the same period is Rs. 1500, the net income will be Rs. 1,800 i.e., $(Rs. 1200 + 2100) - 1500$. Graphically, it can be presented in the following manner

	Product A		Product B	Total
	Rs.		Rs.	Rs.
Sales	2000	Sales	3600	5600
Less : Variable cost	800	Less : Variable cost	1500	2300
Contribution	1200	Contribution	2100	3300
		Less : Fixed cost		1500
		Net Income		1800

Each of the products will add their contribution in a pool, from where fixed expenses will be met. Any surplus in the pool fund will indicate profit. Any deficit will indicate loss. The merit in such an analysis is that profitability of each product is reflected correctly, in that the contribution of each product is independent of the others, as well as of the fixed overheads. Any variation in the contribution rate or sales volume will have effect on the overall profit of the organisation.

2.4 MARGINAL COSTING VS. ABSORPTION COSTING

Under marginal costing system, inventory is valued at variable cost, and fixed cost is deducted from contribution to arrive at profit. Profit is termed as net income or net margin. No portion of fixed cost enters into inventory value, hence no part of fixed cost is carried to the next period with work-in-progress and finished goods. Thus, profit is related entirely to the sales value of the period and production has no bearing on the profit. Herein lies the basic difference between absorption costing and marginal costing techniques, which can be summarised as follows :

(a) Concept of profit

- Under absorption costing, net profit is arrived at by deducting administration, selling and distribution expenses from gross profit.
- Under marginal costing, net profit is arrived at by deducting fixed expenses from contribution.

The difference lies in the gross profit and contribution margin concepts.

(b) Valuation of inventory

Under absorption costing, inventory is valued at factory cost, which includes production overheads, - both fixed and variable. A part of production overhead is, therefore, carried to the next accounting period with work-in-progress and finished goods. As a result, profits of both current period as well as next period are influenced by the inventory value. Under marginal costing, inventory is valued at variable cost and no part of fixed cost is applied to the inventory. Thus, the influence of production on profit is totally eliminated. Profit of both the periods remain unaffected by the inventory holding. Hence, net profit will be the same under both the techniques, if no inventory exists. Net operating profit will differ, if inventory exists.

The effect upon profit it under absorption and marginal costing will differ with the increase or decrease of inventory as indicated below :

Inventory position	Effect on profit shown by absorption costing and marginal costing
(a) Production and sales are same - Nil inventory	Profit same under both the techniques.
(b) Sales less than production i.e., closing stock increase.	Absorption costing will show higher profit than under marginal costing, since some portion of current cost is transferred to next period with inventory value.
(c) Sales more than production i.e., closing stock is less than opening stock.	Absorption costing will show lower profit than under marginal costing, since some cost of previous period is added to this period, which reduces profit, whereas under marginal costing, fixed cost of the period only will be deducted from gross margin.

2.5 COST-VOLUME-PROFIT (CVP) ANALYSIS

Two significant relationships between Sales, Cost and Profit can be established; they are :

(a) $\text{Sales} - \text{Variable cost} = \text{Contribution}$

(b) $\text{Contribution} - \text{Fixed cost} = \text{Profit or Contribution} = \text{Fixed cost} + \text{Profit}$.

Hence, $\text{Sales} - \text{Variable cost} = \text{Fixed cost} + \text{Profit}$.

From the above equation, it is clear that if any three of the above are known, the fourth one can be worked out. The same equation can also be used to find

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out break even point (BEP), where there will be no profit and no loss. It is that volume of sale, where $\text{Sales} - \text{Variable cost} = \text{Fixed cost}$.

From total sales volume variable cost and fixed cost, break even sales can be calculated as follows :

Suppose, $S = \text{Total sales value}$
 $V = \text{Variable cost}$
 $F = \text{Fixed cost}$

Then,

$$\begin{aligned}\text{Break-even sales} &= (\text{Contribution at break-even point} / \text{P/V ratio}) \\ &= \text{Fixed cost} / \text{P/V ratio}\end{aligned}$$

[Since, Contribution at break-even point = Fixed cost]

Here, we will get sales in rupee value

If we want to obtain break-even sales in units we can utilise the following formulae directly

$$\text{Break-even (units)} = \text{Fixed cost} / \text{Contribution per unit}$$

THE BASIC PRINCIPLES OF CVP ANALYSIS

CVP analysis is based on the assumption of a linear total cost function (constant unit variable cost and constant fixed costs) and so is an application of marginal costing principles.

The principles of marginal costing can be summarised as follows:

- Period fixed costs are a constant amount, therefore if one extra unit of product is made and sold, total costs will only rise by the variable cost (the *marginal cost*) of production and sales for that unit.
- Also, total costs will fall by the variable cost per unit for each reduction by one unit in the level of activity.
- The additional profit earned by making and selling one extra unit is the extra revenue from its sales minus its variable costs, i.e. the contribution per unit.
- As the volume of activity increases, there will be an increase in total profits (or a reduction in losses) equal to the total revenue minus the total extra variable costs. This is the extra contribution from the extra output and sales.
- The total profit in a period is the total revenue minus the total variable cost of goods sold, minus the fixed costs of the period.

2.6 PROFIT-VOLUME RATIO

$$\begin{aligned}\text{The P/V ratio formulae, } (S - V)/S &= (\text{Sales} - \text{Variable cost})/\text{Sales} \\ &= \text{Contribution}/\text{Sales}\end{aligned}$$

It indicates a ratio of contribution in relation to sales, or profit in relation to sales volume. This is called profit/volume or P/V ratio. So long as unit selling price and unit variable cost remain constant, P/V ratio can also be found out by expressing change in contribution in relation to change in sales. P/V ratio is normally expressed in percentage. P/V ratio determines the increase or decrease in contribution which can be expected from increase or decrease in volume, provided there is no change in other factors. A higher P/V ratio will indicate high profitability, whereas a lower P/V ratio will indicate low profitability. Where the profitability is high, increase of sales volume is possible through more spending in advertisement and sales promotion. The scope for price reduction in the face of stiff competition is also revealed by P/V ratio.

Any improvement of P/V ratio indicates additional profit, since the additional contribution will only add to profit, fixed overheads remaining constant. The improvement of P/V ratio can be done by any of the following ways :

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- (i) increasing selling price,
- (ii) reducing variable cost, and
- (iii) if there are more than one products, then changing sales-mix i.e., increasing sales of products having higher P/V ratio.

Illustration : A retail trader has just started his business by setting a cosmetic article at Rs. 20 each, the variable cost of purchase, etc. of which is Rs.12. The fixed costs are Rs. 8,000 per month. You are required to —

- (a) Establish the fundamental margin cost equations and calculate
 - (i) P/V ratio
 - (ii) Break-even sales
 - (iii) Profit at sales Rs. 40,000
 - (iv) Sales to earn a profit of Rs. 5000
 - (v) Margin of safety when sales are Rs. 44000
- (b) Using a simple model of CVP calculate —
 - (i) Break-even sales
 - (ii) Profit at sales Rs. 40000
 - (iii) Sales to earn profit of Rs. 5000.

Solution :

- (a) The usual marginal cost equations are

$$S - V = C \quad \dots\dots\dots (1)$$

$$P + F = C \quad \dots\dots\dots (2)$$

$$S - V - F = P \quad \dots\dots\dots (3)$$

$$P/V \text{ Ratio} = \frac{C}{S} \text{ or } \frac{\Delta C}{\Delta S} \text{ or } \frac{\Delta P}{\Delta S} \quad \dots\dots\dots (4)$$

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$$S = \frac{C}{P/V \text{ Ratio}} \quad \dots\dots\dots (5)$$

$$C = S \times P/V \text{ Ratio} \quad \dots\dots\dots (6)$$

$$S_{BEP} = \frac{C_{BEP}}{P/V \text{ Ratio}} = \frac{F}{P/V \text{ Ratio}} \quad \dots\dots\dots (7)$$

$$M/S = \text{Sales at selected activity} - B.E. \text{ Sales}$$

$$\text{or} \quad \frac{P}{P/V \text{ Ratio}} \quad \dots\dots\dots (8)$$

$$\dots\dots\dots (9)$$

(i) $P/V \text{ Ratio} = (C/S) = \text{Rs. } 8/20 = 0.40 \text{ or } 40\%$

(ii) $B.E.S = \text{Rs. } 8000/0.40 = \text{Rs. } 20000 \text{ or } (1000 \text{ units})$

(iii) $C = 40000 \times 0.40 = \text{Rs. } 16000$

Hence Profit is $(\text{Rs. } 16000 - \text{Rs. } 8000) = \text{Rs. } 8000$

(iv) To earn a profit of Rs. 5000 is to earn a contribution of $(\text{Rs. } 5000 + \text{Rs. } 8000) = \text{Rs. } 13000$.

$$\text{Sales} = 13000/0.40 = \text{Rs. } 32500$$

(v) $M/S = 4000 / 0.40 \text{ Rs. } 10000$

(vi) $M/S = \text{Rs. } 44000 - 20000 = \text{Rs. } 24000$

(c) A simple CVP model is -
$$n(S - V) \text{ or } \frac{P}{P/V \text{ Ratio}} = \frac{F}{P/V \text{ Ratio}}$$

Where n = Number of units; S is the selling price per unit and V is the variable cost per unit, F is the fixed cost and P is the profit

(i) At, Break-even point $(P) = 0$,

Hence, $n(20 - 12) - 8000 = 0$ or, $n = 1000 \text{ units (or sales Rs. } 20000)$

(ii) When $S = 40000$, $n = 2000 \text{ units}$

Hence $P = 2000 \times 8 - 8000 = \text{Rs. } 8000$

(iii) Here, $n \times 8 = 5000 + 8000$

or, $n = 1625 \text{ units (or, Rs. } 32500)$

2.7 BREAK-EVEN ANALYSIS

A Break even chart depicts marginal costing technique graphically. It is a "chart which shows the profitability or otherwise of an undertaking at various levels of activity and as a result indicates the point at which neither profit nor loss is made". The break even chart (BEC) indicates the following :

(a) Variable cost, fixed cost and total cost

(b) Sales value

(c) Profit or loss and point of "no-profit, no loss" i.e. break-even point.

(d) Margin of safety.

The margin of safety represents excess sales over and above the Break-even point, and indicates the strength of the business.

Construction of Break-even Chart

Construction of break-even chart involves the drawing of fixed cost line, total cost line, and sales line as follows :

- (1) Select a scale for production on the horizontal axis and a scale for costs and sales on the vertical axis.
- (2) Plot the fixed cost on the vertical axis and draw fixed cost line passing through this point parallel to horizontal axis.
- (3) Plot the variable costs for some activity levels starting from the fixed cost line and join these points. This will give the total cost line. Alternatively, obtain total cost at different levels, plot the points starting from horizontal axis and draw the total cost line.
- (4) Plot the maximum or any other sales volume and draw the sales line by joining zero and the point so obtained.

Illustration : A company produces a single article and sells at Rs. 10 each. The marginal cost of production is Rs. 6 each and total fixed cost of the concern is Rs. 400 per annum.

Construct a break-even chart and show :

- (a) break-even point ;
- (b) margin of safety at sales Rs.1,500 ;
- (c) angle of incidence ;
- (d) increase in selling price if the break-even point is reduced to 80 units.

Solution : A break-even chart is prepared by obtaining the information at these levels –

Output	40	80	120	200
	Rs.	Rs.	Rs.	Rs.
Sales	400	800	1,200	2,000
Fixed cost	400	400	400	400
Variable cost	240	480	720	1,200
Total cost	640	880	1,120	1,600

Fixed cost line, total cost line, and sales line are drawn one after another following the usual procedure described hereinbefore.

- (a) **Break-even point :** This is the point at which the sales line and the total cost line intersect. Here B is the break-even point equivalent to a sale of Rs. 1,000 or 100 units.
- (b) **Margin of safety :** This is the difference in sales or units of production

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- from the breakeven point. Thus margin of safety at M is sales of (Rs. 1,500 — Rs. 1,000) i.e., Rs. 500 or 50 units of production.
- (c) *Angle of incidence* : This is the angle formed by the sales line and the total cost line at the break-even point. A large angle of incidence shows a high rate of profit being made and *vice versa*.
- (d) At 80 units the total cost (from the table) = Rs. 880 = Sales value of 80 units. Hence, selling price for break-even at 80 units = Rs. 880/80 = Rs. 11 per unit. Increase in selling price is Re. 1 or 10% over the original selling price of Rs. 10 per unit.

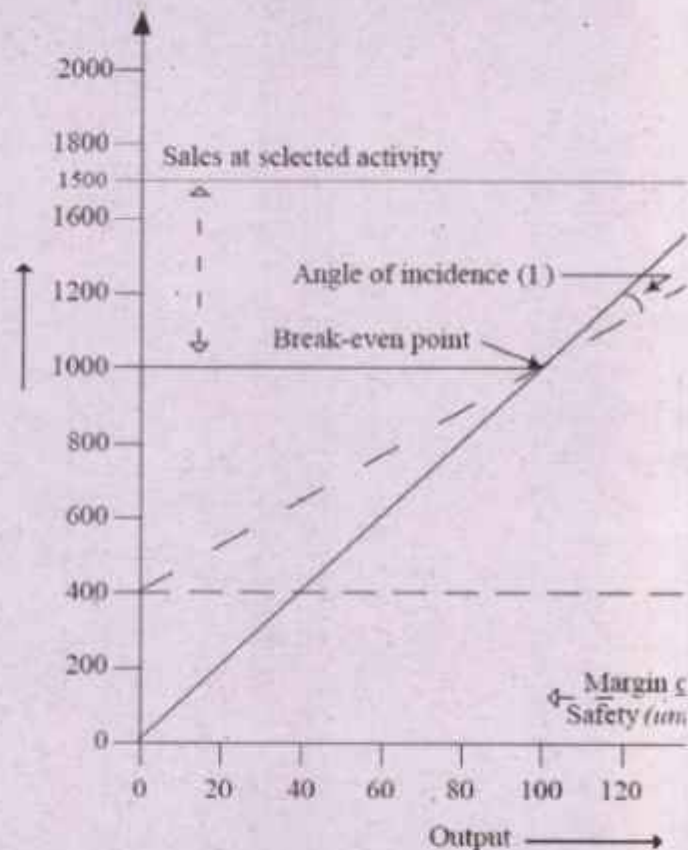


Fig. : Contribution Break-even Chart

This chart shows clearly the break-even point, margin of safety and angle of incidence.

Alternative forms of break-even chart : A break-even chart should be in a form which is suitable for the particular purpose. The following is a *Contribution Break-even Chart* showing the contribution more clearly than the orthodox type. Some cost accountants favour it because of the fact that it reveals more clearly the effects of fixed overheads on volume of sales. The graph is obtained from the information of previous Illustration in a similar way to previous Figure, except that variable cost line is drawn first, then fixed cost and sales lines are drawn.

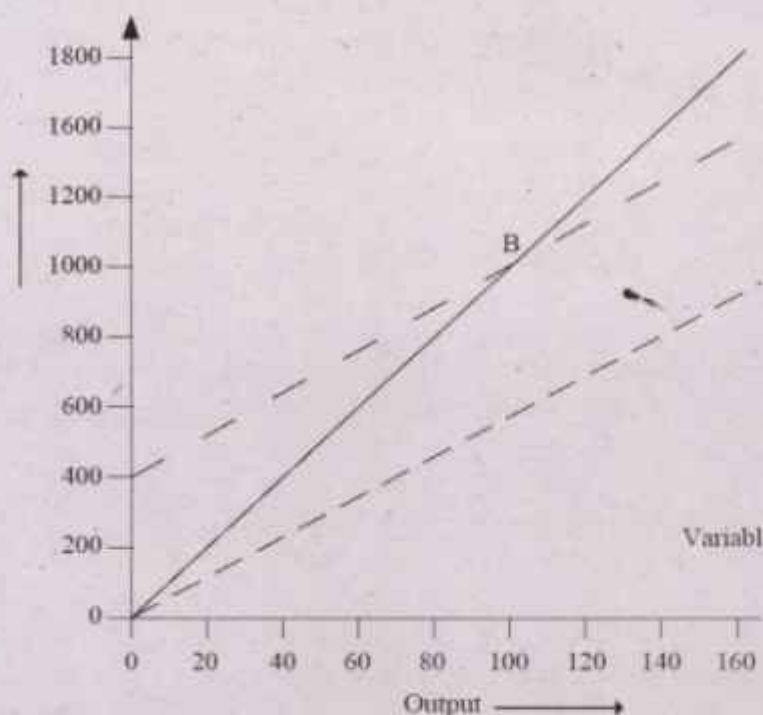


Fig. : Contribution Break-even Chart

This chart shows clearly the contribution at various levels of production.

An analytical break-even chart is another form showing –

- (i) *Fixed costs*: divided into production fixed overhead, administration and selling and distribution fixed overheads;
- (ii) *Marginal costs*: divided into direct material cost, direct wages and variable overhead relating to factory, administration, selling and distribution; and
- (iii) *Profit appropriations*: divided into income-tax, preference dividends, ordinary dividends and reserves.

There are other forms of break-even charts, such as, cash break-even chart showing cash requirements during period under different heads; control break even chart comparing the actual profits, break-even points and sales with those of the budget, etc.

MARGIN OF SAFETY AND ANGLE OF INCIDENCE

Margin of safety as explained earlier is denoted by excess over the break-even sales, and represents the strength of the organisation. A high margin of safety gives confidence to the organisation. A sudden drop in volume will not affect the profit so much. On the other hand, an undertaking with low margin of safety may wipe off the profit and turn into a loss with a drop in sales. Margin of safety (MoS) can be mathematically expressed using the marginal cost equations, namely, –

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Margin of safety = Sales at selected activity – Break-even Sales

or,
$$= (\text{Profit}) / (\text{P/V Ratio})$$

When,
$$\text{profit} = \text{Sales} - \text{Total cost, and}$$

$$\text{P/V ratio} = \text{Contribution} / \text{Sales}$$

When,

M/S is expressed in ratio we get, $M/S = (\text{Sales at selected activity} - \text{B. E. S.}) / \text{Sales at selected activity}$

Angle of incidence is an indicator of profit earning capacity above the break-even point. A wider angle will indicate higher profitability, while a narrow angle will indicate very low profitability.

If margin of safety and angle of incidence are considered together, they will provide significant information to management regarding profit earning position of the undertaking. A high margin of safety with a wider angle of incidence will indicate the most favourable condition of the business.

VARIATIONS OF BREAK-EVEN CHART

Break-even charts can be presented in various forms, such as,

- (i) Profit-volume graph,
- (ii) Multi product break-even chart,
- (iii) Elementwise break-even chart,
- (iv) Cash break-even chart,
- (v) Control break-even chart.

Each of the above charts highlights some specific objective. For example, in the profit volume graph, the relationship between profit and volume can be indicated, if any two of the following data are known, viz., fixed overheads, profit at a given level of activity and break-even point.

The graph is divided into two areas, - the vertical axis above 'X' axis i.e. zero line represents profit area and the vertical axis below the 'X' axis represents the loss or fixed cost area.

That means, 'X' axis denotes break-even line.

USES OF P/V RATIO

When P/V ratio has been established, it is possible to determine—

- (a) variable cost of any volume of sales,
- (b) break-even point, and the level of output required to earn a desired profit, and
- (c) product-mix to improve overall profit of the concern.

Break-even chart is drawn with certain assumptions, such as, variable cost per unit is fixed, and fixed cost in total is fixed within the level of activity. Sales value also indicate same unit price at all levels. As a result, each of the lines is a straight line. In actual practice, it is highly unlikely that variable cost, fixed cost and selling price remain totally unaffected by change in the level of activity. In fact, these lines may assume curved lines or steps for change at various levels of activity, and instead of one Break even point, there may be several Break-even points.

Besides, Break-even charts ignore the capital employed in business, which is one of the important factors in the determination of profitability. It is, therefore, wise not to place too much reliance on a break even chart or consider it as the only means of judging the profits to be obtained at higher levels. Perhaps, the best way of using Break even chart is to consider it as being an instantaneous photograph of the current position and possible future trend. The chart can be used along with other information before important conclusion is drawn by the management.

2.8 APPLICATION OF MARGINAL COSTING FOR DECISION-MAKING

Marginal costing technique is frequently used for short-term decision-making. As has been seen earlier, the contribution margin helps to forecast income, since fixed cost remains unchanged. It has to be remembered that the fixed cost remains unchanged over a relevant period, not a long period, and within the relevant range, perhaps not if production doubles the capacity. Within this parameter, variable costs, which vary in direct proportion to the changes in the activity level are the only relevant costs for short-term decision-making. In such decisions, fixed costs do not count. The basic consideration in all decision-making is that marginal contribution is a reliable index of profitability. When alternative courses of action are available, the most suitable course will be one which gives highest contribution, provided there are no limiting factors. Fixed costs will not be taken into consideration except where these are liable to change as a result of the proposed action. For example for an additional product, if a machine has to be purchased or a conveyor belt has to be extended, the fixed cost will increase marginally.

Marginal costing technique helps short-term decision-making in the following areas –

- (a) Profit planning and selection of profitable product-mix.
- (b) Problems of limiting factor.
- (c) Performance evaluation.

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- (d) Fixation of selling price.
- (e) Accepting additional order and capacity utilisation.
- (f) To make or buy.
- (g) Alternative methods of manufacture.
- (h) Closing down or suspending activities.

LIMITING FACTOR

In the same way, under difficult situation, when a limiting factor restricts the output, a contribution analysis based on the limiting factor can help maximising profit. For example, if machine availability is the limiting factor, then machine hour utilisation by each product shall be ascertained and contribution shall be expressed as so many rupees per machine hour utilised. Then, emphasis of one product in relation to the other one changes and subject to other conditions remaining same, it is possible to influence total contribution and thereby maximise profit.

FIXATION OF SELLING PRICE

Marginal costing technique is increasingly used for fixation of selling price in a multi-product company. It is extremely useful where products are many, and fixed overheads are not too high. On the other hand, where variable cost is low, but fixed cost is too high, as in say, Petrochemical industry, the gap between the contribution margin and selling price becomes very wide and price fixation based on contribution becomes risky. Again, in the long period, all overheads have to be recovered by sales, so as to make profit, and make the business run. Hence, total costs are also considered in such cases.

When marginal cost is applied to fixation of selling price, it should be remembered that the price cannot be less than marginal cost. The price should be fixed above the contribution level in a way so as to have sufficient margin to contribute to the pool of fixed cost and profit. The margin depends on so many factors, such as, demand and supply, competition, nature of product, management policy, marketing strategy, etc.

If the price is equal to marginal cost, then no contribution will be left for fixed cost recovery, and hence, will result in loss. Therefore, even for a short period, selling price should be higher than marginal cost.

There are occasions when selling at or below marginal cost may be justified for a very short period. Mentioned below are some of the situations :

- (i) To maintain production and to keep employees occupied during a trade depression.
- (ii) To prevent loss of future orders.
- (iii) To dispose of perishable goods.

- (iv) To eliminate competition of weaker rivals.
- (v) To popularise a new product.
- (vi) To help in selling a conjoined product which is making substantial profit.
- (vii) To keep the plant ready for "full production" ahead.
- (viii) To explore foreign market when export incentives and import quotas make good the loss.

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TO MAKE OR BUY

Components and spare parts may be made in the factory instead of buying from the market. In such cases, the marginal cost of manufacturing the components or spare parts should be compared with market price while taking decision "to make or buy". If marginal cost is lower than the market price, it is more profitable to make than purchasing from market. Additional or specific fixed cost may be a relevant cost. However, the decision shall depend on capacity utilisation. If unused capacity is available, then comparing only variable cost with market price will hold good. But if the factory operates on full capacity, then such decision has to be taken after adding opportunity cost of the product which is replaced by the manufacture of the component.

Advantages of Marginal Costing :

- (i) Variable cost remains constant per unit of output and fixed costs remain constant in total during short period. Thus control over costs becomes more effective and easier. Standards can be set for variable costs, while Budgets can be established for fixed cost in order to exercise full control over the total activities.
- (ii) Marginal costing brings out contribution or profit margin per unit of output, and clearly brings out the effect of change in activity. It facilitates making policy decisions in a number of management problems, such as determining profitability of products, introducing a new product, discontinuing a product, fixing selling price, deciding whether to make or buy, utilising spare capacity, profit-planning, etc.
- (iii) The distinction between product cost and period cost helps easy understanding of marginal cost statements.
- (iv) Closing inventory of work-in-progress and finished goods are valued at marginal or variable cost only. This method leads to greater accuracy in arriving at profit as it eliminates any carry over of fixed costs of the previous period through inventory valuation.
- (v) As a corollary to above, since fixed costs do not enter into product-cost, it eliminates the process of allocating, apportioning and absorbing overheads, and adjusting underand over-absorbed overheads. Therefore, the method is simpler to operate.

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Disadvantages or Limitations of Marginal costing are as follows :

- (i) The technique is based on the segregation of costs into fixed and variable ones, while many expenses are neither totally fixed nor totally variable at various levels of activity. Thus, classifying all expenses into two categories of either fixed or variable is a difficult task.
- (ii) The assumptions regarding behaviour of costs, such as, fixed cost remains static, are often not realistic.
- (iii) Contribution is not the only index to take decisions. For example, where fixed cost is very high, selling price should not be fixed on the basis of contribution alone without considering other key factors such as capital employed.
- (iv) Marginal cost, if confused with total cost while fixing selling price may lead to a disaster.
- (v) Inventory valuation at marginal cost will understate profits and may not be acceptable by tax-authorities. Any claim based on cost will be very low, as it will not have a share of fixed cost.

2.9 RELEVANT COSTS FOR DECISION MAKING

The costs which should be used for decision making are often referred to as "relevant costs". CIMA defines relevant costs as 'costs appropriate to aiding the making of specific management decisions'.

To affect a decision a cost must be:

- (a) **Future** : Past costs are irrelevant, as we cannot affect them by current decisions and they are common to all alternatives that we may choose.
- (b) **Incremental** : Meaning, expenditure which will be incurred or avoided as a result of making a decision. Any costs which would be incurred whether or not the decision is made are not said to be incremental to the decision.
- (c) **Cash flow** : Expenses such as depreciation are not cash flows and are therefore not relevant. Similarly, the book value of existing equipment is irrelevant, but the disposal value is relevant.

Other Terms :

- (d) **Common costs** : Costs which will be identical for all alternatives are irrelevant, e.g., rent or rates on a factory would be incurred whatever products are produced.
- (e) **Sunk costs** : Another name for past costs, which are always irrelevant, e.g. dedicated fixed assets, development costs already incurred.
- (f) **Committed costs** : A future cash outflow that will be incurred anyway, whatever decision is taken now, e.g. contracts already entered into which cannot be altered.

It has been observed the marginal costing technique is applicable within a relevant range and a relevant period. It might give misleading results, if the decision variables do not lie within the 'relevant range' and time span exceeds 'relevant period'. Non-routine decisions are often required to be taken, such as, replacing an equipment, changing a method, introducing a new programme, etc., when quantitative as well as qualitative factors are to be considered. So far as quantitative factor is concerned, only relevant costs are considered. Costs that are affected by the decision are relevant costs, while those are not affected are irrelevant costs and should be ignored. Differential cost analysis provides one such method which is explained below.

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DIFFERENTIAL COST ANALYSIS

Differential costing is defined as a technique used in the preparation of ad-hoc information in which only costs and income differences between alternative courses of action are taken into consideration. (CIMA Terminology). Costs may increase or decrease due to change in production, sale, production method, production-mix, etc.

This change in total cost at a particular level of activity compared to another one is called differential costs, which are obtained by subtracting costs at one level from those at a higher level. Differential cost calculation includes both variable as well as fixed costs which are affected by the alternative course of action. Thus, the information can be presented by absorption costing or marginal costing techniques.

Difference with Marginal Costing

In fact, differential costs are often confused with marginal costs. This is because of the fact that both marginal costing and differential cost analysis stem from the basic behaviour of cost, i.e., fixed and variable. When fixed cost remain unaffected, both marginal costs and differential costs are the same. However, they are not the same. The differences are as follows :

- (a) Marginal cost is an unit concept and applies to output per unit basis. Differential cost is a total concept and applies to a fixed additional quantity of output.
- (b) Marginal costing is presented by showing contribution per unit and fixed cost as a total amount. Differential costs are presented in totals in both formats – i.e., under marginal cost as well as absorption cost techniques.
- (c) Product cost under differential cost analysis may contain fixed costs, which will not be so under marginal costing.

Use of Differential Cost Analysis

Differential cost analysis may be a useful technique in taking appropriate policy decisions, such as, –

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- (i) Acceptance of an additional order at lower than existing price to a special customer,
- (ii) Acceptance of an export order, requiring additional outlay,
- (iii) Introduction of a new product,
- (iv) Opening of a new sales territory or channel of distribution,
- (v) Processing of a by-product or a joint product beyond the split-off point.

In all such cases, the differential cost is compared with incremental revenue. As long as incremental revenue is more than or equals to incremental or differential cost, the additional activity is justified. However, if differential cost exceeds incremental revenue, the project should be abandoned.

Incremental Cost and Incremental Revenue

A slight variation of differential cost analysis is incremental costing, which is defined as a technique used in the preparation of adhoc information, where consideration is given to a range of graduated or stepped changes in the level or nature of activity, and the additional costs and revenues likely to result from each degree of change are presented. (CIMA terminology). Incremental costing technique considers incremental costs and incremental revenue arising out of a decision to change the level of activity. If the incremental revenue exceeds incremental cost by changing a level of activity, it will be an acceptable decision.

SUNK COST

Relevant costs are aimed at decision making, which again are taken for future. Hence, past costs incurred are sunk, and has no relevance in the decision which will apply for future activity. Cost of a fixed asset is an example of sunk cost. Expenditure incurred in research and development for new product, new method, etc. are all instances of sunk costs, which are not retrievable by managerial action, and hence irrelevant for future decisions.

OPPORTUNITY COST

Again, for each decision, there may be alternatives. Each alternative will have its cost and benefit. Analysis should be made for those costs which are different in each alternative, and therefore, relevant. Opportunity cost is based on the concept of scarce resources, which have alternative uses. Opportunity cost is defined as the value of benefit sacrificed in favour of an alternative course of action. There may be alternative uses of a factor of production. Opportunity cost is the contribution foregone by not accepting the best of the alternatives.

AVOIDABLE AND UNAVOIDABLE COST

Costs may be avoidable or unavoidable. Avoidable costs are those which can be identified with an activity or sector of a business which would be avoided, if that activity or sector did not exist. For example, 'the hiring cost of a machine'

hired specially for the manufacture of a product becomes an avoidable cost, if that product is discontinued. Common costs apportioned to a particular activity or segment of a business are usually unavoidable because total common cost cannot be avoided or reduced if that activity or sector does not exist. For example, a part of rent of the factory, apportioned on machine shop, is an unavoidable cost for machine shop.

QUALITATIVE FACTORS IN DECISION-MAKING

Management sometimes faces situation when qualitative factors alone cannot decide the issue. For example, take the case of changing a method of eleven-billets rolling to thirteen-billets rolling in 40 minutes instead of 50 minutes. In such case, both quantitative, such as relevant costs as well as qualitative factors, such as effect on work-force and reaction by labour union have to be considered. But these factors cannot be quantified. Yet, its overall effect on cost/benefit has to be analysed before making decision.

2.10 SUMMARY

- **Marginal costing** is a technique of ascertaining cost used in any method of costing. According to this technique, variable costs are charged to cost units and the fixed cost attributable to the relevant period is written off in full against the contribution for that period. Contribution is the difference between sales value and variable cost.
- Marginal costing technique is based on the segregation of fixed and variable costs. Fixed costs or period or time costs arise from policy decisions of the top-management to provide and to keep in readiness a given capacity to produce and sell, regardless of the current actual volume of production or sales.
- Variable costs or product or output costs, on the other hand, vary directly or tends to vary directly with current volume without need for managerial decision. Time has no effect on this type of cost.
- A Break even chart depicts marginal costing technique graphically. It is a "chart which shows the profitability or otherwise of an undertaking at various levels of activity and as a result indicates the point at which neither profit nor loss is made".

2.11 REVIEW QUESTIONS

1. Define "Marginal cost". Discuss the importance of classifying expenses into variable and fixed. Give two examples each.
2. What is the difference between absorption costing and marginal costing in concept and use?

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3. How is Price cost different from Marginal cost? State the elements of cost included in the two types of cost indicating their significance in cost accounting.
4. "The break-even concept is fundamentally a static analysis ", discuss and explain the limitations of the concept.
5. "The choice between absorption costing and marginal costing is determined by certain factors". What are they ? What are the advantages and disadvantages of using marginal costing ?
6. In the concept of marginal costing, what is meant by 'limiting factor' ? State the difficulties experienced in the determination of the limiting factors in a concern and indicate how would you overcome them.
7. Write short notes on :
(a) Key-factor of production, (b) P/V ratio (c) Opportunity cost, (d) Sunk Cost

2.12 FURTHER READINGS

- Arora, M. N., *Cost and Management Accounting- Theory and Problems*, Himalaya Publisher, New Delhi.
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BUDGETARY CONTROL

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STRUCTURE

- 3.1 Learning Objectives
- 3.2 Introduction
- 3.3 Meaning of Budget
- 3.4 Budgetary Control : Meaning and Objectives
- 3.5 Advantages and Problems of Budgeting
- 3.6 Budget Period
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- 3.8 Consideration of Limiting Factors
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- 3.13 Zero Base Budgeting (ZBB)
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- 3.15 Review Questions
- 3.16 Further Readings

3.1 LEARNING OBJECTIVES

After going through this unit, students will be able to :

- state the fundamental concept of budget;
- explain the methods of budgetary control;
- discuss the classification of budget.

3.2 INTRODUCTION

There are two types of control, namely budgetary and financial. This chapter concentrates on budgetary control only. Budgetary control is defined by the Institute of Cost and Management Accountants (CIMA) as:

“The establishment of budgets relating the responsibilities of executives to the requirements of a policy, and the continuous comparison of actual with budgeted results, either to secure by individual action the objective of that policy, or to provide a basis for its revision”.

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3.3 MEANING OF BUDGET

Budget is defined as "a plan quantified in monetary terms prepared and approved prior to a defined period of time usually showing planned income to be generated and/ or expenditure to be incurred during that period and the capital to be employed to attain a given objective". (CIMA Terminology). An analysis of the definition will bring out the following features of a budget :

- (a) it is a plan expressed in monetary terms; but it also contains physical units;
- (b) it is prepared prior to the period during which it will operate;
- (c) it is approved by the management for implementation;
- (d) it is related to a definite future period;
- (e) it indicates planned income and expenditure including capital expenditure during the period, and
- (f) it is prepared for the purpose of implementing the policy formulated by the management, and the objective to be achieved during the period.

A budget may be expressed in relation to **time**, viz. short-term and long-term budget, in relation to **functions**, viz. production budget, sales budget, cash budget, capital budget, etc. and in relation to **behaviour**, viz. fixed budget and flexible budget.

3.4 BUDGETARY CONTROL: MEANING AND OBJECTIVES

Budgetary control is the system of planning and accounting control through the use of budget. It is defined as "the establishment of budgets relating the responsibilities of executives to the requirement of a policy, and the continuous comparison of actual with budgeted results either to secure by individual action the objective of that policy or to provide a basis for its revision" – (CIMA Terminology). From the definition, the following features of budgetary control emerge :

- (a) **Establishment of budgets** – Budgets are prepared for each function relating to the responsibilities of individual executives. The overall functional budgets are then coordinated with each other, so that an overall budget for the business may be prepared.
- (b) **Executive responsibility** – Executives have specific tasks to be performed and responsibilities to be discharged. These must be directed towards the attainment of the objectives of the enterprise.
- (c) **Requirement of a policy** – A budget is a policy statement. It indicates what the business plans to do, and how it proposes to do it.

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- (d) **Comparison of actuals with Budgets** – Comparison is the foundation of control. Actual performance must be measured and periodically compared with the plans. Such comparisons will indicate deviations from the planned course of action which must be highlighted in time, so that remedial action can be taken to reach the preset goods.
- (e) **Revision of policy** – Sometimes the comparison of actual performance with the plans may indicate the need to change policies. If a change in policies is necessary to reach the goals of the organisation, then the policy change must be brought about. To that extent, policies must be flexible.

Budgetary control involves the following steps :

- Setting up of plans and budgets for each functional area like sales, production, purchase, etc
- Measuring and recording actual performance of each functional area.
- Comparing actual performance with the planned performance and measuring the deviation or variations.
- Investigating into the cause of the deviations and identifying the persons responsible.
- Taking corrective action and ensuring that such deviation do not arise in future. Budgetary control implies a constant and continuous watch on all phases of business activities daily, weekly, monthly, quarterly and yearly.

The objectives of budgetary control may be listed under three heads :

- (a) **Planning** – To achieve its goal, an enterprise must plan what it must do and how it will reach the goal. In the process of assessing the factors that will help reaching the goals, the enterprise should also anticipate problems that would make the process of reaching its goals difficult. Having identified some of these problems, it can decide well in advance how it would overcome them, if and when they come up.
- (b) **Coordination** – This involves proper balancing of all factors and coordinating the efforts put together by various departments and persons to reach the goals of the enterprise. If they do not work in a synchronised manner, the organisation will never be able to reach its goals.
- (c) **Control** – It is a process of keeping watch over actions and taking immediate action at the first signs of deviation from the planned course of action. In this way, events are compelled or directed to conform to plans.

Establishing a budgetary control system involves the following :

- (a) Selecting the budget period,
- (b) Identifying the types of budget to be prepared,
- (c) Consideration of the limiting factor.

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3.5 ADVANTAGES AND PROBLEMS OF BUDGETING

Budgetary control is an important technique of control on business activities by management, in which business activities are operated on the basis of pre-prepared budget and thereafter actual results are evaluated in the light of budget estimates.

ADVANTAGES OF BUDGETARY CONTROL

There are a number of advantages to budgeting and budgetary control :

- Compels management to think about the future, which is probably the most important feature of a budgetary planning and control system. Forces management to look ahead, to set out detailed plans for achieving the targets for each department, operation and (ideally) each manager, to anticipate and give the organisation purpose and direction.
- Promotes coordination and communication.
- Clearly defines areas of responsibility. Requires managers of budget centres to be made responsible for the achievement of budget targets for the operations under their personal control.
- Provides a basis for performance appraisal (variance analysis). A budget is basically a yardstick against which actual performance is measured and assessed. Control is provided by comparisons of actual results against budget plan. Departures from budget can then be investigated and the reasons for the differences can be divided into controllable and non-controllable factors.
- Enables remedial action to be taken as variances emerge.
- Motivates employees by participating in the setting of budgets.
- Improves the allocation of scarce resources.
- Economises management time by using the management by exception principle.

PROBLEMS IN BUDGETING

Whilst budgets may be an essential part of any marketing activity they do have a number of disadvantages, particularly in perception terms.

- Budgets can be seen as pressure devices imposed by management, thus resulting in :
 - (a) bad labour relations
 - (b) inaccurate record-keeping.
- Departmental conflict arises due to :
 - (a) disputes over resource allocation
 - (b) departments blaming each other if targets are not attained.

- It is difficult to reconcile personal/individual and corporate goals.
- Waste may arise as managers adopt the view, "we had better spend it or we will lose it". This is often coupled with "empire building" in order to enhance the prestige of a department.

Responsibility versus controlling, *i.e.*, some costs are under the influence of more than one person, *e.g.*, power costs.

- Managers may overestimate costs so that they will not be blamed in the future should they overspend.

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3.6 BUDGET PERIOD

The budget period is the period of time for which the budget is prepared and used. In most cases, the period of time chosen is the accounting period of the organisation, since this period is usually sufficiently long to take care of seasonal variations that would occur in production and sales.

In certain industries, which are characterised by significant seasonal variation, a shorter period of six-months or a quarter may be found more useful. In industries involving large capital outlay and long production cycles such as, shipbuilding or generation of electricity, the budget period is likely to extend beyond one accounting year.

However, for the purpose of control, it is important that the budget is broken down into figures for shorter period. Thus, a budget may be prepared for five years, indicating monthly figures for the first year, and annual figures for the next four years.

3.7 TYPES OF BUDGET

Generally, a **Master Budget** is prepared, which in turn, is broken into functional budgets.

Budgets may be classified as follows :

- Basic budget and current budget;
- Fixed budget and flexible budget
- Master budget and functional budget.

BASIC BUDGET

A **basic budget** is based on a long term plan and is used as a basis for developing current budgets. A basic budget is much broader in scope and less detailed than a current budget. It may be fixed or flexible. The basic data are not updated whenever there are changes in conditions, such as, increase in material price or wage rates. As a result, the use of basic budgets obscures operating variances. That is why for control purposes, current budgets are more useful.

CURRENT BUDGET

Current budget is established for use over a short period of time, usually one year but sometimes even less, and related to current conditions, that is, average conditions which are likely to prevail during the budget period.

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FIXED BUDGET

A **Fixed Budget** is designed to remain unchanged irrespective of the volume of output or turnover attained. The budget remains fixed over a given period and does not change with the change in the volume of production or level of activity attained. Normally, such a budget is prepared in respect of expenses of a fixed nature. As such, this budget is of limited practical application.

FLEXIBLE BUDGET

A **Flexible Budget** by recognising the difference in behaviour between fixed and variable costs in relation to fluctuation in output or turnover, is designed to change appropriately with such fluctuations. A flexible budget changes according to the levels of activity.

MASTER BUDGET AND FUNCTIONAL BUDGETS

A **Master Budget** is prepared from, and summarises, the various functional budgets. It is also called summary budget. It is a summary plan of the overall activities of the enterprise for a definite future period. It generally includes details relating to production, sales, stocks, debtors, cash position, fixed assets, etc. in addition to important control ratios. A **functional budget** is a budget of income or expenditure appropriate to or the responsibility of a function, such as, production, sales, purchase, etc. Each functional department prepares its own budget, and all these functional budgets are then integrated into the master budget.

3.8 CONSIDERATION OF LIMITING FACTORS

A *limiting factor* is the key factor which at a particular time, or over a period, will limit the activities of an undertaking. This limiting factor is usually the level of demand for the products and services of the undertaking but it could be a shortage of one of the productive resources, for example, raw material, skilled labour, or machine capacity or financial resources, such as, working capital.

In order to ensure that the functional budgets are reasonably capable of fulfilment, the extent of the influence of this factor must be first assessed. It is, therefore, known as principal budget factor, or key factor.

3.9 ORGANISATION FOR BUDGETARY CONTROL

For effective budgetary control, a sound and efficient organisation is essential. The following requirements are to be fulfilled for establishing a sound system :

(a) **Budget cost centre** – A budget cost centre is a section of the organisation for which separate budgets can be prepared and control exercised. They can be same as cost centres with accountability resting with a responsible person who heads that cost centre.

(b) **Organisation chart** – There should be well-defined organisation chart, showing the lines of authority and responsibility of each executive, and his position in relation to others, - both upwards as well as downwards. The design of the organisation chart will vary depending on the nature and size of the individual business and the extent of control desired.

(c) **Budget committee** – The responsibility for the preparation of budgets generally rests with the budget committee, which includes the following executives :

- Chief executive, who will be the Chairman of the committee
- Production manager
- Sales manager
- Materials manager
- Standards and quality control manager
- Finance manager
- Other departmental heads.

The main functions of the budget committee are as follows:

- (i) Assisting the managers in making budget by giving them information about past performances,
- (ii) Circulating broad outline of the policies framed by the top management, which should be taken under consideration while preparing the budgets,
- (iii) Reviewing the budget estimates prepared by the various departments, and suggesting modifications, if necessary,
- (iv) Preparing the master budget after the functional budgets are approved,
- (v) Comparing reports of actual performance with budgets and initiating follow up action,
- (vi) Making changes in budget policies and procedure,
- (vii) Assisting in preparing budget manual.

The management accountant performs the role of Secretary to the committee, and assists in coordinating the tasks of various departments in the budget preparation.

(d) **Budget manual** – It is a document which contains the guidelines for the preparation of various budgets, and sets out the responsibilities of the persons engaged in the routine of and the forms and records required for budgetary control. All departments refer to this manual for clarification regarding procedural details and formats to be used at every stage from preparing budgets till reporting of actuals and deviations from budgets.

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3.10 FUNCTIONAL BUDGETS

A functional budget is a statement of income and/or expenditure applicable to a particular function, department or process. The following functional budgets are generally prepared :

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<i>Budget</i>	<i>Prepared by</i>
Sales - Quantity and value	Sales manager
Selling and distribution cost	Sales manager
Production- Units and plant	Production manager
Utilisation personnel	Personnel manager
Materials	Purchase manager
Factory expenses	Production manager
Administrative expense	Finance manager
Cash	Finance manager
Capital expenditure	Chief executive
Research and development	R and D manager

These budgets are briefly discussed and illustrated.

SALES BUDGET

This is generally the starting point for the preparation of the functional budgets. It shows the quantities and values of each products to be sold during the next year, usually broken down into quarterly and monthly figures. It may be further classified into product groups, areas or territories, salesman or agent wise, types of customers, etc. The sales budget is prepared from :

- (a) Analysis of past sales,
- (b) Market analysis, and survey reports,
- (c) Reports of field staff,
- (d) Growth trend in the volume of sales
- (e) General business condition.

If the principal budget factor is production capacity, then the sales budget will be determined by output, and preparation of budget will be relatively easy. However, if sales is the key factor, then the production budget will be determined by estimated sales.

SELLING AND DISTRIBUTION COST BUDGET

After sales budget is finalised and approved, selling and distribution cost budget is prepared based on the selling and distribution planned during the budget-period. Most of the expenses are related to the sales volume, and, therefore,

estimated by the sales manager. Other expenses which are not directly related to sales-volume, such as advertising, sales promotion, market research, etc. are determined by marketing manager and conveyed to the sales manager for incorporation in the budget.

PRODUCTION BUDGET

This is prepared by the Production Manager and shows the quantities of the products to be made, the departments which will produce them and the time within which the production will take place. The product budget is built up from plant utilisation budget, which shows the extent of utilisation of plant and machinery. This budget is important because —

- (i) it shows the extent of utilisation of each machine.
- (ii) if the capacity is insufficient, extra-shift working may be required or new machinery may be purchased or a portion of output may have to be manufactured by outside plants,
- (iii) if the capacity is idle, the sales department can be alerted to find out ways and means to get additional sales volume.

LABOUR AND MANPOWER BUDGET

This budget will show the number of each grade of workmen required to produce the target output which has been approved by the budget committee. It will also indicate anticipated labour cost for the budget period, and the period of training that would be required for the additional workmen, if required to be recruited. However, the labour cost has to be classified into direct and indirect labour for incorporation in variable cost and fixed overheads.

MATERIALS BUDGET

This will project the total quantities and value of each item of raw-materials, components and packing materials that will be consumed in the process of producing the budgeted output. It will take into account the projected inventories at the commencement of the budget period and the inventory norms fixed by the management and determine the quantities and value of materials that are needed to be purchased.

This can be scheduled by the months when the materials will be required. Preparation of this budget requires the anticipation of material prices prevailing during the budget period.

PRODUCTION COST BUDGET

With the help of production budget, material budget, labour budget and expense budget, the cost department normally prepares production cost budget for each of the intermediate and final products.

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CAPITAL EXPENDITURE BUDGET

Based on the plant utilisation budget, capital assets required for the production departments are projected. Other assets required for administration and other departments shall be considered while preparing and placing for approval of total capital expenditure budget before the budget committee.

RESEARCH AND DEVELOPMENT BUDGET

The research and development manager will provide his estimate of expenses on research and development work itemwise, which after receiving approval from the chief executive will be adopted in the budget.

CASH BUDGET

When all the budgets are approved, a cash budget summarising the anticipated Cash receipts and cash payments shall be prepared. This will help in anticipating cash shortfalls and excesses, and assist in planning in advance to meet shortfalls. It is desirable to break this budget into monthly and quarterly budgets.

MASTER BUDGET

Master budget is a comprehensive plan which is prepared from and summarises the functional budgets. The master budget embraces both operating decisions and financial decisions. When all budgets are ready, they can finally produce budgeted profit and loss account or income statement and budgeted balance sheet. Such results can be projected monthly, quarterly, halfyearly and at year-end. When the budgeted profit falls short of target it may be reviewed and all budgets may be reworked to reach the target or to achieve a revised target approved by the budget committee.

FLEXIBLE BUDGET

As mentioned earlier, there are two approaches to budgeting *viz.*, Fixed Budgeting, which we have so far discussed, and flexible budgeting which is now being explained. For control of expenses under fixed budgeting procedure, the expenses included in the budgets are used as a guide for expense limitation during the budget period, and a standard against which actual expenses are compared and variances are ascertained.

When **flexible budgeting procedure** is used, the budgeted expenses will be analysed and adjusted to the actual volume before comparing with actual expenses incurred. In other words, a flexible budget is not a schedule of expenses at a specific or defined volume of activity. It consists of a series of figures for a series of volumes or levels of activity.

Flexible budget is also called variable budgeting or slide scale budgeting. The main principle involved in flexible budgeting is that cost can be related to activity, and can be primarily the results of two factors, viz., (a) the passage of time, and (b) the productive activity. The concept of cost variability gives rise to three categories of costs, such as —

- (i) Fixed cost,
- (ii) Variable cost,
- (iii) Semi-variable cost.

Fixed costs do not vary with the volume or production activity, but accrue with the passage of time. They are time or period costs. They remain constant over a period of time irrespective of the volume or level of activity. Variable costs vary in proportion to the volume of activity. They accrue as a result of efforts, activity or work done. They are product cost. They would not arise if there are no activity. Semi-variable costs contain elements of both fixed and variable costs.

There are two methods of preparing flexible budget, viz.,

- (i) Formula method, and
- (ii) Multi-activity or tabular method.

(i) *Under the Formula Method, the following procedure is adopted :*

(a) *Before the budget period :*

- A budget is prepared for normal level of activity
- Costs are segregated into fixed and variable.
- A variable cost per unit is computed.

(b) *At the end of the budget period :*

- The actual output and actual level of activity are ascertained.
- The variable cost allowed for the actual output is calculated and added to the fixed cost to obtain the budget cost allowance.
- Actual expenses are compared against allowed cost.
- Expressed as a formula, Allowed cost = Fixed cost + (Actual units of output × Variable cost per unit).

Illustration:

Budget output - 8000 units per month

Budget fixed overheads - Rs. 40000 per month

Budget variable cost - Rs. 5 per unit

Budget total overheads - Rs. 80000 per month

Actual for January, 2002

Output - 7000 units

Solution : Hence, allowed cost for January 2002 will be Rs. 40000 + (7000 × 5) = Rs.75000. Actual expense will be compared against allowed cost of Rs.75000.

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- (ii) The **Multi-activity method** involves the preparation of a budget for all major levels of activity. When the actual output is known at the end of the budget period, the allowed costs are computed by either adopting the budget of the given level or next higher level of activity or by interpolating between the budgets of the activity levels on either side of the actual level of activity. For example, if the budget amounts for the following levels are given,

At 70% – Rs. 24,000

80% – Rs. 28,000

90% – Rs. 30,000,

and actual level of activity attained is 75%, then the allowed cost will be either (a) Rs. 28,000, i.e. the budget for next higher level or (b) by interpolation method, $\text{Rs. } 24,000 + (28,000 - 24,000) \times \frac{5}{10}$ or $\text{Rs. } 24,000 + 2,000 = \text{Rs. } 26,000$

3.11 BUDGET VARIANCE

A *budget variance* represents the difference between plan and achievements expressed in monetary terms, that is, the difference between budget figure and actual figure. Variance analysis is the process of ascertaining variances from budget and finding reasons for such variances. Variance is unfavourable if actual is more than budget. The same is favourable if actual is less than budget.

Variance report is prepared showing budget and variances and sent to persons responsible for each functional budgets for comments and action. When standard costing is employed along with a system of flexible budgeting, variance analysis is greatly facilitated.

3.12 MANAGEMENT ACTION AND COST CONTROL

Producing information in management accounting form is expensive in terms of the time and effort involved. It will be very wasteful if the information once produced is not put into effective use.

There are five parts to an effective cost control system. These are:

- (a) preparation of budgets;
- (b) communicating and agreeing budgets with all concerned;
- (c) having an accounting system that will record all actual costs;
- (d) preparing statements that will compare actual costs with budgets, showing any variances and disclosing the reasons for them; and
- (e) taking any appropriate action based on the analysis of the variances in (d) above.

Action(s) that can be taken when a significant variance has been revealed will depend on the nature of the variance itself. Some variances can be identified

to a specific department and it is within that department's control to take corrective action. Other variances might prove to be much more difficult, and sometimes impossible, to control.

Variances revealed are historic. They show what happened last month or last quarter and no amount of analysis and discussion can alter that. However, they can be used to influence managerial action in future periods.

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3.13 ZERO BASE BUDGETING (ZBB)

After a budgeting system has been in operation for some time, there is a tendency for next year's budget to be justified by reference to the actual levels being achieved at present. In fact this is part of the financial analysis discussed so far, but the proper analysis process takes into account all the changes which should affect the future activities of the company. Even using such an analytical base, some businesses find that historical comparisons, and particularly the current level of constraints on resources, can inhibit really innovative changes in budgets. This can cause a severe handicap for the business because the budget should be the first year of the long range plan. Thus, if changes are not started in the budget period, it will be difficult for the business to make the progress necessary to achieve longer term objectives.

One way of breaking out of this cyclical budgeting problem is to go back to basics and develop the budget from an assumption of no existing resources (that is, a zero base). This means all resources will have to be justified and the chosen way of achieving any specified objectives will have to be compared with the alternatives. For example, in the sales area, the current existing field sales force will be ignored, and the optimum way of achieving the sales objectives in that particular market for the particular goods or services should be developed. This might not include any field sales force, or a different-sized team, and the company then has to plan how to implement this new strategy.

The obvious problem of this zero-base budgeting process is the massive amount of managerial time needed to carry out the exercise. Hence, some companies carry out the full process every five years, but in that year the business can almost grind to a halt. Thus, an alternative way is to look in depth at one area of the business each year on a rolling basis, so that each sector does a zero base budget every five years or so.

3.14 SUMMARY

- *Budget* is defined as "a plan quantified in monetary terms prepared and approved prior to a defined period of time usually showing planned income to be generated and/ or expenditure to be incurred during that period and the capital to be employed to attain a given objective".

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- *Budgetary control* is the system of planning and accounting control through the use of budget. It is defined as "the establishment of budgets relating the responsibilities of executives to the requirement of a policy, and the continuous comparison of actual with budgeted results either to secure by individual action the objective of that policy or to provide a basis for its revision"
- Budgetary control is an important technique of control on business activities by management, in which business activities are operated on the basis of pre-prepared budget and thereafter actual results are evaluated in the light of budget estimates.
- A **basic budget** is based on a long term plan and is used as a basis for developing current budgets. A basic budget is much broader in scope and less detailed than a current budget.
- A *functional budget* is a statement of income and/or expenditure applicable to a particular function, department or process.

3.15 REVIEW QUESTIONS

1. Define budget and budgetary control.
2. What are the principle objectives of budgetary control?
3. What the the basic principles of budgetary control? Discuss the advantages of budgetary control.
4. Distinguish between basic and current budget.
5. Differentiate between production budget and material budget.
6. What do you mean by budget variance?

3.16 FURTHER READINGS

- Dr P Periasamy, *A Textbook of Financial, Cost and Management Accounting*, Himalaya Publisher, New Delhi.
- Arora, M. N., *Cost and Management Accounting- Theory and Problems*, Himalaya Publisher, New Delhi.
- Jain, S.P. and Narang, K.L., *Cost & Management Accounting*, Kalyani Publishers, New Delhi, 2009.
- Ashton D., Hopper T., Scapens R. W., 1995, *Issues in Management Accounting*, Prentice Hall, London.

UNIT – IV

Standard Costing and
Variance Analysis

STANDARD COSTING AND VARIANCE ANALYSIS

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STRUCTURE

- 4.1 Learning Objectives
- 4.2 Introduction
- 4.3 Meaning of Standard
- 4.4 Advantages and Limitation of Standard Costing
- 4.5 Setting Standards
 - Setting Standards for Direct Materials
 - Setting Direct Labour Cost
 - Setting Standards of Overheads
- 4.6 Determination of Standard Costs
- 4.7 Revision of Standards
- 4.8 Variance Analysis
- 4.9 Explanation of Fixed Overhead Variances
- 4.10 Mix and Yield (or Productivity) Variances
- 4.11 Planning and Operational Variances
- 4.12 Causes of Variances
- 4.13 Summary
- 4.14 Review Questions
- 4.15 Further Readings

4.1 LEARNING OBJECTIVES

After going through this unit, students will be able to :

- know the conceptual base of standard costing;
- explain the principal concept of variance analysis;
- discuss the advantages and disadvantages of standard costing.

4.2 INTRODUCTION

A **standard cost** is a planned or forecast unit cost for a product or service, which is assumed to hold good given expected efficiency and cost levels within an organisation. It represents a target cost and is useful for planning, controlling and motivating within an organisation.

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Variance analysis is a budgetary control process, which compares standard or budgeted costs and revenues with the actual results of an organisation, in order to obtain information regarding any exceptions from budget, this information is also used to improve performance through control action e.g., correcting problems.

4.3 MEANING OF STANDARD

When you want to measure some thing, you must take some parameter or yardstick for measuring. We can call this as standard. What are your daily expenses? An average of \$50! If you have been spending this much for so many days, then this is your daily standard expense.

The word standard means a benchmark or yardstick. The standard cost is a predetermined cost which determines in advance what each product or service should cost under given circumstances.

In the words of Backer and Jacobsen, "*Standard cost* is the amount the firm thinks a product or the operation of the process for a period of time should cost, based upon certain assumed conditions of efficiency, economic conditions and other factors."

DEFINITION

The CIMA, London has defined standard cost as "a predetermined cost which is calculated from managements standards of efficient operations and the relevant necessary expenditure." They are the predetermined costs on technical estimate of material labor and overhead for a selected period of time and for a prescribed set of working conditions. In other words, a standard cost is a planned cost for a unit of product or service rendered.

The technique of using standard costs for the purposes of cost control is known as standard costing. It is a system of cost accounting which is designed to find out how much should be the cost of a product under the existing conditions. The actual cost can be ascertained only when production is undertaken. The predetermined cost is compared to the actual cost and a variance between the two enables the management to take necessary corrective measures.

4.4 ADVANTAGES AND LIMITATIONS OF STANDARD COSTING

Standard costing is a management control technique for every activity. It is not only useful for cost control purposes but is also helpful in production planning and policy formulation. It allows management by exception. In the light of various objectives of this system, some of the advantages of this tool are given below:

Efficiency measurement— The comparison of actual costs with standard costs enables the management to evaluate performance of various cost centers. In the

absence of standard costing system, actual costs of different period may be compared to measure efficiency. It is not proper to compare costs of different period because circumstance of both the periods may be different. Still, a decision about base period can be made with which actual performance can be compared.

Finding of variance— The performance variances are determined by comparing actual costs with standard costs. Management is able to spot out the place of inefficiencies. It can fix responsibility for deviation in performance. It is possible to take corrective measures at the earliest. A regular check on various expenditures is also ensured by standard cost system.

Management by exception— The targets of different individuals are fixed if the performance is according to predetermined standards. In this case, there is nothing to worry. The attention of the management is drawn only when actual performance is less than the budgeted performance. Management by exception means that everybody is given a target to be achieved and management need not supervise each and everything. The responsibilities are fixed and every body tries to achieve his/her targets.

Cost control— Every costing system aims at cost control and cost reduction. The standards are being constantly analyzed and an effort is made to improve efficiency. Whenever a variance occurs, the reasons are studied and immediate corrective measures are undertaken. The action taken in spotting weak points enables cost control system.

Right decisions— It enables and provides useful information to the management in taking important decisions. For example, the problem created by inflating, rising prices. It can also be used to provide incentive plans for employees etc.

Eliminating inefficiencies— The setting of standards for different elements of cost requires a detailed study of different aspects. The standards are set differently for manufacturing, administrative and selling expenses. Improved methods are used for setting these standards. The determination of manufacturing expenses will require time and motion study for labor and effective material control devices for materials. Similar studies will be needed for finding other expenses. All these studies will make it possible to eliminate inefficiencies at different steps.

LIMITATIONS OF STANDARD COSTING

1. It cannot be used in those organizations where non-standard products are produced. If the production is undertaken according to the customer specifications, then each job will involve different amount of expenditures.
2. The process of setting standard is a difficult task, as it requires technical skills. The time and motion study is required to be undertaken for this purpose. These studies require a lot of time and money.
3. There are no inset circumstances to be considered for fixing standards.

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The conditions under which standards are fixed do not remain static. With the change in circumstances, if the standards are not revised the same become impracticable.

4. The fixing of responsibility is not an easy task. The variances are to be classified into controllable and uncontrollable variances. Standard costing is applicable only for controllable variances.

For instance, if the industry changed the technology then the system will not be suitable. In that case, we will have to change or revise the standards. A frequent revision of standards will become costly.

4.5 SETTING STANDARDS

Normally, setting up standards is based on the past experience. The total standard cost includes direct materials, direct labor and overheads. Normally, all these are fixed to some extent. The standards should be set up in a systematic way so that they are used as a tool for cost control.

Various Elements which Influence the Setting of Standards

SETTING STANDARDS FOR DIRECT MATERIALS

There are several basic principles which ought to be appreciated in setting standards for direct materials. Generally, when you want to purchase some material what are the factors you consider. If material is used for a product, it is known as direct material. On the other hand, if the material cost cannot be assigned to the manufacturing of the product, it will be called indirect material. Therefore, it involves two things :

- Quality of material
- Price of the material

When you want to purchase material, the quality and size should be determined. The standard quality to be maintained should be decided. The quantity is determined by the production department. This department makes use of historical records, and an allowance for changing conditions will also be given for setting standards. A number of test runs may be undertaken on different days and under different situations, and an average of these results should be used for setting material quantity standards.

The second step in determining direct material cost will be a decision about the standard price. Material's cost will be decided in consultation with the purchase department. The cost of purchasing and store keeping of materials should also be taken into consideration. The procedure for purchase of materials, minimum and maximum levels for various materials, discount policy and means of transport are the other factors which have bearing on the materials cost price. It includes the following :

- Cost of materials
- Ordering cost
- Carrying cost

The purpose should be to increase efficiency in procuring and store keeping of materials. The type of standard used— ideal standard or expected standard— also affects the choice of standard price.

SETTING DIRECT LABOR COST

If you want to engage a labor force for manufacturing a product or a service for which you need to pay some amount, this is called wages. If the labor is engaged directly to produce the product, this is known as direct labor. The second largest amount of cost is of labor. The benefit derived from the workers can be assigned to a particular product or a process. If the wages paid to workers cannot be directly assigned to a particular product, these will be known as indirect wages. The time required for producing a product would be ascertained and labor should be properly graded.

Different grades of workers will be paid different rates of wages. The times spent by different grades of workers for manufacturing a product should also be studied for deciding upon direct labor cost. The setting of standard for direct labor will be done basically on the following :

- Standard labor time for producing
- Labor rate per hour

Standard labor time indicates the time taken by different categories of labor force which are as under :

- Skilled labor
- Semi-skilled labor
- Unskilled labor

For setting a standard time for labor force, we normally take in to account previous experience, past performance records, test run result, work-study etc. The labor rate standard refers to the expected wage rates to be paid for different categories of workers. Past wage rates and demand and supply principle may not be a safe guide for determining standard labor rates. The anticipation of expected changes in labor rates will be an essential factor. In case there is an agreement with workers for payment of wages in the coming period, these rates should be used.

If a premium or bonus scheme is in operation, then anticipated extra payments should also be included. Where a piece rate system is used, standard cost will be fixed per piece. The object of fixed standard labor time and labor rate is to device maximum efficiency in the use of labor.

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SETTING STANDARDS OF OVERHEADS

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The next important element comes under overheads. The very purpose of setting standard for overheads is to minimize the total cost. Standard overhead rates are computed by dividing overhead expenses by direct labor hours or units produced. The standard overhead cost is obtained by multiplying standard overhead rate by the labor hours spent or number of units produced. The determination of overhead rate involves three things:

- Determination of overheads
- Determination of labor hours or units manufactured
- Calculating overheads rate by dividing A by B

The overheads are classified into fixed overheads, variable overheads and semi-variable overheads. The fixed overheads remain the same irrespective of level of production, while variable overheads change in the proportion of production. The expenses increase or decrease with the increase or decrease in output. Semi-variable overheads are neither fixed nor variable. These overheads increase with the increase in production but the rate of increase will be less than the rate of increase in production. The division of overheads into fixed, variable and semi-variable categories will help in determining overheads.

4.6 DETERMINATION OF STANDARD COSTS

How should the ideal standards for better controlling be determined?

1. DETERMINATION OF COST CENTER

According to J. Betty, "A cost center is a department or part of a department or an item of equipment or machinery or a person or a group of persons in respect of which costs are accumulated, and one where control can be exercised." Cost centers are necessary for determining the costs. If the whole factory is engaged in manufacturing a product, the factory will be a cost center. In fact, a cost center describes the product while cost is accumulated. Cost centers enable the determination of costs and fixation of responsibility. A cost center relating to a person is called personnel cost center, and a cost center relating to products and equipments is called impersonal cost center.

2. CURRENT STANDARDS

A current standard is a standard which is established for use over a short period of time and is related to current condition. It reflects the performance that should be attained during the current period. The period for current standard is normally one year. It is presumed that conditions of production will remain unchanged. In case there is any change in price or manufacturing condition, the standards are also revised. Current standard may be ideal standard and expected standard.

3. IDEAL STANDARD

This is the standard which represents a high level of efficiency. Ideal standard is fixed on the assumption that favorable conditions will prevail and management will be at its best. The price paid for materials will be lowest and wastes etc. will be minimum possible. The labor time for making the production will be minimum and rates of wages will also be low. The overheads expenses are also set with maximum efficiency in mind. All the conditions, both internal and external, should be favorable and only then ideal standard will be achieved.

Ideal standard is fixed on the assumption of those conditions which may rarely exist. This standard is not practicable and may not be achieved. Though this standard may not be achieved, even then an effort is made. The deviation between targets and actual performance is ignorable. In practice, ideal standard has an adverse effect on the employees. They do not try to reach the standard because the standards are not considered realistic.

4. BASIC STANDARDS

A basic standard may be defined as a standard which is established for use for an indefinite period which may a long period. Basic standard is established for a long period and is not adjusted to the preset conations. The same standard remains in force for a long period.

These standards are revised only on the changes in specification of material and technology productions. It is indeed just like a number against which subsequent process changes can be measured. Basic standard enables the measurement of changes in costs. For example, if the basic cost for material is Rs. 20 per unit and the current price is Rs. 25 per unit, it will show an increase of 25% in the cost of materials. The changes in manufacturing costs can be measured by taking basic standard, as a base standard cannot serve as a tool for cost control purpose because the standard is not revised for a long time. The deviation between standard cost and actual cost cannot be used as a yardstick for measuring efficiency.

5. NORMAL STANDARDS

As per terminology, normal standard has been defined as a standard which, it is anticipated, can be attained over a future period of time, preferably long enough to cover one trade cycle. This standard is based on the conditions which will cover a future period of five years, concerning one trade cycle. If a normal cycle of ups and downs in sales and production is 10 years, then standard will be set on average sales and production which will cover all the years. The standard attempts to cover variance in the production from one time to another time. An average is taken from the periods of recession and depression. The normal standard concept is theoretical and cannot be used for cost control purpose. Normal

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standard can be properly applied for absorption of overhead cost over a long period of time.

6. ORGANIZATION FOR STANDARD COSTING

The success of standard costing system will depend upon the setting up of proper standards. For the purpose of setting standards, a person or a committee should be given this job. In a big concern, a standard costing committee is formed for this purpose. The committee includes production manager, purchase manager, sales manager, personnel manager, chief engineer and cost accountant. The cost accountant acts as a co-coordinator of this committee.

7. ACCOUNTING SYSTEM

Classification of accounts is necessary to meet the required purpose, i.e. function, asset or revenue item. Codes can be used to have a speedy collection of accounts. A standard is a pre-determined measure of material, labor and overheads. It may be expressed in quality and its monetary measurements in standard costs.

4.7 REVISION OF STANDARDS

For effective use of this technique, sometimes we need to revise the standards which follow for better control. Even standards are also subjected to change like the production method, environment, raw material, and technology.

Standards may need to be changed to accommodate changes in the organization or its environment. When there is a sudden change in economic circumstances, technology or production methods, the standard cost will no longer be accurate. Standards that are out of date will not act as effective feed forward or feedback control tools. They will not help us to predict the inputs required nor help us to evaluate the efficiency of a particular department. If standards are continually not being achieved and large deviations or variances from the standard are reported, they should be carefully reviewed. Also, changes in the physical productive capacity of the organization or in material prices and wage rates may indicate that standards need to be revised.

In practice, changing standards frequently is an expensive operation and can cause confusion. For this reason, standard cost revisions are usually made only once a year. At times of rapid price inflation, many managers have felt that the high level of inflation forced them to change price and wage rate standards continually.

This, however, leads to reduction in value of the standard as a yardstick. At the other extreme is the adoption of basic standard which will remain unchanged for many years. They provide a constant base for comparison, but this is hardly satisfactory when there is technological change in working procedures and conditions.

4.8 VARIANCE ANALYSIS

By comparing a flexed budget, which has been prepared using standard cost information to actual results, total variances can be calculated. These reconcilable differences between the two statements can then be sub-divided further, calculated, interpreted and used to correct problems within the organisation to stay on target through control action by management or employees.

Variances can occur for the following reasons

- Inaccurate data when creating standards, producing the budget or compiling actual results;
- A standard used which is either not realistic or perhaps out of date;
- Efficiency of how operations were undertaken by management or employees during the period of assessment;
- Random or chance.

Budgetary planning involves the production of budgets or forecasts using realistic standards for cost and efficiency levels. **Budgetary control** identifies areas of responsibility for management and is the process of regularly comparing actual results against budget or standards. Because the original budget would have forecast a different number of units produced or sold, when compared to actual units produced or sold, a 'flexed budget' would be prepared in order to compare costs and revenues on a like with like basis.

Variance Calculations

Sales price	Did sell (actual quantity sold x actual price)	X
variance	Should sell (actual quantity sold x standard price)	(X)
Sales price variance		X
		units
	Did sell (actual quantity sold)	X
	Should sell (budget quantity sold)	(X)
		(X standard profit per unit*
Sales volume profit variance		X

* Standard profit would be used if the organisation uses absorption costing methods, when using **marginal costing** methods, the standard **contribution volume variance**, rather than standard **volume profit variance** would be used. The proforma above would be the same however the difference in units above would be multiplied by the standard contribution per unit rather than standard profit per unit.

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Sales volume profit variance	There is also the calculation of the sales volume revenue variance	
	units	units
	Did sell (actual quantity sold)	X
	Should sell (budget quantity sold)	(X)
		X
		x standard price
	Sales volume revenue variance	X
This would be a calculation considered in isolation from an operating statement e.g., if an organisation wants to reconcile the difference between the original sales budget revenue and actual sales revenue achieved rather than profit or contribution		
Material price variance	Did spend (actual quantity purchased x actual price)	
		X
	Should spend (actual quantity purchased x standard price)	(X)
	Material price variance	X
This variance calculation always uses the quantity of material actually purchased never used, if there is a difference between the two within a question.		
Material usage variance	Kg/litres	
	Actual production did use	X
	Actual production should use (actual production x standard usage)	(X)
		X
		x standard price
	Material usage variance	X
This variance calculation always uses the quantity of material actually used never purchased, if there is a difference between the two within a question.		
Labour rate variance	Did spend (actual hours paid x actual rate)	
		X
	Should spend (actual hours paid x standard rate)	(X)
	Labour rate variance	X
This variance calculation always uses the actual hours paid for never hours worked if there is a difference between the two within a question.		

		Hours
	Actual production did take	X
Labour efficiency variance	Actual production should take (actual production x standard hours)	(X)
		X
		X standard rate
	Labour efficiency variance	X
	This variance calculation always uses the actual hours worked never hours paid if there is a difference between the two within a question.	
		Hours
	Actual hours paid for	X
Labour idle time variance	Actual hours worked	(X)
	Idle time	X
		x standard rate
	Labour idle time variance	X
	Only applicable if there is idle time e.g., a difference between labour hours paid and worked.	
	Did spend (actual hours worked x actual OH rate)	X
Variable overhead expenditure variance	Should spend (actual hours worked x standard OH rate)	(X)
	Variable overhead expenditure variance	X
	Variable overhead expenditure within a question will be assumed to be driven by labour hours worked never paid if there is a difference between the two e.g., if production stops and staff are idle then no variable overhead should be incurred.	
		Hours
	Actual production did take	X
Variable overhead efficiency variance	Actual production should take (actual production x standard hours)	(X)
		X
		x standard overhead rate
	Variable overhead efficiency variance	X
	This variance calculation always uses the actual hours worked never hours paid if there is a difference between the two within a question; notice the proforma is similar to the labour efficiency variance.	

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Fixed overhead expenditure variance	Actual fixed overhead expenditure	units
	Budgeted fixed overhead expenditure	X
	Fixed overhead expenditure variance	(X)
		X
	Did produce (actual quantity produced)	X
	Should produce (budget quantity produced)	(X)
Fixed overhead volume variance		X
		x overhead absorption rate (O.A.R)
	Fixed overhead volume variance	X
	This variance calculation is only applicable if the organisation uses absorption costing, never when marginal costing, and is to do with the way the organisation charges the profit and loss account within the production fixed overhead control account.	

4.9 EXPLANATION OF FIXED OVERHEAD VARIANCES

Traditional **absorption costing** takes the total budgeted fixed overhead for a period and divides by a budgeted (or normal) activity level e.g., units, in order to find the overhead absorption rate. This is a simple method of charging fixed overhead and allows fixed overhead to be allocated to products, jobs or work-in-progress

Overhead absorption rate (OAR) = (Budgeted production overhead)/(Normal/budget level of activity)

Production fixed overhead control account

Actual Production overhead X Actual production (units) x O.A.R = Charge to W.P.I during the period X

At the end of the period, the overhead 'absorbed' or charged to production is compared to the actual production overhead incurred for the period. Any **shortfall in overhead charged would be an 'under absorption'** of production overhead (DR profit and loss account CR Production overhead control account). Any **'over charge' to the profit and loss account during a period would be an 'over absorption'** of production overhead (CR profit and loss account DR Production overhead control account).

The sum of the fixed overhead expenditure and volume variance would be equal to the under or over absorption, when sub-divided, explaining the two different causes as to how this occurred during a period e.g., under or over spent and/or under or over produced when compared to the original budget.

The difference between absorption costing and marginal costing organisations, is that the marginal costing organisation makes no attempt to absorb or charge production overhead into a cost unit or the profit and loss account. It treats production overhead as a period cost only and does not absorb overhead, but rather charges it entirely to the profit and loss account for each period. With marginal costing organisations only the fixed overhead expenditure **never** the fixed overhead volume variance would be applicable within a question.

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4.10 MIX AND YIELD (OR PRODUCTIVITY) VARIANCES

A **material usage variance** can be subdivided into a **mix and yield variance** where there exists two or more ingredients that can be substituted for one another. The sum of the material mix and yield variances will total the sum of the material usage variance. The same concept can also be applied to labour mix and yield variances, when one grade or skill of labour can be substituted for another, when making a particular product or completing a job.

The **labour efficiency variance** in this case reanalysed further into the mix and yield variances, **exactly in the same way as the material usage variance.**

- If you use a quantity of material which is more than standard mix and the material is more expensive than the average cost, there would be an adverse variance.
- If you use a quantity of material which is more than standard mix and the material is less expensive than the average cost, there would be a favourable variance.
- If you use a quantity of material which is less than standard mix and the material is more expensive than the average cost, there would be a favourable variance.
- If you use a quantity of material which is less than standard mix and the material is less expensive than the average cost, there would be an adverse variance.

Both totals of the individual and average valuation bases give the same answer; it is the analysis which makes up the total, where you would find the differences between the two methods.

4.11 PLANNING AND OPERATIONAL VARIANCES

Planning variances are caused by the budget or standard at the planning stage being wrong. The budget and standard used would therefore need revising if your operational variances are to be more realistic.

Operational variances are your normal variance calculations as learned earlier within this chapter, that is, assuming all planning errors within the budget have been adjusted for or removed and your standard used is realistic.

NOTES

Process of Calculating Planning Variances

1. Calculate the planning variance and adjust the original budget within the operating statement for this, before any operational variances are calculated.
2. Adjust the standard cost used in the budget from ex ante to ex post (revised) standard.
3. Now that the original budget and standard cost has been adjusted, the operational variances that would be effected by the adjustment, will give a more realistic standard.

The Effect is to Sub-divide a Variance into 2 Parts

1. The planning variance which is beyond the control of staff e.g., planning errors.
2. The operational variances which may be within the control of staff.

This allows better management information for control purposes. Planning and operational variances are not alternatives to the conventional approach; they just produce a more detailed analysis. Further analysis of variances into groups e.g., planning which are to do with poor planning or inadequate standards used compared with actual true favourable or adverse operational variances, allow managers to be appraised truly on deviations they can control not those variances which are beyond their control.

Advantages of Planning Variances

- Highlight between variances which are controllable and uncontrollable;
- Help motivate managers and staff;
- Help use more realistic standards;
- Give a fairer reflection of operational variances.

However criticism includes still the question of determining a 'realistic standard' in the first place and putting too much emphasis on 'bad planning' rather than 'bad management' and the analysis can be more time consuming and costly than the conventional approach.

4.12 CAUSES OF VARIANCES

Possible causes of the individual variances are :

Material price variance	<ul style="list-style-type: none">• Different sources of supply.• Unexpected general price increase.• Alteration in quantity discounts.• Alteration in exchange rates (imported goods).• Substitution of a different grade of material.
Material usage variance	<ul style="list-style-type: none">• Standard set at mid-year price so one would expect a favourable price variance for part of the year and

NOTES

	<p>an adverse variance for the rest of the year.</p> <ul style="list-style-type: none"> • Higher/lower incidence of scrap. • Alteration to product design.
<i>Wages rate variance</i>	<ul style="list-style-type: none"> • Substitution of a different grade of material. • Unexpected national wage award. • Overtime/bonus payments different from plan.
<i>Labour efficiency variance</i>	<ul style="list-style-type: none"> • Substitution of a different grade of labour. • Improvement in methods or working conditions. • Variations in unavoidable idle time. • Introduction of incentive scheme. • Substitution of a different grade of labour.
<i>Variable overhead variance</i>	<ul style="list-style-type: none"> • Unexpected price changes for overhead items. • Labour efficiency variances.
<i>Fixed overhead expenditure variance</i>	<ul style="list-style-type: none"> • Changes in prices relating to fixed overhead items <i>e.g.</i>, rent increase. • Seasonal effects <i>e.g.</i>, heat/light in winter. (This arises where the annual budget is divided into four equal quarters of thirteen equal four-weekly periods without allowances for seasonal factors. Over a whole year the seasonal effects would cancel out.)
<i>Fixed overhead volume</i>	<ul style="list-style-type: none"> • Change in production volume due to change in demand or alterations to stockholding policy. • Changes in productivity of labour or machinery. • Production lost through strikes etc.
<i>Operating profit variance due to selling prices</i>	<ul style="list-style-type: none"> • Unplanned price increase. • Unplanned price reduction <i>e.g.</i>, to try and attract additional business.

4.13 SUMMARY

- A **standard cost** is a planned or forecast unit cost for a product or service, which is assumed to hold good given expected efficiency and cost levels within an organisation.
- Variance analysis is a budgetary control process, which compares standard or budgeted costs and revenues with the actual results of an organisation,

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in order to obtain information regarding any exceptions from budget, this information is also used to improve performance through control action *e.g.*, correcting problems.

- Standard costing is a management control technique for every activity. It is not only useful for cost control purposes but is also helpful in production planning and policy formulation.
- Normally, setting up standards is based on the past experience. The total standard cost includes direct materials, direct labor and overheads. Normally, all these are fixed to some extent. The standards should be set up in a systematic way so that they are used as a tool for cost control.
- Traditional **absorption costing** takes the total budgeted fixed overhead for a period and divides by a budgeted (or normal) activity level *e.g.*, units, in order to find the overhead absorption rate.

4.14 REVIEW QUESTIONS

1. What do you mean by standard?
2. What are the advantages and limitations of standard costing?
3. How is standard set for direct materials?
4. How is standard cost determined?
5. What is fixed overhead variance?
6. What are the main causes of variance?

4.15 FURTHER READINGS

- Drury, C. (2004). *Management and cost accounting*. 6th ed. London: Cengage Learning (formerly Thomson Learning).
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UNIT – V

DECISION MAKING

Decision Making

NOTE

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- 5.1 Introduction
- 5.2 Meaning of Absorption Costing
- 5.3 Meaning of Marginal Costing
 - 5.3.1 Distinction between Absorption Costing and Marginal Costing
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5.1 INTRODUCTION

As we know that total cost involved in a production may be divided broadly into two categories namely – Variable cost and Fixed cost. Variable cost varies directly with changes in the volume of production whereas, fixed cost remains the same for all levels of production. Raw material and labour costs vary according to level of production so these cost consider as variable cost. Fixed cost remains unchanged whether we produce at any level. Every production involves some amount of fixed cost which is not influence by the variations

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in the level of production. Rent of building, insurance premium, local taxes, etc., are some of the examples of fixed cost. A manufacturing firm will have to pay rent of the building, insurance premium and local taxes, irrespective of the level of production. The classification of total cost into variable and fixed components play a significant role in managerial decision-making.

5.2 MEANING OF ABSORPTION COSTING

The traditional technique to calculate the cost of production is the Absorption Costing Technique, according to this total cost involved in a production is aggregated without any regard to its constituents. Since absorption costing technique does not make any distinction between variable and fixed cost and takes into account total cost, it is also known by the names of Full Cost or Total Cost Technique. This method does not consider now-a-days. Modern firms are not only concerned with ascertaining cost per unit for price fixation but they are also conscious of cost control and cost reduction for overcoming the keen competition successfully and enhance overall profitability of their concerns. The traditional or absorption costing sometimes fails to guide the management properly in decision-making. Therefore, marginal costing technique is now increasingly been used in the formulation of production and price policies. Under marginal costing, fixed costs are separated from the total cost in the analysis of cost data for decision-making as well as for calculation of total cost.

5.3 MEANING OF MARGINAL COSTING

In order to understand the marginal costing technique, it is essential to clearly understand the meaning of marginal cost. Marginal cost means the cost of marginal or last unit produced. In this connection, a unit may mean a single commodity, one dozen, a gross or any other packet of goods.

Marginal costing is also called 'Variable Costing'. It may be defined as, *"the technique which charges only the variable costs to the cost units"*. In this technique, cost of a unit consist only of out-of-pocket costs, which are direct, variable or avoidable costs. These are exclusively incurred if specific products are manufactured or sold. Fixed costs are treated as period costs and written off in full against the total contribution or income of the period in which they are incurred.

5.3.1 Distinction between Absorption Costing and Marginal Costing

The critical difference between the two approaches lies in the treatment of fixed manufacturing overheads. The main distinction between these two techniques are given below:

<i>Basis of Differences</i>	<i>Absorption Costing</i>	<i>Marginal Costing</i>
1. Overheads	Fixed overheads are brought into all calculations on the assumption that they must be recovered.	Fixed overheads are considered irrelevant for short-run decisions because they are fixed regarding of the level of output within the 'relevant range'.
2. Production/Sales differences	Low production and high sales result in a lower profit using absorption costing than in marginal costing. This is production oriented.	High production and low sales results in a lower profit for marginal costing than in absorption costing due to lower closing stock valuation. This is more sales oriented.
3. Stock valuation	Absorption costing includes over-heads, except marketing so that the stock value represents all the costs of getting stock to its current condition and location.	Marginal costing excludes fixed overheads for stock valuation and therefore, does not represent the full cost of producing finished goods.
4. Unit costs	All costs, except selling costs are charged to cost units on the principle that all costs relating to the product should be included in the unit cost.	Only variable costs are charged to cost units. It is so on the principle that fixed costs are time based, and should not be charged to output.
5. Costing system	Over and under-absorption of overheads are difficult to operate and sometimes for managers to understand.	Marginal costing is easier to use and understand by managers.
6. Reporting	Absorption costing is primarily used for external reporting, i.e., reporting to shareholders, government and tax authorities.	Marginal costing is primarily used for internal reporting, i.e., reporting to management for decision making.

NOTE**5.3.2 Relation between Marginal Costing and Differential Costing**

Marginal costing is sometimes confused with differential costing. However, the two are not exactly the same. A difference in cost between one course of action and another is called differential cost. If a decision results in an increased cost, the differential cost may be called incremental cost. If the cost is decreased, the differential cost may be referred to as a decremented cost. A decision in favour of an alternative is taken only when the incremental revenue between two levels of output is greater than differential cost of those levels of activity. Thus, differential cost is the difference in net costs and benefits between two or more alternative courses of action. If the selection of an alternative involves changes in variable costs only, marginal cost and differential costs are the same. However, a decision may involve changes in fixed costs also. In such a situation the decision is taken on the basis of only differential costing and not marginal costing.

Example 1. From the following data prepare statements of cost according to both absorption costing and marginal costing system:

NOTE

Particulars	Product X (Rs.)	Product Y (Rs.)
Sales	15,000	40,000
Direct material	6,000	18,000
Direct labour	4,000	7,000
Factory overheads:		
Fixed	3,000	3,000
Variable	1,000	2,500
Administrative overheads:		
Fixed	500	1,000
Selling overheads:		
Fixed	1,000	1,500
Variable	500	1,500

Solution. Statement of Cost and Profit (Absorption Costing)

Particulars	Product X (Rs.)	Product Y (Rs.)	Total (Rs.)
Sales (A)	15,000	40,000	55,000
Less: Cost of Sales:			
Direct material	6,000	18,000	24,000
Direct labour	4,000	7,000	11,000
Factory overheads	4,000	5,500	9,500
Administrative overheads	500	1,000	1,500
Selling overheads	1,500	3,000	4,500
Total Cost (B)	16,000	34,500	50,500
Net Profit (A - B)	(-) 1,000	5,500	4,500

Example 2. A factory is currently running at 50 per cent capacity and produces 5,000 units at a cost of Rs. 90 per unit as per details below:

Material	Rs. 50
Labour	Rs. 15
Factory overheads	Rs. 15 (Rs. 6 fixed)
Administrative overheads	Rs. 10 (Rs. 5 fixed)

The current selling price is Rs. 100 per unit. At 60 per cent working material cost per unit increases by 2 per cent and selling price per unit falls 2 per cent.

At 80 per cent working material cost per unit increases by 5 per cent and selling price per unit falls by 5 per cent. Estimated profits of the factor at 60 per cent and 80 per cent working and offer your comments.

Solution.

Marginal Cost Statement

Particulars	Capacity Level					
	50% 5,000 Units		60% 6,000 Units		80% 8,000 Units	
	Per Unit (Rs.)	Total (Rs.)	Per Unit (Rs.)	Total (Rs.)	Per Unit (Rs.)	Total (Rs.)
A. Sales	100	5,00,000	98	5,88,000	95	7,60,000

B. Marginal cost:					
Material	50	2,50,000	51	3,06,000	52.50 4,20,000
Labour	15	75,000	15	90,000	15 1,20,000
Factory overhead	9	45,000	9	54,000	9 72,000
Administrative overheads	5	25,000	5	30,000	5 40,000
Total (B)	79	3,95,000	80	4,80,000	81.5 6,52,000
C. Contribution (A - B)	21	1,05,000	18	1,08,000	13.5 1,08,000
D. Fixed cost:					
Factory overhead	6	30,000	5	30,000	3.75 30,000
Administrative overhead	5	25,000	4.17	25,000	3.13 25,000
Total (D)	11	55,000	9.17	55,000	6.88 55,000
E. Profit (C - D)	10	50,000	8.83	53,000	6.63 53,000

NOTE**Comments**

1. The profits of the factory increased from Rs. 50,000 to Rs. 53,000 as a result of increase in the capacity level from 50 per cent to 60 per cent. However, the profits would have been more if the material cost would not have increased and the selling price would not have decreased.
2. The profit remained unchanged despite increase in the capacity level from 60 per cent to 80 per cent. The gain from increase in the capacity level was neutralized by 5 per cent increase in the material cost and 5 per cent decrease in selling price.

Statement of Cost (Marginal Costing)

Particulars	Product X (Rs.)	Product Y (Rs.)	Total (Rs.)
Sales (A)	15,000	40,000	55,000
Less: Cost of Sales:			
Direct material	6,000	18,000	24,000
Direct labour	4,000	7,000	11,000
Variable factory overheads	1,000	2,500	3,500
Variable selling overheads	500	1,500	2,000
Total (B)	11,500	29,500	40,500
Contribution (A - B)	3,500	11,500	14,500
Less: Fixed Cost			
(Factory Administrative and Selling)	4,500	5,500	10,000
Net Profit	(-) 1,000	5,500	4,500

Sometimes fixed costs are not traceable to different products, then the statement of cost will be prepared after contribution margin as under:

Statement of Cost (Marginal Costing)

Particulars	Product X (Rs.)	Product Y (Rs.)	Total (Rs.)
Sales (A)	15,000	40,000	55,000
Less: Cost of Sales:			
Direct material	6,000	18,000	24,000
Direct labour	4,000	7,000	11,000
Variable factory overheads	1,000	2,500	3,500
Variable selling overheads	500	1,500	2,000
Total (B)	11,500	29,500	40,500
Contribution (A - B)	3,500	11,500	14,500
Less: Fixed Cost			
(Factory Administrative and Selling)			10,000
Net Profit			4,500

5.3.3 Features of Marginal Costing

The main features of marginal costing are as follows:

Cost Classification

The marginal costing technique makes a sharp distinction between variable costs and fixed costs. On the basis of variable cost:

(i) *Inventory Valuation*: Under marginal costing, inventory for profit-measurement is valued at marginal cost in sharp contrast to total unit cost under absorption costing method.

(ii) *Marginal Contribution*: Marginal costing technique makes use of marginal contribution for marking various decisions. Marginal contribution is the difference between sales and marginal cost, judging the profitability of different products or departments. It is used for Semi-variable overheads.

5.4 METHODS FOR SEGREGATION OF SEMI-VARIABLE COST

The basic condition for application of the technique of marginal costing is the distinction between fixed and variable costs. This means that semi-variable overhead will have to be segregated into fixed and variable elements. The following methods may be used for segregation of semi-variable cost:

5.4.1 Scatter Graph Method

The scatter graph method requires a plot of cost and activity observations on a graph. The accountant's judgment is used to determine usually a line on the graph that best explains the relationship between changes in cost and changes in the level of activity. Once the line has been determined, any two points on the line are then selected to estimate the fixed cost and the variable costs rate.

5.4.2 Equation Method

Under this method the segregation of semi-variable cost is done with the help of straight line equation. The equation used for this purpose is:

$$Y = MX + C$$

where Y = Total semi-variable cost;

M = Variable cost per unit;

X = Output; and

C = Fixed cost included in semi-variable cost.

Example 3. Taking the figures for July and August :

$$\text{July} \quad 75,000 = 25,000 M + C \quad \dots(i)$$

$$\text{August} \quad 66,000 = 15,000 M + C \quad \dots(ii)$$

Solution.

To get the value of M , subtracting (i) and (ii) we get,

$$9,000 = 10,000 M$$

$$M = 0.90$$

NOTE

Putting value of M in (i), we get

$$75,000 = 25,000 \times 0.90 + C$$

$$75,000 = 22,500 + C$$

$$C = \text{Rs. } 52,500$$

NOTE

5.4.3 High and Low Points Method

It is also known as 'range method', this requires only two observations of activity and cost data. One observation is at the highest activity level and the other is at the lowest activity level within a relevant range. The variable cost per unit is obtained by dividing the difference in the two observed costs by the difference in level of activity.

$$\text{Variable cost per unit} = \frac{\text{Difference in total cost}}{\text{Difference in total activity}}$$

An estimate of fixed cost is obtained by subtracting total variable costs at the highest (or lowest) activity from the total cost at the highest (or lowest) activity.

$$\text{Fixed costs} = \text{Total cost} - \text{Variable cost}$$

5.4.4 Analytical Method

This method consider the degree of variability for each item of semi-variable expenses. Some semi-variables items have a 40 per cent variability while others may have 60 per cent variability. Though it seems to be an easy method, yet it is very difficult to estimate the degree of variability of an expense.

Example 4. Taking the amount of any month say October and assuming a 60 per cent degree of variability, the analysis shall be as under:

$$\text{Variable element} = 60 \text{ per cent of Rs. } 85,000 = \text{Rs. } 51,000$$

$$\text{Fixed element} = 85,000 - 51,000 = \text{Rs. } 34,000$$

Solution. Fixed element will remain constant, whereas variable element will vary according to variation in production. Thus, for January, Fixed element is Rs. 34,000 and

$$\text{Variable portion} = \frac{\text{Rs. } 51,000}{\text{Rs. } 30,000} \times \text{Rs. } 20,000 = \text{Rs. } 34,000$$

$$\begin{aligned} \text{Therefore, the total semi-variable expenses for 20,000 units} \\ = \text{Rs. } 34,000 + \text{Rs. } 34,000 = \text{Rs. } 68,000 \end{aligned}$$

5.4.5 Level of Output Method

Under this method, variable element is calculated.

$$\text{variable element} = \frac{\text{Change in amount of expenses}}{\text{Change in quantity}}$$

This method is simple as it is clear from following example but is not scientific and accurate method.

NOTE

Example 5. The X Co. Ltd. Submits the following information in respect of semi-variable costs.

Month	Production Units	Semi-variable Costs
July	25,000	75,000
August	15,000	66,000
September	40,000	1,00,000
October	30,000	85,000
November	50,000	1,15,000
December	35,000	95,000

During the month of January 2005, the production was 20,000 units only. Calculate the amount of fixed variables and total semi-variable expenses for the month.

Solution. Taking the level of activity of any two months, say September and November, the variable costs may be calculated as follows:

Month	Production Units	Semi-variables (Rs)	Fixed (Rs)	Variable (Rs)
September	40,000	1,00,000	40,0003	60,0001
November	50,000	1,15,000	40,0002	75,0002
Difference	10,000	15,000		

$$\text{Therefore, variable element} = \frac{\text{Change in amount}}{\text{Change in quantity}} = \frac{\text{Rs. 15,000}}{\text{Rs. 10,000}} = \text{Rs. 1.50 per unit}$$

Calculation of fixed, variables and total semi-variables costs of 20,000 units for the month of January:

$$\begin{aligned} \text{Variable overheads for January} &= 20,000 \times \text{Rs. 1.50} = \text{Rs. 30,000} \\ \text{Fixed overheads} &= \text{Rs. 40,000} \\ \text{Total Semi-variable overheads} &= \text{Rs. 70,000} \end{aligned}$$

5.4.6 Least Square Method

Under this method, the statistical technique of fitting an equation with the help of a number of observations is used to segregate semi-variable cost. We know the straight line equation $Y = MX + C$ where 'C' represents the fixed element and 'M' the degree of variability. From this basic equation, and given a set of observations, N, two simultaneous linear equations can be used to determine the fixed cost element and the variable cost element per unit of activity. The linear equations are:

$$\Sigma Y = Na + b \Sigma X \quad \dots(i)$$

$$\Sigma XY = a \Sigma X + b \Sigma X^2 \quad \dots(ii)$$

where, X = number of units

1. Variable overheads for September = $40,000 \times \text{Rs. 1.50} = \text{Rs. 60,000}$
2. Overheads for November has been computed accordingly.
3. Fixed overheads for September = $\text{Rs. 1,00,000} - \text{Rs. 60,000} = \text{Rs. 40,000}$

Y = total cost at a given production level

N = number of observations

a = fixed cost

b = variable cost per unit of production

The application of the least squares method can be further clear from the study of the example given below:

Example 6. ESS Co. Ltd. submits the following information for a six months period ended on 31st December, 2004:

Month	Production Units) (Rs.)	Semi-variable Costs
July, 2004	20,000	20,000
August, 2004	40,000	30,000
September, 2004	60,000	40,000
October, 2004	80,000	50,000
November, 2004	1,00,000	60,000
December, 2004	1,20,000	70,000

Calculate the amount of fixed and variable element in semi-variable cost.

Solution.

Month	Production (Units) (X)	Semi-variable Expenses (Rs.) (Y)	X^2	XY (Rs.)
July, 2004	20,000	20,000	4,00,000	4,00,000
August, 2004	40,000	30,000	16,00,000	12,00,000
September, 2004	60,000	40,000	36,00,000	24,00,000
October, 2004	80,000	50,000	64,00,000	40,00,000
November, 2004	1,00,000	60,000	1,00,00,000	60,00,000
December, 2004	1,20,000	70,000	1,44,00,000	84,00,000
Total	$\Sigma X = 4,20,000$	$\Sigma Y = 2,70,000$	$\Sigma X^2 = 3,64,00,000$	$\Sigma XY = 2,24,00,000$

$$N = 6$$

$$\Sigma X = 4,20,000$$

$$\Sigma Y = 2,70,000$$

$$\Sigma X^2 = 3,64,000$$

$$\Sigma XY = 2,24,000$$

substitute these values in the two linear equations, we have

$$\Sigma Y = Na + B \Sigma X$$

$$\text{Rs. } 2,70,000 = 6a + 4,20,000b \quad \dots(i)$$

$$\Sigma XY = a \Sigma X + b \Sigma X^2$$

$$\text{Rs. } 2,24,00,000 = 4,20,000a + 3,64,000b \quad \dots(ii)$$

In order to solve the equations, it will be necessary to eliminate one of the terms. The "a" term can be eliminated by multiplying equation (i) by 70,

NOTE

NOTE

and then subtracting it from equation (ii), we get,

$$\text{Rs. } 2,24,00,000 = 420a + 3,64,00,000b$$

$$\text{Rs. } 1,89,00,000 = 420a + 2,94,00,000b$$

$$\text{Rs. } 35,00,000 = 70,00,000b$$

$$b = \frac{35,00,000}{70,00,000}$$

$$b = \text{Rs. } 0.50$$

Solve 'a' by substituting Rs. 0.50 for 'b' in either equations

$$\text{Rs. } 2,70,000 = 6a + 4,20,000 \times 0.50$$

$$\text{Rs. } 2,70,000 = 6a + 2,10,000$$

$$6a = 2,70,000 - 2,10,000$$

$$6a = 60,000$$

$$a = \text{Rs. } 10,000 \text{ fixed cost}$$

The computation for 'a' and 'b' establish the values for the fixed and variable components in the semi variable costs. Using the calculated values, $a = \text{Rs. } 10,000$ fixed cost per month and $b = \text{Rs. } 0.50$ variables cost per unit, the composition of the semi-variable cost could be shown as follows:

$$4,20,000 \text{ units @ } 0.50 \text{ per unit} = \text{Rs. } 2,10,000 \text{ (variable cost)}$$

$$6 \text{ months @ Rs. } 10,000 \text{ per month} = \text{Rs. } 60,000 \text{ (fixed cost)}$$

$$\text{Total Semi-variable cost} = \text{Rs. } 2,70,000$$

5.5 MARGINAL COSTING AND DECISION MAKING

The effort of the management in an enterprise is to optimize profits or minimize losses. In their efforts to do so they have to review the existing production, pricing and marketing policies from time to time and make necessary adjustments, if needed. Marginal costing technique provides objective basis and facilitates the task of decision-making in respect of the following:

1. Ascertaining Relative Profitability of Products

A manufacturing concern engaged in the production of various products is interested in the relative profitability of its products so that it may suitably change its production and sales policies especially in case of those products which it considers less profitable or unproductive. The concept of P/V Ratio provided by the marginal costing technique is much helpful in understanding the relative profitability of products. The Absorption costing method would hastily concluded that it is of no use of produce and run the department and it should be close down if a product or department shows loss. Sometimes this type of conclusion will mislead the management. The marginal costing technique would suggest that it would be profitable to continue the production of a product if it is able to recover the full marginal cost and a part of the fixed cost.

2. Determining Profitability of Alternative Product-mix

Since the objective of an enterprise to maximize profits, the management would prefer that product-mix which is ideal one in the sense that it yields maximum profits. Product-mix means combination of products which is intended for production and sales. A firm producing combinations of units or values of products and select the one which maximizes profits.

NOTE

3. Make or Buy Decision

If similar product or component is available outside, than a manufacturing firm compares its unit cost of manufacture with the price at which it can be purchased from the market. The marginal cost analysis suggests that it is profitable to the total manufacturing cost. In other words, the firm should prefer to buy if the marginal cost is more than the price to make when the marginal cost is lesser than the purchase price. However, the available plant capacity will exert its own influence in such a decision-making.

4. Expand or Buy Decision

If the capacity of existing plant is not using fully than firm should not interested to buy product for market but if more production firm need new or additional plant, in that case marginal costing helps in decision-making. The firm should evaluate the capital expenditure proposal resulting out of expansion program in items of cash flows and cost of capital. If the installed capacity of the existing plant is partially being used, then it can be utilized by producing more internally. The additional production may necessitate purchase of some specialized equipment and thus involve interest and depreciation cost. It is advisable to expand and produce if the enterprise is able to save some costs by doing so.

5. Pricing in Home and Foreign Markets

Pricing of a product is governed primarily by its cost of production and the nature of competition being faced by the production unit. Once a price is fixed by market forces, it remains stable at least in the short period. During short period, because of selling period, marginal cost and fixed costs remain the same, a businessman is in a position to establish relationship between all of them. On the basis of such a relationship, it is very easy to fix the volume of sales and selling price during normal and abnormal times in the home market. It is also a problem that how far the prices can be cut in case of foreign buyer to effect additional sales. Marginal costing technique gives a realistic answer to this problem.

6. Pricing in Foreign Markets

A foreign market can be kept separate from the domestic market due to many legal and other restrictions. These restrictions are imposed on imports and exports and as such a different price can be charged from foreign buyers. Any company can enjoy surplus production capacity by increasing its production to sell in the foreign market at lower price if its

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full fixed cost already stands recovered for the production from home market.

7. Profits Planning

The process of profit planning involves the calculation of expected costs and revenues, arising out of operations at different levels of plant capacity for the production. The cost and revenues at different level of operations may be different and a concern has to choose one level at which its profits are maximum. Marginal costing technique helps the management by suggesting a suitable product-mix. It also guides the management in selecting the best product mix for attaining a specified level of profit.

5.5.1 Advantages of Marginal Costing

Marginal costing helps in short-term decisions. It provides a base to the management for there tasks of unit cost measurement, stock valuation and income measurement. Advantages of marginal costing are as follows:

1. **Assists Planning and Control:** The separation of factory overheads into its fixed and variable expenses is a fundamental requirement of marginal costing. It assists planning, decision-making and control. It also guides the management in making periodic profit plans. Since it examines the effect of fluctuating volumes on costs, it assists the change in profitability which may occur under certain condition.
2. **Enable Break-even Analysis:** Break-even point is the point at which the sales revenue is just equal to both the fixed and variable overhead costs. In terms of units, it is determined by dividing fixed costs into the contribution margin. The contribution margin is the difference between the unit selling price and the marginal costs. For break-even in terms of sales revenue, the fixed costs are divided by P/V ratio. These concepts are based on marginal costing.
3. **Competitive Pricing:** In the short-run, prices can be determined through the application of marginal costing more intelligibility. Sometimes, the price of a certain product cannot be usual total cost plus something. But, in any case, it has top be above the marginal cost so that every unit-sold plays some part in the recovery of fixed cost.
4. **Avoids Distortion of Profits:** Where sales do not match with production, the inclusion of fixed overheads in stock valuation tends to distort recorded profit from one period to another. When a proportion of fixed overheads is carried forward in stock valuation, the real effect of selling tends to be concealed. Marginal costing avoids the distortion in as much as only variable overheads are included in the unit cost.
5. **Simplified Measure of Relative Profitability:** The arbitrary apportionment of fixed cost complicates any attempt to measure profitability of different products. Marginal costing greatly simplifies the profitability analysis. It shows the product-wise contribution margin.

5.5.2 Disadvantages of Marginal Costing

The disadvantages of marginal costing relate mainly to misuse rather than to any theoretical drawbacks. These are as follows:

1. **Short-term Considerations:** The relationship between costs and volume is true only in the short-run. Any attempt to base a long-term decision on marginal cost will be detrimental to the interests of the firm.
2. **Arbitrary Exercise:** The separation of semi-variable costs into their fixed and variable elements is an arbitrary exercise. This may be subject to inaccuracy and fluctuation at different levels of output. As such, the basic cost information used in decision-making may contain a substantial degree of error.
3. **Dangers in Pricing:** Prices in the long-run reflect a recovery of the utilization of resources represented by fixed costs. They are also expected to give a return on the capital employed. Once prices are announced below the total cost, it may be difficult to raise them later. As production cannot be achieved without fixed costs, it is improper, in general, to ignore them.
4. **Lack of General Acceptability:** There has been absence of support and acceptability of marginal costing. None of the regulatory authorities, be it government, tax authorities, or the accounting profession, have accepted this technique. For valuing inventories, external reporting, and income tax reporting, it is full costing which is insisted upon.

NOTE

5.6 COST-VOLUME-PROFIT ANALYSIS

Cost-Volume-Profit (CVP) analysis is an extension of the technique of marginal costing. As the name suggests, it establishes the relationship between costs, volume and profits. The behaviour of the three key parameters also gives rise to break-even point (BEP). This is the critical point of no profit and no loss. It is defined as the level of output which evenly breaks-even the costs and revenues. At this specific level of activity, the sales revenue covers the total cost. Consequently, the profits are zero. The BEP may be calculated either in terms of:

- (i) Units of output, or
- (ii) Sales revenue.

5.7 METHODS OF BREAK-EVEN ANALYSIS

There are two methods of Break-even analysis viz. (1) Graphic Method and (2) Algebraic Method.

5.7.1 Graphic Method

According to this method, the data of costs and revenues at different levels of output or sales are plotted on a graph paper. This gives Break-Even

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chart showing a definite level of output/sales at which total costs and total revenues are equal. The graphic representation gives a bird's eye-view of the cost-volume-profit relations.

Construction of Break-even Chart

The construction of Break-even chart is not difficult. Information needed to draw a Break-even chart are as follows:

- (i) *Variable Cost* : This is the cost which varies directly with production/sales. Total variable cost for any volume of output can be found out by multiplying the output variable cost per unit.
- (ii) *Cost* : This is that portion of total costs which is not affected by the variations in the level of activity. It means fixed costs remain the same at all levels of production. The portion of fixed cost has to be separated from total cost carefully for accurate analysis of the problems.
- (iii) *Selling Price* : Per unit selling price is determined by market forces of demand and supply and the total selling price at different scales can be calculated at multiplying the scale of production and selling price per unit.

After having ascertained the variables of fixed costs, and total cost for various levels of output, the Break-even chart can be drawn through the following steps:

1. Fix the scale of production and cost/revenue which shall be shown on X-axis and Y-axis respectively.
2. Locate the point of fixed cost on Y-axis and draw a line through this point parallel to X-axis. This is the fixed cost curve (FCC).
3. Draw total revenue curve by locating and joining the points of revenues for different levels of production. The revenue curve starts from point of origin because the revenue at zero output is zero.
4. Draw total cost curve (TCC) by locating and joining the points of total costs for different levels of production. Total cost curve starts from the point of fixed cost because total cost at zero output is equal to fixed cost.

From the chart it will be seen that the total costs curve (TCC) and total revenue curve (TRC) intersect each other at some point. The Break-Even point corresponding to which break-even output at OX-axis can be determined.

Method of Preparing B.E.P. Chart

For preparing Break-even chart, the data relating to firm's capacity of production (in units or sales value), variable costs and fixed costs is require. The steps to prepare a break-even chart are as follows:

- (i) First of all, we have to prepare a table showing fixed costs, variable costs, total costs and total sales value at different levels of production i.e., production at zero level and existing production level.

- (ii) The X-axis (horizontal line) on graph represents volume of sales and output and Y-axis (vertical line) presents costs and sales value.
- (iii) The fixed cost line is drawn parallel to X-axis. This line indicates that fixed expenses remain the same with any volume of production. The variable costs for two levels of activity are plotted over the fixed cost line. The variable cost line is joined to fixed cost line at zero volume of production. This line can also be regarded as the total cost line because it starts from the point where fixed cost has been incurred and variable cost is zero.
- (iv) Sales values at two levels of output are plotted, joined and the obtained line is known as the sales line.
- (v) The sales line will cut the total cost line at a point where the total costs are equal to total revenues and this point of intersection of two lines is known as break-even point—the point of no profit no loss.
- (vi) The number of units to be produced at the break-even point is determined by drawing a perpendicular to the X-axis from the point of intersection and measuring the horizontal distance from the zero point to the point at which the perpendicular is drawn.
- (vii) The sale values at break-even point is determined by drawing a perpendicular to the Y-axis from the point of intersection and measuring the vertical distance from the zero point to the point at which the perpendicular is drawn. The area below B.E.P. represents the loss area as the sales revenue is less than the total cost and area above the B.E.P. indicates the area of profit as the sales revenues exceeds the total cost.
- (viii) The Angle of incidence is the angle formed in the break-even chart at the break-even point at which the sales line cuts the total cost line. This angle indicates the profits are being made at a high rate. On the other hand, a small angle indicates a low rate of profit and suggests that variable costs form a major part of cost of production. A large angle of incidence with high margin of safety indicates the most favourable position of a business and even the existence of monopolistic conditions. The margin of safety is represented on the chart as the distance between the break-even point and the output produced and sold.

The break-even chart may be understood from the following illustrations:

Example 7. Draw a break-even chart from the following information:

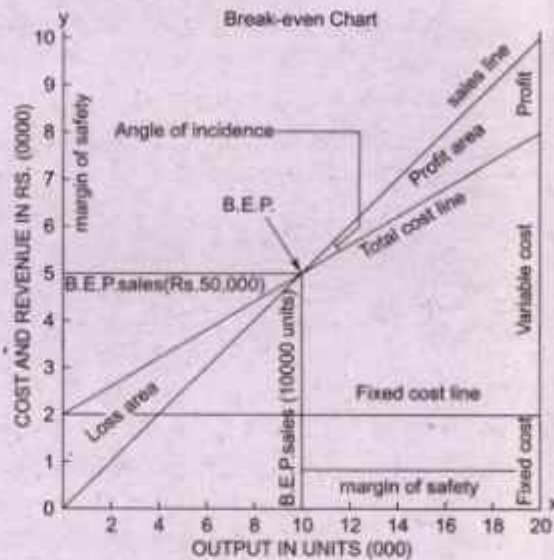
Output (Units)	4,000	8,000	12,000	16,000	20,000
Fixed Costs (Rs.)	20,000	20,000	20,000	20,000	20,000
Variable Cost Rs. 3 per Unit (Rs.)	12,000	24,000	36,000	48,000	60,000
Sales Rs. 5 per Unit (Rs.)	20,000	40,000	60,000	80,000	1,00,000

Also check the B.E.P. and Margin of Safety by arithmetic formula.

Solution. On the basis of given informations, the break-even chart will be as given:

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Verification by Mathematical Formula:

$$\text{B.E.P in Units} = \frac{F}{\text{Contribution (C)} = S - V} = \frac{\text{Rs. 20,000}}{5 - 3 = 2} = 10,000 \text{ Units}$$

$$\text{B.E.P. in Rupees} = 10,000 \text{ Units} \times \text{Rs. 5 per Unit} = \text{Rs. 50,000}$$

$$\text{Margin of Safety} = \text{Actual Sales} - \text{B.E.P.}$$

$$\text{in Units} = 20,000 \text{ Units} - 10,000 \text{ Units} = 10,000 \text{ Units}$$

$$\text{in Rs.} = \text{Rs. 1,00,000} - \text{Rs. 50,000} = \text{Rs. 50,000}$$

5.7.2 Algebraic Method

In order to understand the Cost-Volume-Profit relationship precisely and verify the results drawn from Break-even chart the algebraic method may be used. The algebraic equation showing relationship between cost, volume and profit is:

$$S - V = F + P$$

At Break-even point, there is no profit and the contribution is just equal to fixed cost. Thus,

$$S - V = F \text{ (at break-even point).}$$

The following algebraic methods are used for the study of cost-volume-profit relationship:

1. Contribution,
2. Profit-Volume Ratio (P/V Ratio),
3. Break-even Point,
4. Margin of Safety.

1. Contribution

The difference between sales and marginal cost (variable cost) is known as contribution. In other words, it is just like a fund which is first utilized to recover fixed cost and balance is known as profit. Thus, the total of fixed cost

and profit is called contribution. It is also known as 'Gross Margin' or 'Gross Profit'. The contribution may be expressed in terms of formula as follows:

$$(i) \text{ Contribution} = \text{Sales} - \text{Variable Cost}$$

$$\text{or} \quad C = S - V$$

Variable cost includes direct materials, direct labour, direct expenses and all variable overheads. Variable cost means 'marginal costs'.

$$(ii) \text{ Contribution} = \text{Fixed Cost} + \text{Profit}$$

$$\text{or} \quad C = F + P$$

Both of the above formulae may be represented in the form of following 'Marginal Cost Equation':

$$\text{Sales} - \text{Variable Cost} = \text{Fixed Cost} + \text{Profit}$$

$$\text{or} \quad S - V = F + P$$

It is clear from the above formula of contribution that if contribution is greater than fixed cost ($C > F$), there will be profit to the business while if contribution is less than fixed cost ($C < F$), it will have loss and if contribution is equal to fixed cost ($C = F$), it will have neither profit nor loss.

Contribution Per Unit : If per unit variable cost is deducted from selling price per unit, it will be contribution per unit. It may be written in the form of the following formula:

Where,

$$CP = SP - VP$$

CP = Contribution per unit

SP = Selling price per unit

VP = Variable cost per unit

Profit and fixed cost may be determined easily with the help of contribution. The following formulae are worth remembering:

$$(i) \text{ P/V Ratio} = \frac{C}{S} \times 100 \quad \text{or} \quad \frac{CP}{SP} \times 100$$

$$\text{or} \quad \frac{S - V}{S} \times 100 \quad \text{or} \quad \frac{SP - VP}{SP} \times 100$$

where, C = Total contribution; S = Total sales in Rs.
 CP = Contribution per unit; SP = Selling price per unit
 V = Total variable cost; VP = Variable cost per unit

$$(ii) \text{ P/V Ratio} = \frac{\text{Fixed Cost} + \text{Profit}}{\text{Sales}} \times 100$$

$$\text{or} \quad = \frac{F + P}{S} \times 100$$

If sales and profit of two different periods are given then:

$$\text{P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$$

NOTE

Sometimes sales and total costs are given of two periods. In this case for finding out profit of each period, total cost is deducted from the amount of sales.

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If the amounts of profit and margin of safety are given then:

$$\text{P/V Ratio} = \frac{\text{Profit}}{\text{Margin of Safety}} \times 100$$

or
$$\frac{P}{MS} \times 100$$

2. Profit-Volume Ratio (P/V Ratio)

On the basis of Profit-Volume ratio, we can find profit, contribution, fixed and variable costs easily. The following formulae may be used in this respect:

(i) Contribution = Sales \times P/V Ratio

or
$$C = S \times \text{P/V Ratio}$$

(ii) Variable Cost = Sales \times (100 – % of P/V ratio)

(iii) Fixed Cost = (Sales in Rs. \times P/V Ratio) – Profit

(iv) Profit = (Sales \times P/V Ratio) – Fixed Cost

(v) P/V Ratio = 100 – % of Variable Cost to Sales

(vi) % of Variable Cost to Sales = 100 – % of P/V Ratio

Determining Additional Sales Volume for Recovering Proposed or Additional Expenses

If management of a business firm wants to increase sales volume, it is obvious to have an increase in selling expenses. The management will give its acceptance for this increase only after it is sure about increase in volume of sales. An additional amount of sales may be computed with the help of P/V ratio from the following formula:

$$\text{Additional Sale (in Rs.)} = \frac{\text{Proposed or Increased Expenditure}}{\text{P/V Ratio}}$$

3. Break-even Point

Break-even point may be calculated in the following two ways:

1. Break-even point (in Units);
2. Break-even point (in Rs.).

1. Break-even Point (in Units): As we have already cleared that there is neither profit nor loss at B.E.P., therefore, at this point:

$$\text{Sales} = \text{Fixed Cost} + \text{Variable Cost}$$

or

$$\begin{aligned} \text{Selling Price per Unit} \times \text{Volume of Sales} \\ = \text{Total Fixed Cost} + (\text{Variable Cost per Unit} \times \text{Volume}) \end{aligned}$$

or
$$SP \times Q = F + (VP \times Q)$$

or
$$(SP \times Q) - (VP \times Q) = F$$

$$\text{or } Q(SP - V) = F$$

$$\therefore Q = \frac{F}{(SP - VP)}$$

$$\therefore \text{B.E.P in Units} = \frac{\text{Fixed Cost}}{\text{Selling Price per Unit} - \text{Variable Cost per Unit}}$$

$$\text{or } = \frac{F}{CP \text{ (Contribution per unit)}}$$

It is clear that B.E.P. (in units) may only be possible to calculate if selling price per unit and variable cost per unit are given or these two may be calculated with the help of given informations, otherwise, B.E.P. in units cannot be calculated.

2. Break-even Point (in Rs.): If break-even point (in units) is multiplied with selling price per unit, we can get Break-even point in Rupees. In short,

$$\text{B.E.P. (in Rs.)} = \text{BEP in Units} \times \text{Selling Price Per Unit}$$

It is are of two types:

- (i) **Cash Break-even Point:** When break-even point is calculated only with those fixed costs which are payable in cash, such a break-even point is known as cash break-even point. This means, that depreciation and other non-cash fixed costs are excluded from the fixed costs while items of liabilities matured for payment, i.e., installment of loan due for payment are included in fixed costs. It means while calculating this B.E.P., only those items of costs and revenues are considered which involve cash flows.

$$\text{Cash B.E.P. in Units} = \frac{\text{Cash Fixed Cost} + \text{Loan Installment}}{\text{Cash Contribution Per Unit}}$$

$$\begin{aligned} \text{Cash B..P. Rs.)} &= \frac{(\text{Cash Fixed Cost} + \text{Loan Installment}) \times SP}{\text{Cash Contribution Per Unit}} \\ &= \frac{\text{Cash Fixed Cost} + \text{Loan Installment}}{P/V \text{ Ratio}} \end{aligned}$$

- (ii) **Cost Break-even Point:** Cost Break-even point indicates a situation where the costs of operating two alternatives are equal. The point enables the firm to identify which is the best to operate at or a given level of output assuming that sale price per unit is the same. Such break-even point can be calculated only when the following conditions are fulfilled:

- Fixed costs of operating two alternatives are not the same.
- Variable cost per unit of the alternative having higher fixed costs should be lesser than that of alternative having lower amount of fixed costs.

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Cost B.E.P. or Sales Level at which profit of both the alternatives

$$= \frac{\text{Difference in Fixed Cost}}{\text{Difference in Variable Cost Per Unit}} = \frac{F - F_1}{(V_1 - V)}$$

where,

F = Fixed cost of more expensive alternative

F₁ = Fixed cost of less expensive alternative

V = Variable cost per unit of alternative having higher fixed costs

V₁ = Variable cost per unit of alternative having lower fixed costs.

Margin of Safety (MS)

Margin of Safety in Units = Actual Sales in Units – B.E.P. Sales in Units

Margin of Safety in Rs. = Actual Sales in Rs. – B.E.P. Sales in Rs.

The margin of safety may be determined on the basis of P/V Ratio. Under this situation, the formula will be as follows:

$$\text{Margin of Safety} = \frac{\text{Profit}}{\text{P/V Ratio}} \times 100$$

Margin of safety may be computed as percentage of sales. The formula is as under:

$$\text{M.S. Ratio} = \frac{\text{Margin of Safety}}{\text{Actual Sales}} \times 100$$

Example 8. The following information is obtained from 'A' Co. Ltd. in a certain year:

	Rs.
Sales	1,00,000
Variable Cost	60,000
Fixed Cost	30,000

Find the (i) P/V Ratio, (ii) Break-even Point, and (iii) Margin of Safety.

Solution.

Given: Sales (S) = Rs. 1,00,000,

Variable Cost (V) = Rs. 60,000,

Fixed Cost (F) = Rs. 30,000

$$(i) \quad \text{P/V Ratio} = \frac{S - V}{S} \times 100 = \frac{\text{Rs. } 1,00,000 - \text{Rs. } 60,000}{\text{Rs. } 1,00,000} \times 100 = 40\%$$

$$(ii) \quad \text{Break-even Point in Rs.} = \frac{F}{\text{P/V Ratio}} = \frac{30,000}{40\%} = 30,000 \times \frac{100}{40} = \text{Rs. } 75,000$$

$$(iii) \text{ Margin of Safety in Rs.} = \text{Actual Sales} - \text{B.E.P. Sales in Rs.}$$

$$= \text{Rs. } 1,00,000 - \text{Rs. } 75,000 = \text{Rs. } 25,000$$

$$\text{or Margin of safety} = \frac{\text{Profit}}{\text{P/V Ratio}}$$

$$= \frac{10,000}{40\%} = \frac{10,000 \times 100}{40} = \text{Rs. } 25,000$$

Where, $\text{Profit} = \text{Sales} - \text{Variable Cost} - \text{Fixed Cost}$

$$= \text{Rs. } 1,00,000 - \text{Rs. } 60,000 - \text{Rs. } 30,000$$

$$= \text{Rs. } 10,000$$

Example 9. From the following data, you are required to calculate the B.E.P. and sales value at this point:

Selling price per unit = Rs. 25

Fixed overheads = Rs. 24,000

Direct material cost per unit = Rs. 8;

Variable overheads = @ 60% on Direct Labour

Direct labour cost per unit = Rs. 5

Trade discount = 4%

If sales are 15% and 20% above the Break-Even Volume, determine the net profit.

Solution.

Selling price per unit	Rs. 25	
(-) Trade discount 4%	<u>Rs. 1</u>	
Net Selling price per unit (SP)		Rs. 24
(-) Variable cost per unit (VP):		
Direct material per unit	Rs. 8	
Direct labour per unit	Rs. 5	
Variable overheads (60% of Rs. 5)	<u>Rs. 3</u>	<u>Rs. 16</u>
Contribution per unit (CP)		<u>Rs. 8</u>

$$\text{B.E.P in Units} = \frac{\text{Fixed Cost}}{\text{CP}} = \frac{\text{Rs. } 24,000}{\text{Rs. } 8} = 3,000 \text{ Units}$$

$$\text{B.E.P in Rs.} = 3,000 \text{ Units} \times \text{Rs. } 24 \text{ per Unit} = \text{Rs. } 72,000$$

Net Profit when Sales are 15% above the Break-even Volume

Sales at BEP	Units	Rs.
		3,000
Add: (15% above BEP)	450	
Sales 15% above BEP	<u>3,450</u>	
Contribution on 3,450 units (3,450 × Rs. 8)		27,600
Less: Fixed Cost		<u>24,000</u>
Profit		3,600

NOTE

**Net Profit when Sales are 20%
above the Break-even Volume**

NOTE

	Units	Rs.
Sales at BEP	3,000	
Add: (20% above BEP)	600	
Sales 20% above BEP	3,600	
Contribution on 3,600 units ($3,600 \times \text{Rs. } 8$)		28,800
Less: Fixed Cost		24,000
Profit		4,800

5.8 LIMITATION OF BREAK-EVEN ANALYSIS

From the above explanations of the use and application of break-even and profit charts, it proved that they are important managerial tools but they should be interpreted carefully as they suffer from certain limitations as explained below.

1. Break-even and profit charts give only a bird's eye-view of the cost-volume and profit position. The determination of exact profit or loss for a given output and price requires a lot of care on the part of one who draws chart. A little deviation may give different result.
2. The analysis is based on the assumption that the total costs can be split into fixed and variable components and fixed costs remain the same for all levels of output. In practice, the separation of costs into fixed and variable components is full of difficulties and the component of fixed cost remains the same only upto a certain level of output. Fixed cost is bound to go up if additional capacity of production has to be created.
3. The assumption of linear relationship between sales and variable cost is also not realistic under the varying technological and economic conditions in a modern era. In a simple break-even chart, the total cost and total revenue curves are the straight lines because of the assumption of linear relationship between sales and variable cost. In actual practice, the business firm may revise their price policies due to change in demand. Similarly, variable cost per unit for additional production goes down if additional supplies of raw materials are available at reduced rates.
4. The B.E.P analysis assumes that production and sales are equal. In fact, whatever is produced is not sold in the same period, and some stock has to be carried to the next period. Opening and closing stocks are generally found in all types of business concerns.
5. Break-even charts are suitable only to represent a single product or combined position of a fixed product-mix. To know the profitability of individual products, profit path graph has to be drawn but this graph does not depict the cost and revenues of sales-volumes.

6. The production technique and efficiency of factors of production is assumed as remaining the same. It is not proper to assume constant conditions of work when the enterprise is moving towards the path of expansion and development.

NOTE**5.9 SUMMARY**

- As we know that total cost involved in a production may be divided broadly into two categories namely—Variable cost and Fixed cost. Variable cost varies directly with changes in the volume of production whereas, fixed cost remains the same for all levels of production.
- The traditional technique to calculate the cost of production is the Absorption Costing Technique, according to this total cost involved in a production is aggregated without any regard to its constituents.
- Marginal cost means the cost of marginal or last unit produced. Marginal costing is also called 'Variable Costing'.
- Marginal costing is sometimes confused with differential costing. However, the two are not exactly the same.
- The scatter graph method requires a plot of cost and activity observations on a graph.
- The effort of the management in an enterprise is to optimize profits or minimize losses.
- Marginal costing helps in short-term decisions. It provides a base to the management for these tasks of unit cost measurement, stock valuation and income measurement.
- Cost-Volume-Profit (CVP) analysis is an extension of the technique of marginal costing.
- There are two methods of Break-even analysis viz. (1) Graphic Method and (2) Algebraic Method.

5.10 REVIEW QUESTIONS

1. What do you mean by variable costing? Discuss the relation between marginal costing and differential costing.
2. Discuss how marginal costing technique aids the task of decision making.
3. Discuss advantages and disadvantages of marginal costing.
4. Write short notes as:
 - (a) Features of Marginal Costing.
 - (b) Graphic method of break-even analysis.
 - (c) Limitation of break-even analysis.

NOTE

5. The following figures are submitted for a year's working of a factory:

Budgeted output	80,000 units
Fixed expenses	Rs. 4,00,000
Variable expenses per unit	Rs. 10
Selling price per unit	Rs. 20

Prepare a break-even chart on a graph paper to show break-even point and also determine new B.E.P. if selling price is reduced to Rs. 18.

6. Consider the following data:

Year	Sales (Rs.)	Profit/Loss (Rs.)
2006	Rs. 2,00,000	Rs. 10,000 Loss
2007	Rs. 5,00,000	Rs. 20,000 Profit

Calculate: (i) P/V Ratio, (ii) Break-even point, (iii) Variable Costs of each year, (iv) Required Sale to earn a profit of Rs. 40,000.

7. The relationship between sales and cost in a Ria Ltd. is as follows:

Sales	Total Costs
Rs. 50,000	Rs. 40,000
Rs. 90,000	Rs. 60,000

Calculate the following: (i) Break-even point of the business, (ii) Profit at an estimated sale of Rs. 1,00,000, (iii) Sales required to earn a profit of Rs. 20,000, (iv) Total cost at a sale of Rs. 80,000

5.11 FURTHER READINGS

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