

# Cost Accounting



Developed By  
Prof. Vanita Patel

On behalf of  
Prin. L.N.Welingkar Institute of Management Development & Research

# About the Author

---

Prof. Vanita Patel is an alumnus of the Prin L.N. Welingkar Institute of Management Development and Research. Having graduated in Commerce from university of Mumbai and thereafter Post-Graduated from Welingkar Institute, i.e: (MMS), with specialisation in finance of University of Mumbai, she has a corporate experience of 7 years and teaching experience of 10 years in the core subjects of finance.

She is core faculty at welingkar Institute and teaches Cost Accounting and Management Control, Financial Accounting and Financial Management for the master's degree programs of University of Mumbai. Currently she is pursuing Ph.D. in General Management.

She has put extensive efforts to create this courseware for the students of our Distance Learning Program.

**Prof. Dr. Uday Salunkhe**

**Director**

Prin. L.N. Welingkar Institute of Management Development & Research

# Contents

---

1	Cost Accounting - An Introduction	4
	Section II - Direct Expenses and Overheads	
2	Materials	106
3	Activity Based Costing	128
4	Budgetary Control	154
5	Cost Volume Relation and Break Even Analysis	193
6	Methods of Costing	227
7	Standard Costing and Variance Analysis	256
8	Marginal Costing	303

# 1

## COST ACCOUNTING - AN INTRODUCTION

---

### SECTION I:

#### INTRODUCTION

##### 1. CONCEPT OF COSTS

Cost is a Sacrifice. It is the amount of resource given up in exchange for some goods or services. The resources given up are money or money's equivalent expressed in monetary units.

The Chartered Institute of Management Accountants, London defines cost as "the amount of expenditure (actual or notional) incurred on, or attributable to a specified thing or activity." The committee on cost concepts and standards of the American Accounting Association defines cost as "cost is a foregoing, measured in monetary terms, incurred or potentially to be incurred to achieve a specific objective".

This objective of a firm may be the manufacture of a product or the rendering of a service which involves expenditure under various heads, e.g. materials, labour, other expenses, etc. A manufacturing organisation is interested in ascertaining the cost per unit of the product manufactured while an organisation rendering service, e.g. transport undertaking, canteen, electricity company, municipality, etc. is interested in ascertaining the cost of the service it renders. In its simplest form, the cost per unit is arrived at by dividing the total cost incurred by the total units produced or the quantum of services rendered. But this method is applicable if the manufacturer produces only one product. If the manufacturer produces more than one product, it becomes imperative to split up the total expenditure between the various products so that the cost of each product can be ascertained

separately. Even if only one product is manufactured, it may be necessary to analyse the cost per unit of each item of expenditure that goes to make up the total cost. The problem becomes more complicated where a number of products are produced and it is necessary to analyse the cost per unit of each product into various items of expenditures that make up the total cost.

The objective with which costs are compiled is always important. For example, if the purpose is to fix the selling price of all items of expenditure; production, administrative and selling will be included. But for valuation of inventories, cost generally means only production cost. Also, if the objective is to measure efficiency, cost compilation method is different than for inventory valuation on quoting prices. Thus, the term "cost" has different denotations.

It is necessary to specify the exact meaning of "cost". When the term is used specifically, it is modified with such terms as prime cost, fixed cost, sunk cost, etc. Each description implies a certain characteristic, which is helpful in analysing the cost. It helps in achieving its three basic objectives namely Cost Ascertainment, Cost Control and Cost Presentation.

A cost must always be studied in relation to its purpose and conditions. Different costs may be ascertained for different purpose and under different conditions. Work-in-progress is valued at factory cost, while stock of finished goods may be valued at office cost. Even if the purpose of the study of cost is the same, different conditions may lead to variation in cost. The cost per unit of a product is sure to vary with an increase in the volume of output since the amount of fixed expenses to be borne by each unit of output decreases.

It is also important to note here that there is no such thing as an exact cost or true cost because no figure of cost is true in all circumstances and for all purposes. Most of the costing information is based on estimates; for example, the amount of overhead is generally estimated in advance; it is distributed over cost units, again on an estimated basis using different methods, many items of cost of production are handled in an optional manner which may give different costs for the same product without going against the accepted principles in any way. Depreciation is one such item, the amount of which will vary in accordance with the method of depreciation being used. Thus, to arrive at an absolutely correct cost may be quite difficult

unless one waits for a long time by which time the costing information may lose all its value.

### **2. CLASSIFICATION OF COSTS**

The different bases of cost classification are:

- a) By time (historical, pre-determined).
- b) By nature of elements ( material, labour and overhead).
- c) By degree of traceability to the products (direct, indirect).
- d) Association with the product (product, period).
- e) Change in activity or volume (fixed, variable, semi variable).
- f) By function (manufacturing, administrative, selling, research, and development, pre-production).
- g) Relationship with accounting period (capital, revenue).
- h) Controllability (controllable, non-controllable).
- i) Cost for analytical and decision-making purpose (opportunity, sunk, differential, joint, common, inputs, out-of-pocket, marginal, uniform, replacement).
- j) Other (conversion, traceable, normal, avoidable, unavoidable, total).

#### **a) Classification on the basis of time**

- i. Historical costs: These costs are ascertained after they are incurred. Such costs are available only when the production of a particular thing has already been done. They are objective in nature and can be verified with reference to actual operations.
- ii. Pre-determined costs: These costs are calculated before they are incurred on the basis of a specification of all factors affecting cost. Such costs may be:

a) Estimated costs: Costs are estimated before goods are produced; these are naturally less accurate than standards.

b) Standard costs: this is a particular concept and technique. This method involves:

- setting up predetermined standards for each element of cost and each product;
- comparison for actual with standard;
- pin-pointing the causes of such variances and taking remedial action.

Obviously, standard costs, though pre-determined, are arrived with much greater care than estimated costs.

### b) By nature or elements

There are three broad elements of costs:

i. **Material:** The substance from which the product is made is known as material, it can be direct as well as indirect.

Direct material: It refers to those materials, which becomes a major part of the finished products and can be easily traceable to the units. Direct materials include:

- All materials specifically purchased for a particular job / process.
- All materials acquired and later requisitioned from stores.
- Components purchased or produced.
- Primary packing materials.
- Material passing from one process to another.

Indirect material: All material which is used for purposes ancillary to production and which can be conveniently assigned to specific physical units is termed as indirect materials. Examples, oil grease, consumable stores, printing and stationary material etc.



ii. **Labour:** Labour cost can be classified into direct labour and indirect labour.

**Direct labour:** It is defined as the wages paid to workers who are engaged in the production process whose time can be conveniently and economically traceable to units of products. For example, wages paid to compositors in a Printing press, to workers in the foundry in cast iron works etc.

**Indirect labour:** Labour employed for the purpose of carrying out tasks incidental to goods or services provided, is indirect labours. It cannot be practically traced to specific units of output. Examples. Wages of store keepers, foreman, time-keeper, supervisors, inspectors etc.

iii. **Expenses:** Expenses may be direct or indirect:

**Direct expenses:** These expenses are incurred on a specific cost unit and identifiable with the cost unit. Examples are cost of special layout design or drawings, hiring of a particular tools or equipment for a job; fees paid to consultants in connection with a job etc.

**Indirect expenses:** These are expenses which cannot be directly, conveniently and wholly allocated to cost center or cost units. Examples are rent, rates and taxes, insurance, power, lighting and heating, depreciation etc.

It is to be noted that the term overheads has a wider meaning than the term indirect expenses. Overheads include the cost of indirect material, indirect labour and indirect expenses. Overhead may be classified as (a) production or manufacturing overheads, (b) administration overheads, (c) selling overheads, and (d) distribution overheads.

### c) By degree of traceability

The products cost can be distinguished as direct and indirect costs. Costs which can be easily traceable to a product or some specific activity are called direct costs. Those costs which are difficult to trace to a single product are called indirect costs. They are common to several products, e.g. salary of a factory manager.



Costs may be direct or indirect with respect to a particular division or department. For example, all the costs incurred in the power house are indirect as far as the main product is concerned but as regards the power house itself, the fuel cost or supervisory salaries are direct. It is necessary to know the purpose for which cost is being ascertained and whether it is being associated with a product, department or some activity.

Indirect costs have to be apportioned to different products, if appropriate measurement techniques are not available. These may involve some formula or base which may not be totally correct or exact.

### **d) Association with the product**

Cost can be classified as products costs and period costs.

**Product costs:** Product costs are those which are traceable to the product and included in inventory values. In a manufacturing concern it comprises the cost of direct materials, direct labour and manufacturing overheads. Product cost is a full factory cost. Product costs are used for valuing inventories which are shown in the balance sheet as asset till they are sold. The products cost of goods sold is transferred to the cost of goods sold account.

**Period costs:** Period costs are incurred on the basis of time such as rent, salaries, etc. and include many selling and administrative costs essential to keep the business running. Though they are necessary to generate revenue, they are not associated with production, therefore, they cannot be assigned to a product. They are charged to the period in which they are incurred and are treated as expenses.

Selling and administrative costs are treated as period costs for the following reasons:

- Most of these expenses are fixed in nature.
- It is difficult to apportion these costs to products equitably.
- It is difficult to determine the relationship between such cost and the product.
- The benefits accruing from these expenses cannot be easily established.

The net income of a concern is influenced by both product and period costs. Product costs are included in the cost of the products and do not affect income till the product is sold. Period costs are charged to the period in which they are incurred.

### e) By changes in activity or volume

Costs can be classified as fixed, variable and mixed cost.

- i. **Fixed costs:** The Chartered Institute of Management Accountants, London, defines fixed costs as "the cost which is incurred for a period, and which, within certain output and turnover limits, tends, to be unaffected by fluctuations in the levels of activity (output or turnover)".

These costs are incurred so that physical and human facilities necessary for business operations can be provided. These costs arise due to contractual obligations and management decisions. They arise with the passage of time and not with production and are expressed in terms of time. Examples are rent, property-taxes, insurance, supervisors' salaries etc.

It is wrong to say that fixed costs never change. Those costs may vary depending on the circumstances. The terms fixed refer to non-variability related to the relevant range. Fixed cost can be classified into the following categories for the purpose of analysis:

- *Committed costs:* These costs are incurred to maintain certain facilities and cannot be quickly eliminated. The management has little or no discretion in this cost, e.g., rent, insurance etc.
- *Policy and management costs:* Policy costs are incurred for implementing particular management policies such as executive development, housing, etc. Such costs are often discretionary. Managed costs are incurred to ensure the operating existence of the company e.g. staff services.
- *Discretionary costs:* These are not related to the operations and can be controlled by the management. These costs result from special policy

decisions, new researches etc. and can be eliminated or reduced to a desirable level at the discretion of the management.

- *Step costs*: Such costs are constant for a given level of output and then increase by a fixed amount at a higher level of output.

- Variable costs**: Variable costs are those costs that vary directly and proportionately with the output e.g. direct materials, direct labour. It should be kept in mind that the variable cost per unit is constant but the total cost changes corresponding to the levels of output. It is always expressed in terms of units, not in terms of time.

Management decision can influence the cost behaviour patterns. The concept of variability is relative. If the conditions upon which variability was determined changes, the variability will have to be determined again.

- Semi-fixed or semi-variable costs**: Such costs contain fixed and variable elements because of the variable element, they fluctuate with volume and because of the fixed element, they do not change in direct proportion to output. Semi-variable or semi-fixed costs change in the same direction as that of the output but not in the same proportion. e.g., depreciation for two shift working may be only 50% more than that for single shift working. They may change with comparatively small changes in output but not in the same proportion.

### f) Functional classification of costs:

A company performs a number of functions. Functional costs may be classified as follows:

- Manufacturing / Production costs**: It is the cost of operation of manufacturing division of an undertaking. It includes the cost of direct materials, direct labour, direct expenses, packing (primary) cost and all overhead expenses relating to production.
- Administration costs**: They are indirect and cover all expenditure incurred in formulating the policy, directing the organisation and controlling the operation of a concern, which is not related to research, development, production, distribution or selling functions.

- iii. **Selling and distribution cost:** Selling cost is the cost of seeking to create and stimulate demand e.g. advertisements, market research etc.  
Distribution cost is the expenditure incurred which begins with making the packaging material available for dispatch and ends with making the reconditioned packages available or re-use e.g. warehousing, cartage etc. It includes expenditure incurred in transporting articles to central or local storage. Expenditure incurred in moving articles to and from prospective customers as in the case of goods on sale or return basis is also distribution cost.
- iv. **Research and Development costs:** They include the cost of discovering new ideas, processes, products by experiment and implementing such results on a commercial basis.
- v. **Pre-Production cost:** When a new factory is started or when a new product is introduced, certain expenses are incurred. There are trial runs. Such costs are referred to as pre-production costs and treated as deferred revenue expenditure. They are charged to the cost of future production.

### g) **Relationships with Accounting period:**

Costs can be capital and revenue. Capital expenditure provides benefits in future period and is classified as an asset. On the other hand, revenue expenditure benefits only the current period and is related as an expense and when an asset is written off, capital expenses to that extent becomes cost. Only when capital and revenue is properly differentiated, the income of a particular period can be correctly determined. It is not possible to distinguish between the two under any circumstances.

### h) **Controllability:**

*Cost can be controllable and non-controllable cost:* The Chartered Institute of Management Accountants, defines controllable cost as "a cost which is influenced by its budget holder". Non-controllable cost is the cost which is not subject to control at any level of Managerial supervision.



The difference between the terms is very important for the purpose of cost accounting, cost control and responsibility accounting. A controlled cost can be controlled by a person at a given organisational level.

Controllable costs are not totally controllable. Some costs are partly controllable by one person and partly by another e.g. maintenance cost can be controlled by both the production and maintenance manager. The term "controllable costs" is often used to mean variable costs and non-controllable costs as fixed.

Belkaoni has mentioned the following fallacies about controllable costs:

- All variable costs are controllable and fixed are not.
- All direct costs are controllable and indirect costs are not.
- All long-term costs are controllable.

Sometimes the time factors and the decision making authority can make a cost controllable. If the time period is long enough, all costs can be controlled. Proper delegation helps in establishing clear responsibility and controllability. But all costs can be controlled by one or another person. The authority and responsibility of cost control is elevated to different levels, though the managing directors is responsible for all the costs.

### i) **Costs for analytical and decision making purposes**

i. **Opportunity costs:** Opportunity cost is the cost of selecting one course of action and the losing of other opportunities to carry out that course of action. It is the amount that can be received if the asset is utilised in its next best alternative.

Edwards, Hermanson and Salmonson define it as "the benefits lost by rejecting the best competing alternative to the one chosen. The benefit lost is usually the net earnings or profit that might have been earned from the rejected alternative".

Example: Once the capital is invested in plant and machinery, it cannot be invested in shares or debentures. This loss of interest and dividend that would be earned is the opportunity cost. Another example is when the owner of a business foregoes the opportunity to employ himself elsewhere.

Opportunity costs are not recorded in the books but they are important in decision making and comparing alternatives.

ii. **Sunk costs:** A sunk cost is one that has already been incurred and cannot be avoided by decisions taken in the future. As it refers to past costs, it is called unavoidable cost. The National Association of Accountants (USA) defines a sunk cost as "an expenditure for equipment or productive resource which has no economic relevance to the present decision making process". This cost is not useful for decision making as all past costs are irrelevant. It has also been defined as the difference between the purchase price of an asset and its salvage value.

iii. **Differential cost:** Differential cost has been defined as "the difference in total cost between alternatives, calculated to assist decision making".

Differential cost is increase or decrease in total costs resulting out of:

- Producing and distributing a few more or few less of products;
- A change in the method of production/ distribution;
- An addition or deletion of a product or a territory; and
- The selection of an additional sales channel.

The differential cost between any two level of production is the difference between the marginal costs at these two levels and the increase or decrease in fixed costs. Incremental cost measures the additional unit cost for an addition in output. This cost need not be the same at all levels of production. It is usually expressed as a cost per unit whereas the differential cost is measured in total. The former applies to increase in production and is restricted to the cost only, whereas the differential cost has a comprehensive meaning and application in the sense that it denotes both increase or decrease in differential costs and is useful in planning and decision making and helps to choose the best alternative. It helps management to know the additional profit that would be earned if idle capacity is used or when additional investments are made.

iv. **Joint costs:** The processing of single raw material results in two or more different products simultaneously. The joint products are not identifiable as different types of products until a certain stage of production known as the split-off point is reached. Joint costs are the costs incurred up to the points of

separation. One product may be of major importance and others of minor importance which are called by-products.

Bierman define it as: "Joint costs relate to a situation in which the factors of production by their basic nature result in two or more products. The jointness result from there being more than one product, and these multi-products are the result of the methods of production or the nature of raw material and not of a decision by management to produce both".

The National Association of Accountants defines it as follows:

"Joint costs relate to two or more products produced from a common production process or element-material, labour or overhead or any combination there of or so locked together that one cannot be produced without producing the other."

Joints costs can be apportioned to different products only by adopting a suitable basis of apportionment.

v. **Common costs:** Common costs are those costs which are incurred for more than one product, job, territory or any other specific costing object. They are not easily related with individual products and hence are generally apportioned.

The National Association of Accountants defines the term as " the cost of service employed in the creation of two or more output which is not allocable to those outputs on a clearly justified basis". It should be kept in mind that management decision influence the incurrence of common costs e.g. rent of the factory is a common cost to all departments located in factory.

vi. **Imputed costs:** Some costs are not incurred and are useful while taking decision pertaining to a particular situation. These costs are known as imputed or notional costs and they do not enter into traditional accounting systems.

Examples: Interest on internally generated funds, salaries of owners of Proprietorship or partnership, notional rent etc.

vii. **Out-of-pocket costs:** Out-of-pocket costs signifies such outlay required for an activity. The management would like to know that the income from a particular project will at least cover the expenditure for the project. Acceptance of a special order requires to be considered as additional costs



need not be incurred if the special order is not accepted. Hence the importance of outof- pocket costs.

viii. **Marginal costs:** It is the aggregate of variable costs, i.e., prime cost plus variable overheads. Thus, costs needs to be classified in fixed and variable component.

ix. **Replacement costs:** This is the cost of replacing an asset at current market values e.g. when the cost of replacing an asset is considered, it means the cost of purchasing the asset at the current market price is important and not the cost at which it was purchased.

(j) **Others:**

(i) **Conversion cost:** It is the cost of a finished product or work-in-progress comprising direct labour and manufacturing overhead. It is production cost less the cost of raw material but including the gains and losses in weight or volume of direct material arising due to production.

(ii) **Normal cost:** This is the cost which is normally incurred at a given level of output in the conditions in which that level of output is achieved.

(iii) **Traceable cost:** It is the cost which can be easily associated with a product, process or department.

(iv) **Avoidable costs:** Avoidable costs are those costs which under the present conditions need not have been controlled.

Example: (a) Spoilage in excess of normal limit; (b) Unfavourable cost variances which could have been controlled.

(v) **Unavoidable costs:** Unavoidable costs are those costs which under the present conditions must be incurred.

(vi) **Total cost:** This is the sum of all costs associated to particular unit, or process or department or batch or the entire concern. It may also mean the sum total of material labours and overhead. The term total cost however, is not precise, it needs to be made precise by using terms that indicate the elements of cost included.

(vii) **Value added:** Strictly, it is not cost. It means the selling price of the products/ services less the costs of materials used in the product or the services. Often depreciation is also deducted for ascertaining "value added".

### 1. COSTING AND COST ACCOUNTING

Costing is the technique and process of ascertaining costs. These techniques consist of principles and rules which govern the procedure of ascertaining cost of products or services. The techniques to be followed for the analysis of expenses and the processes by which such an analysis should be related to the different product or services differ from industry to industry. These techniques are also dynamic and they change with time.

The trading and profit and loss account of a business is designed to disclose the financial result of the collective activities of the business. Expenditure in total is set against total turnover or income, but no detailed information is available for the factors leading to the profit or loss. Total turnover may comprise many varied activities, departments, processes, job, contracts etc.; some of which may be profitable, while others are being conducted at a loss. The main object of orthodox cost accounts is the analysis of financial records, so as to subdivide the expenditure and to allocate it carefully to selected cost centers, and hence to build up a total cost for the departments, processes or job or contracts of the undertaking. The extent to which the analysis of expenditure should be carried will depend upon the nature of business and degree of accuracy desired. Expenditure will ultimately be charged to 'cost units'. The cost units should be natural, which is readily understood and accepted by all. The other important objects of costing are cost control and cost reduction for which standard costing and budgetary control methods are more and more widely used.

The processes of costing are the day-today routines for ascertaining costs. These Costs may be ascertained in any of the following ways.

(a) **Historical costing or conventional costing:** It refers to the determination of costs after they have been actually incurred. It means that cost of a product can be calculated only after its production. In this case only past figures are taken into consideration and as such, it is termed as historical costing. This system is useful only for determining costs, but not useful for exercising any control over costs. It can serve as

a guidance for future production only when conditions continue to be the same in future.

- (b) **Standard costing:** It refers to the preparation of standard costs and applying them to measure the variations from standard costs and analysing the variation with a view to maintain maximum efficiency in production. What is done in this case is that costs of each article are determined before-hand under current and anticipated conditions, but sometimes they are determined before-hand under normal or ideal conditions. Then actual costs are compared with the pre- determined costs and deviations known as variances are noted down. Thereafter, the reasons for the variances are ascertained and necessary steps are taken to prevent their recurrence.
- (c) **Marginal Costing:** It refers to the ascertainment of marginal costs by differentiating between fixed costs and variable costs and the effect on profit of the change in volume or type of output. In this case, only the variable costs are charged to products or operations while fixed costs are charged to profit and loss account of the period in which they arise.

Cost Accounting may be regarded as "a specialised branch of accounting, which involves classification, accumulation, assignment and control of costs. The costing terminology of C.I.M.A. London defines costs accounting as "the establishment of budget, standard costs and actual costs of operations, processes, activities or products, and the analysis of variances, profitability or the social use of funds." Wheldon defines cost accounting as "classifying, recording and appropriate allocation of expenditure for determination of costs of products or services and for the presentation of suitably arranged data for purpose of control and guidance of management". It is thus, a formal mechanism by means of which costs of products or services are ascertained and controlled.

## 2. GENERAL PRINCIPLES OF COST ACCOUNTING

The following may be considered as the general principles of costs accounting:

- (1) **A cost should be related to its causes:** Costs should be related as closely as possible to their causes so that cost can be shared only among the cost units passing through that department of which expenses are being considered.
- (2) **A cost should be charged only after it has been incurred:** While determining the cost of individual units those costs which have actually been incurred should be considered. For example, a cost unit should not be charged to the selling costs, while it is still in the factory. Selling costs can be charged with the products which are sold.
- (3) **The convention of prudence should be ignored:** Usually accountants believe in historical costs and while determining cost, they always attach importance to the historical cost. In cost accounting this convention must be ignored, otherwise, the management appraisal of the profitability of projects may be vitiated. According to W.M.Harper,"a cost statement should, as far as possible, give the facts with no known bias. If a contingency needs to be taken into consideration it should be shown separately and distinctly."
- (4) **Abnormal costs should be excluded from costs accounts:** Costs which are of abnormal nature (e.g. accident, negligence etc.) should be ignored while computing the cost, otherwise, it will distort cost figures and mislead management as to the working result of their undertaking under normal conditions.
- (5) **Past costs not be charged to future period:** Costs, which could not be recovered or charged in full during the concerned period, should not be taken to a future period, for recovery. If past costs are included in the future period, they are likely to influence the future period and future results are likely to be distorted. Principles of double entry should be applied wherever necessary: costing requires a greater use of cost sheets and cost statements for the purpose of cost ascertainment and cost control, but cost ledger and cost control accounts should be kept on double entry principle as far as possible.



### 3. OBJECTIVES OF COST ACCOUNTING

Costs Accounting aims at systematic recording of expenses and analysis of the same so as to ascertain the cost of each product manufactured or services rendered by an organisation. Information regarding cost of each product or services would enable the management to know where to economise on costs, how to fix prices, how to maximise profit and so on. Thus the main objectives of cost accounting are the following:

- (1) To analyse and classify all expenditures with reference to the cost of products and operations.
- (2) To arrive at the cost of production of every unit, job, operation, process, department or service and to develop cost standard.
- (3) To indicate to the management any inefficiencies and the extent of various forms of waste, whether of materials, time, expenses or in the use of machinery equipment and tools, analysis of the causes of unsatisfactory results may indicate remedial measures.
- (4) To provide data for periodical profit and loss accounts and balance sheet at such intervals. e.g., weekly, monthly, or quarterly, as may be desired by the management during the financial year, not only for the whole business but also by department or individual products. Also, to explain in detail the exact reasons for profit or loss revealed in total, in the profit and loss account.
- (5) To reveal sources of economies in production having regard to methods, types of equipment, design, output and layout, daily, weekly, monthly or quarterly information may be necessary to ensure prompt and constructive action.
- (6) To provide actual figures of cost for comparison with estimates and to serve as a guide for future estimates or quotations and to assist the management in their price-fixing policy.
- (7) To show, where standard costs are prepared, what the cost of production ought to be and with which the actual costs, which are eventually recorded, may be compared.

- (8) To present comparative cost data for different period and various volumes of output and to provide guidance in the development of business. This is also helpful in budgetary control.
- (9) To record the relative production results of each unit of plant and machinery in use as a basis for examining its efficiency. A comparison with the performance of other types of machines may suggest the necessity for replacement.
- (10) To provide a perpetual inventory of stores and other materials so that interim profit and loss account and balance sheet can be prepared without stock taking, as well as, checks on stores and adjustments are made at frequent intervals. To provide the basis for production planning and for avoiding unnecessary wastage or losses of materials and stores.
- (11) Last but not the least, to provide information to enable management to make short term decisions of various types, such as quotation of price to special customers or during a slump, make or buy decision, assigning priorities to various products, etc.

#### **4. FINANCIAL ACCOUNTING AND COST ACCOUNTING**

Both Financial Accounting and Cost Accounting are concerned with systematic recording and presentation of financial data. Financial Accounting reveals profits and losses of the business as a whole during a particular period, while Cost Accounting shows, by analysis and localisation, the unit costs and profits and losses of different products lines. The main difference between Financial Accounting and Cost Accounting are summarized below:

- (1) Financial Accounting aims at safeguarding the interests of the business and its proprietors and others connected with it. This is done by providing suitable information to various parties, such as shareholders or partners, present or prospective creditors etc. Cost Accounting on the other hand, renders information for the guidance of the management for proper planning, operation, control and decision making.
- (2) Financial accounts are kept in such a way as to meet the requirements of the Company Acts, Income Tax Acts and other statutes. On the other hand cost accounts are generally kept voluntarily to meet the

requirements of management. But now the companies act has made it obligatory to keep cost records in some manufacturing industries.

- (3) Financial Accounting emphasises the measurement of profitability, while Cost Accounting aims at ascertainment of cost and accumulates data for this very purpose.
- (4) Financial Accounting disclose the net profit and loss of the business as a service. This enables the management to eliminate less profitable product lines and maximise the profits by concentrating on more profitable ones.
- (5) Financial Accounting provides operating results and financial positions usually gives information through cost reports to the management as and when desired financial accounts deal mainly with actual facts and figures, but cost accounts deal partly with facts and figures and partly with estimates. In case of financial accounts stress is on the ascertainment and exhibition of profits earned or losses incurred in the business. On account of this reasons in financial accounts, the transaction are recorded, classified and analysed in subjective manner i.e. according to the nature of expenditure. In Cost Accounts the emphasis is more on aspects of planning and control and therefore transactions are recorded in an objective manner.
- (6) Financial Accounts are concerned with external transaction i.e. transactions between the business concern on the one side and third parties on the other. These transactions form the basis for payment or receipt of cash. While cost accounts are concerned with internal transactions which do not form the basis of payment or receipt of cash.
- (7) The costs are reported in aggregate in financial accounts but into units basis in cost accounts.
- (8) Financial account do not provide information on the relative efficiencies of various workers, plants and machinery while cost accounts provides valuable information of the relative efficiencies of various plants and machinery.
- (9) In financial accounts stocks are valued at cost or market prices whichever is less, whereas stocks are valued at cost prices in cost accounts.



The above analysis reveals the following limitations of financial accounting :

1. Measurement of efficiency with which each task has been carried out in an organization is not possible with the help of financial accounts. For this purpose, it is essential to compute the cost of completing each task or producing each article with suitable analysis and to compare the cost and its components with figures of previous year or of other organizations or with standards previously laid down. (profit can be on the basis for measuring only overall and broad level of efficiency).
2. Control over expenditure can be effective only if it is known before hand how much should be spent and the figure obviously depend on the volume of activity and the nature of each group of expenses. Financial accounts do not provide any Information in these respects.
3. Pricing is another important matter which cannot be solved with the help of financial accounts. Even if prices do not ordinarily depend on cost, such as in the case of free competition, often it has to be decided whether orders should be accepted at concessional prices or even below cost. Only cost accounts can provide information for proper pricing.
4. Frequently, priorities have to be laid down among various products so that profit may be maximised in a given situation. Financial accounts are not of much help in this case, but cost accounts provide a good deal of relevant information.
5. Financial accounts are not of much help in ascertaining the break-even point sales or output, i.e. the sales or output where the revenue equals to it is cost, but analysis of cost accounts makes it possible.
6. Financial accounts are not of very great help in forecasting, planning and budgeting. But cost accounts are of great help in this regard.
7. Avoidance of any wasteful expenditure or loss should be the aim of all undertaking which use resources. This involves measurement of efficiency and control financial accounts do not help much in this regard, but cost accounts go a long way in this regard.
8. Financial accounts do not provide adequate information for reports to outside agencies like the Government, Bank, etc cost accounting removes

all the limitations mentioned above. Hence the importance of this branch of accounting.

### 5. IMPORTANCE OF COST ACCOUNTING

The limitations of financial accounting have made the management to realise the importance of cost accounting. Whatever may be the type of business, it involves expenditure on labour, material and other items required for manufacturing and disposing of the products. The management has to avoid the possibility of waste at each stage. It has to ensure that no machine remains idle, efficient labour gets due incentive, byproducts are properly utilized and costs are properly ascertained. Besides the management, the creditors and employees are also benefited in numerous ways by installation of a good costing system. Cost Accounting increases the overall productivity of an organisation and serves as an important tool, in bringing prosperity to the nation. Thus the importance of Cost Accounting can be discussed under the following heading:

(a) **Costing as an Aid to management:** Cost Accounting provides invaluable aid to management. It provides detailed costing information to the management to enable them to maintain effective control over stores and inventory, to increase efficiency of the organization and to check wastage and losses. It facilitates delegation of responsibility for important tasks and rating of employees. For all these, the management should be capable of using the information provided by cost accounts in a proper way. The various advantages derived by the management from a good system of costing are as follows:

1. **Cost Accounting helps in periods of trade depression and trade competition-**In periods of trade depressions, the organisation cannot afford to have losses which pass unchecked. The management must know the areas where economies may be sought, waste eliminated and efficiency increased. The organization has to wage a war not only for its survival but also continued growth. The management should know the actual cost of their products before embarking on any scheme of price reduction. Adequate system of costing facilitates this.
2. **Cost Accounting aids price fixation -** Although the law of supply and demand to a great extent determines the price of the article, cost to the

producer does play an important role. The producer can take necessary guidance from his costing records in case he is in a position to fix or change the price charged.

3. Cost Accounting helps in making estimates - Adequate costing records provide a reliable basis for making estimates and quoting tenders.
4. Cost Accounting helps in channelising production on right lines- Proper costing information makes it possible for the management to distinguish between profitable and non-profitable activities. Profits can be maximized by concentrating on profitable operations and eliminating the non-profitable.
5. Cost Accounting eliminates wastages- As cost accounting is counted with detailed break-up of costs, it is possible to check various forms of wastages of losses.
6. Cost Accounting makes comparisons possible - Proper maintenance of costing records provides various costing data for comparisons which in turn helps the management in formulation of future lines of action.
7. Cost Accounting provides data for periodical profit and loss account- adequate costing records provide the management with such data as may be necessary for preparation of profit and loss account and balance sheet at such intervals as may be desired by the management.
8. Cost Accounting helps in determining and enhancing efficiency -losses due to wastage of materials, idle time of workers, poor supervision, etc., will be disclosed if the various operations involved in the production are studied carefully. Efficiency can be measured, costs controlled and various steps can be taken to increase the efficiency.
9. Cost Accounting helps in inventory control - Cost Accounting furnishes control which management requires, in respect of stock of materials, work-in-progress and finished goods.

(b) **Costing as an Aid to creditors-** Investors, banking and other money lending institutions have a stake in the success of the business concern and are, therefore, benefited immensely by the installations of an efficient system of costing. They can base their judgement about the profitability and future prospects of the enterprise on the costing records.

(c) **Costing as an Aid to Employees-** Employees have a vital interest in their employer's enterprises in which they are employed. They are benefited by a number of ways by the installation of an efficient system of costing and through continuous employment and higher remuneration by way of incentives, bonus, plans, etc.

(d) **Costing as an Aid to National Economy-** An efficient system of costing brings prosperity to the business enterprise which in turn results in stepping up of the government revenue. The overall economic development of a country takes place as a consequence of increase in efficiency of production. Control of costs, elimination of wastages and inefficiencies led to the progress of the industry and, in consequence of the nation as a whole.

### 6. COST CENTER AND COST UNITS

A cost accountant has to ascertain cost by cost center or cost unit or by both cost center: According to the Chartered Institute of Management Accountants London, cost center means, " a production or service location, function, activity or item of equipment whose costs may be attributed to cost units." Cost center is the smallest organisation sub-unit for which separate cost collection is attempted. Thus cost center refers to one of the convenient unit into which the whole factory organisation has been appropriately divided for costing purposes. Each such unit consists of a department or a sub-department or item of equipment or, machinery or a person or a group of persons. For example, although an assembly department may be supervised by one foreman, it may contain several assembly lines. Some times each assembly lines regarded as a separate cost center with its own assistant foreman. Take another example, in a laundry, activity may be considered as a separate cost center and all costs relating to a particular cost center may be found out separately.

**Cost centers may be classified as follows:**

(i) **Productive, unproductive and mixed cost centers:** Productive cost centers are those which are actually engaged in making the products. The raw material are handled here and converted into saleable products. In such centers both direct and indirect costs are incurred. Machine shops, welding shops, and assembly shops are examples of production cost centers in an engineering factory.



Unproductive cost centers do not make the products but are essential aids to the productive center. Examples of such service centers are those of administration, repairs and maintenance stores and drawing office departments. Mixed costs centers are those which are engaged some on productive and other lines on services works. For instance, a tool shops serves as a productive cost center when it does repairs for the factory.

(ii) **Personal and impersonal cost center:** A personal cost center consists of a person or a group of persons. An impersonal cost center is one which consists of a department plant or item of equipment (or group of these).

(iii) **Operation and process cost center:** in case a cost center consists of machines and/or persons which carry out the same operation, it is termed as operations cost center. If a cost center consists of a continuous sequence of operations it is called process cost center.

The determination of a suitable cost center is very important for ascertainment and control of cost. The manager in charge of a cost center is held responsible for control of cost of his cost center.

**Cost unit:** The Chartered Institute of Management Accountants, London, defines cost unit as:

"A unit of cost as a unit of product or service in relation to which costs are ascertained sub-divisions. These smaller sub-divisions are attributed to products or services to determined products cost or services cost or cost of time spent for a particular job etc." We may for instance determine the cost per ton of steel, per ton kilometre of a transport services or cost per machine hour. The forms of measurement used as cost value, time etc. Unit selected should be unambiguous, simple and commonly used following are some examples of cost unit:

Industry/ product	Cost unit
Automobile	Number
Brick works	1000 bricks
Cement	Ton
Transport	Ton - kilometre
	Passenger - kilometre
Chemicals	Litre, gallon, kilogramme, Ton
Steel	Ton
Sugar	Ton

The selection of suitable cost centres or cost units for which costs are to be ascertained in an undertaking depends upon a number of factors which are listed as follows:

- (i) Organisation of the factory.
- (ii) Conditions of incidence of cost.
- (iii) Requirements of the costing system i.e. suitability of the units of centers for cost purpose.
- (iv) Availability of information.
- (v) Management policy regarding making a particular choice from several alternatives.

## 7. METHODS OF COSTING

The general fundamental principles of ascertaining costs are the same in every system of cost accounting, but the methods of analysis and presenting the costs vary from industry to industry. Different methods are used because business enterprises vary in their nature and in the types of products or service they produce or render. Basically there are two principal methods of costing, namely (i) job costing, and (ii) process costing.

(i) **Job costing:** It refers to a system of costing in which costs are ascertained in terms of specific jobs or orders which are not comparable with each other. Industries where this method of costing is generally applied are printing presses, automobiles garages, repairs shops, ship-building, house building, engine and machine construction etc. Job costing includes the following methods of costing.

- (a) **Contract costing** - Although contract costing does not differ in principle from job costing, it is convenient to treat contract cost accounts separately. The term is usually applied to the costing method adopted where large scale contracts at different sites are carried out, as in the case of building construction.
- (b) **Batch costing** - This method is also a type of job costing. A batch of similar products is regarded as one job and the cost of this complete batch is ascertained. It is then used to determine the unit cost of the articles produced it should, however be, noted that the articles produced should not lose their identity in manufacturing operations.
- (c) **Terminal costing** - This method is also a type of job costing. This method emphasizes the essential nature of job costing, i.e. the cost can be properly terminated at some point and related to a particular job.
- (d) **Operation costing** - This method is adopted when it is desired to ascertain the cost of carrying out an operation in a department, for example, welding. For large undertakings, it is frequently necessary to ascertain the cost of various operations.

(ii) **Process Costing:** Where a product passes through distinct stages or processes the output of one process being the input of the subsequent process, it is frequently desired to ascertain the cost of each stage or process of production. This is known as process costing. This method is used where it is difficult to trace the item of prime cost to a particular order because its identity is lost in volume of continuous production. Process costing is generally adopted in textile industries, chemical industries, oil refineries, soap manufacturing, paper manufacturing, tanneries, etc.

(iii) **Unit or Single or Output or Single-Output Costing:** This method is used where a single article is produced or services are rendered by continuous manufacturing activity. The cost of whole production-cycle is ascertained as a process or series of processes and the cost per unit is



arrived at by dividing the total cost by the number of units produced. The unit of costing is chosen according to the nature of the product. Cost statements or cost sheets are prepared under which various items of expenses are classified and the total expenditure is divided by total quantity produced in order to arrive at unit cost of production. This method is suitable in industries like brick-making, collieries, flour mills, cement manufacturing, etc. This method is useful for the assembly department in a factory producing a mechanical article e.g., bicycle.

(iv) **Operating Costing:** This method is applicable where services are rendered rather than goods produced. The procedure is same as in the case of single output costing. The total expenses of the operation are divided by the units and cost per unit of services is arrived at. This method is employed in railways, road transport, water supply undertakings, telephone services, electricity companies, hospital services, municipal services, etc.

(v) **Multiple or Composting:** Some products are so complex that no single system of costing is applicable. It is used where there are a variety of components separately produced and subsequently assemble in a complex production. Total cost is ascertained by computing component costs which are collected by job or process costing and then aggregating the costs through use of the single or output costing system. This method is applicable to manufacturing concerns producing Motor cars aeroplanes, machine tools, type-writers, radios, cycles, sewing machines, etc.

(vi) **Uniform Costing:** It is not a distinct method of costing by itself. It is the name given to a common system of costing followed by a number of firms in the same industry. This helps in comparing performance of one firm with that of another.

(vii) **Department Costing:** When costs are ascertained department by department, the method is called "Departmental Costing". Usually, for ascertaining the cost of various goods or services produced by the department, the total costs will have to be analysed, say by the use of job costing or unit costing.

In addition to the above methods of costing, mention can be made of the following techniques of costing which can be applied to any one of the above method of costing for special purpose of cost control and policy making:

(a) Standard costing.

(b) Marginal costing ( These will be discussed later on.)

### 8. COST ACCOUNTING

The Cost Accounting department and its relation with other departments in an organisation differs widely in their nature and structure. Various persons in the organisation need various types of information for decision making and control. These factors have to be considered while designing an organisation structure and as also the cost accounting department. The cost department maintains cost accounting records for manufacturing and non-manufacturing activities. It analyses cost of manufacturing, marketing and administration to help management to plan, decide and control. It provides control reports and other decision making data to all levels of management for the purpose of controlling and reducing costs. It is obvious that proper co-ordinations with other department is required e.g. purchase department, industrial engineering department.

For a proper and scientific method of costs accounting, a sound organisation is indispensable. The whole organisation must strive towards scientific planning and there should be efficient coordination and control of men, machines and methods. There should be complete Inter-locking of the activities of the various individuals carrying out the objects of the establishment, in such a manner as would enable them to co-operate for the common good. There should be definite lines of supervision and delegation of authority. Store should be efficiently controlled, and should always ensure a sufficient quantity of material and spare parts in hand, so that production may not suffer. Control over receipts and issues of material will check wastage and pilferage. Labour, being the most important part of cost of production, should be directed and controlled in such a manner as would secure utmost efficiency. Age records should be so organised that each job or work order is charged with the correct wages cost. The cost department prepares and processes data of the past, present and future, To department profit, the accountant records and presents costs and revenues of operation and transaction completed. The cost reports are frequently submitted to the management and in some cases they are submitted every week. In developing costs for planning and decision making purpose, the accountant is concerned with the future.

### Relationship with other Departments

**The Manufacturing Departments:** The factory superintendents and engineers design, plan and control products till their finished stage. The scheduling, producing and inspecting processes of job and products are measured for efficiency with respect to costs incurred.

**The Research and Design Department:** Cost estimates for material, labour and overhead and process are needed before deciding about accepting or rejecting a design.

**The Personnel Department:** The personnel records, wage-rate agreed upon, etc., forms the basis for computing the pay-rolls.

**Financial Department:** This department relies on the cost department for accounting, budgeting, cash-flow statements, etc.

**The Marketing Department:** It needs a good product with a competitive price. While costs do not determine the price, they do indicate, what the price should be. Cost data helps to distinguish profitable and non-profitable products.

**The Public Relations Department:** It establishes good relation between the company and its customers , shareholders and employees. The cost department provides information of regarding prices, wages, etc.

**The Legal Department:** The affairs of the company should adhere to the law, for example, taxes, maintenance of books etc.

The cost accountant is intimately connected with the production, marketing and finance.

### 9. INSTALLATION OF A COSTING SYSTEM

The law has not made it compulsory to install a costing system, though Government has the power to order the installation of such a system in such industries as it may decide. By and large, costing is installed by firms on grounds of its utility. This means that, the costing systems should commensurate with the expected benefits from it. This means that, if the financial accounting system can provide the necessary costing information, there should be no need for a separate costing system - only financial

accounts should be suitably adapted. However, mostly a separate costing systems is needed.

A cost accounting system is a system that accumulates costs, assigns them to cost objective and report cost information. It ascertains products profitability and helps management in planning and control of business operations.

A system has to be designed to suit the needs of an organisation. Costing can be employed in any industry whether it is manufacturing industry or other industries like public utility, public services, construction companies, agriculture, mining etc.

As a system designer, the cost accounting should be able to perceive the needs of the management at various level and design such a system as will meet those needs promptly, effectively and efficiently. The "needs" are concerned with the following:

- (i) **The objective:** The system will naturally differ according to what is expected from the costing system. The system will be simple if the objective is merely to fix prices; it will have to provide detailed information if the aim is to measure efficiency, control, etc. If the law requires installation of the costing systems, the legal requirement must obviously be kept in mind.
- (ii) **Decision-making points:** The levels of management which require information will determine the quantum and format of information that the costing system will have to provide. The periodicity of the various report will be similarly determined.
- (iii) **Significant operations:** Costing must obviously pay greater attention to those areas which account for the bulk of expenditure. Mostly, it is production but, in quite a few cases, selling and distribution, accounts for greater expenditure than the production; in such a case the system must devote greater care to selling and distribution.
- (iv) **Uncontrollable items:** Sometimes the law provided for a certain course of action: for example sugar must be packed in new gunny bags. Costing must not try to change this. Sometimes management may decide to adopt a particular course for various reasons for example, purchasing an item only from a particular firm. Obviously, it will be no use trying to alter this.



To install a sound costing system in an organisation is not an easy task. The costing for each firm must be so designed as to meet its earlier needs. It should be ensured first that the following pre-requisite for installing a sound costing system are present in the organisation:

- (a) The organisational set up should be clear-cut regarding authority and responsibility of different individuals.
- (b) The management of the organisation should extend full support to the system.
- (c) The co-operation of the members of the staff and of the workers in general should be ensured. They should have the real spirit and enthusiasm to operate the system.
- (d) If financial records can yield all the necessary costing information, it is not necessary to have a separate costing department. Usually, however, a separate costing department is essential or desirable but its strength will depend upon the needs of the management and the volume and complexity of transaction or event to be recorded and handled.

The following are the essential consideration which would govern the installation of a sound costing in an organisation in general:

**Executive side:** The memorandum and articles, organisation chart, delegation of powers etc.

**Accounting side:** Financial accounting records, last audited accounts etc.

**Internal control side:** The existing forms, registers, number of copies etc.

**Technical side and others:**

- (i) The size, layout and organisation of the factory should be studied
- (ii) The methods of purchase, receipt, storage and issue of material should be examined and modified if necessary.
- (iii) The method of paying wages should be studied.
- (iv) The cost of installing and operating the system should be economic.
- (v) The nature, method, process and stages of production, the quantities and qualities of each product should be examined.

- (vi) The system should suit the organisation.
- (vii) The management requirements and their attitude towards cost accounting should be kept in view.
- (viii) Forms and record should involve minimum clerical work and cost.
- (ix) The system should enable prompt reporting to the various levels of management.
- (x) The system should be so designed that cost can be effectively controlled.
- (xi) The staff in the cost accounting department should have the ability to produce required cost data. The persons using the reports should be able to understand and use the information.
- (xii) The adoption of cost accounting systems and practices followed by other firms in the industry facilitates inter units and inter-firm comparisons.
- (xiii) A suitable unit of cost should be selected so that the cost is meaningful. For example, in a steel mill, the units is "tonne" and in a company producing refrigerators, the units is each refrigerator. In a transport company, the units is "tonne-km" i.e., the effort in hauling one tonne of goods for one kilometer.
- (xiv) External factor e.g. government regulation affect the frequency, volume and structure of the cost accounting system.

### Other points to be noted are:

- (a) **Accuracy:** Cost Accounts must be accurate and correct otherwise they will prove to be misleading.
- (b) **Equity:** Allocation of indirect expenses to a particular class of output, department or job should be fair and equitable.
- (c) **Simplicity:** As cost accountant are highly analytical, there is a tendency towards complexity. Needless, elaboration should be scrupulously avoided and care must be taken to keep them as simple as possible. Careful choice should be made of the cost unit i.e. the quantity for which cost will be computed e.g. a tonne of steel, a kg. of yarn etc.

- (d) **Elasticity:** The cost accounting system should be elastic and capable of adapting itself to altered circumstances.
- (e) **Comparability:** The records must be maintained in such a manner that the result of one period can be compared with the results of any other period. The record of the past must act as a guide for the future.
- (f) **Promptness:** Prompt recording of the relevant figures in analytical form is the sine que non of costing. Arrangement should be made for the prompt supply of records by the various department relating to raw material, stores, labours etc. And the data thus obtained, are promptly analysed and recorded.
- (g) **Observance of instructions:** The costing staff must carefully obey the instructions given to them and even slight deviations must be permitted.
- (h) **Periodical results:** In order to derive maximum benefit, it is advisable to have the result prepared periodically actual so that cost can be compared with estimated costs.
- (i) **Reconciliation with financial accounts:** The whole system should be so maintained as to make reconciliation with financial accounts easy and simple.

## 10. ORGANISING THE COST OFFICE

It is always advisable that the cost office is situated near to the factory so that delay in the clearance of documents or discrepancies or doubts is avoided. The costing staff must be allowed to have access to the works if they are to perform their duties properly.

The duties of cost office fall into the following spheres.

- (i) Stores accounts: Posting of material receipts and stores issues in stores ledger, preparing material abstracts etc.
- (ii) Labour accounting: Evaluation of time sheets, job cards etc. and preparing labour abstracts.
- (iii) Cost accounts: Posting of all cost accounts whether job, process or service accounts.



- (iv) **Cost control:** Abstracting cost control accounts from the information.
- (v) **Statistical reports:** Preparing special statistical and other information for management for carrying out special investigations and preparing periodical trading statements.

The scope of a cost accountant depends on his powers and placement in the organisation. If he is subordinate to financial accountant or production manager he will not be able to work effectively. He should have ready access to all the information. It would be better if he works autonomously in the main accounts department.

### 11. PRACTICAL DIFFICULTIES IN INSTALLING A COSTING SYSTEM

- 1) **Lack of support from top management:** Many a times, the cost accounting system is introduced without the support of the top management in all the functional areas. Even managing directors and chairman often introduce such system without consulting the departmental heads. This results in opposition from the various managers as they consider it is an interference on their activities.
- 2) **Resistance from the existing staff:** The existing financial accounting staff may offer resistance to the cost accounting system because of a feeling of their being declared redundant under the new system.
- 3) **Non-co-operation at other levels of organisation:** The foreman, supervisors and other staff may also resent the additional paper work and may not co-operate in providing the basic data which is absolutely essential for the success of the system.
- 4) **Shortage of trained staff:** There may be shortage of cost accountants to handle the works of cost analysis, cost control and cost reduction. The works of the costing department cannot be handled with the availability of trained staff.
- 5) **Heavy costs:** The costing system will involve heavy costs unless it has been suitably designed to suit specific requirements.

**To overcome this difficulties the following points are suggested:**

- 1) Before the installation of a costing system, there must be firm commitment to the system on the part of the top management.
- 2) The existing accounting staff should be impressed about the need to supplement the existing financial accounting system.
- 3) The employees should be properly educated regarding the benefits which can be obtained from such a system.
- 4) The existing staff working in the accounts department must be properly trained in costing methods and techniques.
- 5) The costing system should be installed and operated according to the requirements of a specific case, so that it may not entail heavy cost to the organisation.
- 6) There should be proper supervision after installation and continuous efforts on the part of the cost accountant to make the system successful and to achieve the desired objectives.

## **SECTION II**

### **DIRECT EXPENSES AND OVERHEADS**

#### **1. DIRECT EXPENSES**

##### **Meaning, importance and control**

Expenses may be defined as "the costs of services provided to an undertaking and the internal costs of the use of owned assets."

Direct expenses are those expenses which are directly chargeable to a job account. They are part of the prime cost. Direct expenses may be defined as those expenses, which are easily identifiable and attributes to the individual units or jobs. All expenses other than the direct material or direct labour which are incurred for a particular product or process are termed as direct expenses. Expenses, which can be identified with a territory, a customer or product can be considered as direct expenses. Expenses in relation to a department may be indirect in relation to the product.

Direct expenses are defined as "costs, other than materials or wages, which are incurred for a specific product or saleable service."

There is no hard and fast rule regarding classification of expenses into direct and indirect. Direct expenses are specific charges directly attributable while the indirect expenses are apportioned on suitable basis. Some items by nature are direct but treated as indirect because the amounts chargeable are either of small or negligible value. It is difficult and costly to analyse them and hence treated as indirect expenses, e.g. nuts, screws, thread, glue, etc.

##### **Types of direct expenses**

- i. Royalties if it is charged as a rate per unit.
- ii. Hire charges of plant if used for a specific job.
- iii. Sub-contract or outside work, if jobs are sent out for special processing.
- iv. Salesman commission if it is based on the value of units sold.
- v. Freight: if the goods are handled by an outside carrier whose charges can be related to individual units.

- vi. Travelling, hotel and other incidental expenses incurred on a particular contract.
- vii. Cost of making a design, pattern for a specific job.
- viii. Cost of any special process not forming part of the normal manufacture like water proofing for canvas cloth.

### **Accounting Treatment**

Direct expenses are chargeable expenses and are debited to Direct Expenses Account in financial books. Accounts are prepared in columnar form so that the analysis can be made and the expenses can be related to the specific job/contract.

In cost accounting records, the direct expenses account is credited and the contract account is debited. The cost department should verify from the accounts department that the expenses properly booked. These expenses should not be mixed up with overheads.

### **Control of Direct Expenses**

Items under this head are few. They form a small part of the total cost. Such costs are controlled by fixing standards. The actuals should be compared with the standard. The causes of variations, if any, should be ascertained and necessary corrective action should be taken.

## **2. INDIRECT EXPENSES**

Indirect expenses are expenses other than direct expenses. These refer to those expenses which cannot be directly, conveniently and wholly allocated to cost centres or cost units. A few examples of such expenses are as follows:

- i. Rent, rates and insurance of factory and office.
- ii. Depreciation, repairs and maintained of plants, machinery, furniture, building etc.
- iii. Power, fuel, lighting, heating, of factory and office.
- iv. Advertising, legal, charges, audit fees, bad debts, etc.

Expenses excluded from costs: The following types of items are not included in cost of production or sales:

- (a) Matters of pure finance including interest paid and received, dividend received on investments, rent received, profit or loss on sale of investments or company's property, transfer fees received etc.
- (b) Appropriation of profits including income-tax paid, dividends paid, transfer to sinking fund, general reserve, excessive depreciation, goodwill or other fictitious assets written off, etc.

**Notional Expenses:** Expenses that are usually incurred should be included in costs even if a particular firm is not required to pay for such expenses. Rent for own premises is an example. If a firm occupies its own buildings, it does not pay rent for this, but for costing purposes, an appropriate amount of rent should be included in costs.

### 3. OVERHEADS - MEANING

Overhead may be defined as the cost of indirect material, indirect labour and such other expenses, including services, as cannot be conveniently charged direct to specific cost centers or cost units. It should be noted that direct costs (materials, labour, etc.) are associated with individual jobs or products. Indirect expenses or overheads are not associated with individual jobs or products; they represent the cost of the facilities required for carrying on the operations. CIMA, London defines overhead as "Expenditure on labour, materials or services which cannot be economically identified with a specific saleable cost unit."

In modern industrial undertakings, overheads are a very large proportion of the total cost and, therefore, good deal of attention has been paid to them. It will be a big mistake to pay attention only to direct cost. The problem in respect of overheads arises from the facts that the amount of overheads has to be estimated and that too before the concerned period begins (since it is only continuous costing that is found useful) and that, the amount has to be distributed over cost units, again on an estimated basis.



## 4. CLASSIFICATION OF OVERHEADS

The process of classification of overheads involves:

- (a) The determination of the classes or groups in which the costs are sub-divided; and
- (b) The actual process of classification of the various items of expenses into one or another of the groups.

The classification of overhead expenditure depends upon the type and size of a business and the nature of the product or service rendered.

Generally overheads are classified on the following basis:

- i. Function-wise classification
- ii. Behaviour-wise classification
- iii. Element-wise classification

### (i) **Function - wise Classification:**

Overheads can be divided into the following categories on functional basis:

- (a) **Manufacturing or production overheads:** Manufacturing overheads includes all indirect costs (indirect material, indirect labour, and indirect expenses) incurred for operation of manufacturing or production division in a factory on cost or works on cost etc.
- (b) **Administration overheads:** It is the sum of these costs of general management, secretarial, accounting and administrative services, which cannot be directly related to the production, marketing, research or development functions of the enterprise. Administration overheads include the cost of formulating the policy, directing the organisation and controlling the operations of an undertaking which is not related directly to production, selling, distribution, research or development activity or function.
- (c) **Selling and distribution overheads:** Selling overheads is the cost of seeking to create and stimulate demand and of securing orders. It comprises the cost to products of distributors for soliciting and recurring orders for the articles or commodities dealt in and of efforts to find and

retain customers. Distribution overhead is the expenditure incurred in the process which begins with making the packed product available for dispatch and ends with making the reconditioned returned empty package, if any, available for re-use. It includes expenditure incurred in transporting articles to central or local storage. It also comprises expenditure incurred in moving articles to and from prospective customer as in the case of goods on sale or return basis. In case of gas, electricity and water industries distribution means pipes, mains and services which may be regarded as equivalent to packing and transportation.

### Examples of different types of overheads

Production	Administration	Selling & Distribution
(1)	(2)	(3)
(a) Indirect materials: Lubricants, cotton waste, stationery, repair materials, etc	Indirect materials: Office stationery and printing	Indirect materials: i. Stationery and printing ii. Catalogues iii. Price list etc.
(b) Indirect labour, salaries and wages, of: i. Supervisors, foremen and chargehands ii. Inspectors iii. Storekeepers iv. Maintenance labours v. Tool room Operators vi. Employees of drawing office vii. Watch and ward staff viii. Welfare staff ix. Works clerical staff x. Works executive including works manager, etc.	Indirect labour, salaries of: i. Office clerks ii. Secretaries iii. Accountants iv. Executives v. Managers and General Managers vi. Directors, etc.	Indirect labour, salaries and commission of: i. Salesman ii. Travellers iii. Agents iv. Demonstration and technical advisors to customer v. Sales manager
(c) Indirect Expenses: i. Rent, rates and insurance of factory ii. Power, lighting and heating of factory iii. Depreciation, repairs and maintenance of plant, machinery, factory furniture and fixture and factory buildings iv. Welfare expenses like canteen, medical, recreation services etc.	Indirect Expenses: i. Rent, rates and insurance of office ii. Lighting, heating and cleaning of office iii. Depreciation, repairs and maintenance of office, furniture, equipment and buildings iv. Sundry expenses like legal charges audit fees etc.	Indirect Expenses: i. Rent, rates and insurance of showroom, sales office finished goods, godown, etc. ii. Advertising expenses iii. Expenses on consumers service, after sales service etc. iv. Sundry expenses like discount, bad debts etc.

### (ii) **Behaviour-wise Classification:**

Based on the behaviour patterns, overheads can be classified into the following categories:

- i. Fixed overheads
- ii. Variables overheads
- iii. Semi-variable overheads

#### **Fixed overheads:**

Fixed overheads expenses are those which remain fixed in total amount with increases or decreases in volume of output or productive activity for a particular period of time, e.g. managerial remuneration, rent of building, insurance of building, plant etc. Fixed overheads costs remain the same from one period to another except when they are deliberately changed, e.g. increments granted to staff. The incidence of fixed overhead on unit cost decreases as production increases and vice versa.

Fixed overheads are stated to be uncontrollable in the sense that they are not influenced by managerial action. However, it should be noted that an expenditure is fixed within specified limit relating to some or other activity. In a hypothetical organisation no expenditure remains unchanged for all time. Therefore, it is true to state that "fixed overhead is fixed within specified limit relating to time and activity."

#### **Variable overheads:**

Variable overhead costs are those costs which vary in total in direct proportion to the volume of output. For instance, if the output increases by 5%, the variable expenses also increase by 5%. Correspondingly, on a decline of the output it will also decline proportionately. Examples are direct material and direct labour. Variable overhead changes in total but its incidence on unit cost remains constant.

#### **Semi-variable overheads:**

These overhead costs are fixed and partly variable. They are known as semi-variable overheads because they contain both fixed and variable element. Semi-variable overheads do not fluctuate in direct proportion to volume. It may remain fixed within a certain activity level, but once that level

is exceeded, they vary without having direct relationship with volume changes. Examples are depreciation, telephone charges, repair and maintenance of buildings, machines and equipment etc.

Semi-variable expenses usually have two parts - one fixed and other variable. For instance depreciation usually depends on two factors - one time (fixed) and other wear and tear (variable). The two together make depreciation (as a whole) semi-variable.

An analytical study thus can make it possible for all semi-variable expenses to be split up into two parts. Fundamentally, therefore, there are only two types of expenses - fixed and variable.

### **Methods of segregating semi-variable costs into fixed and variable costs**

Separation of semi-variable cost into fixed and variable can be done by applying any of the following methods:

### **Advantages of classification of overheads into fixed and variable**

- i. **Effective cost control:** The classification of expenses into fixed and variable helps in controlling expenses. Fixed expenses are incurred by management decisions and incurred irrespective of the output, hence it is more or less uncontrollable. Variable expenses vary with the volume of activity and responsibility for incurring this expenditure in relation to output.
- ii. **Preparation of budget estimates:** Unless a distinction between fixed and variable expenses is made, it would not be possible to prepare a flexible budget in a given period on the basis of different levels of activity. For instance in March 1997, the output of the factory is 2,000 units and the expenses are as follows:

	Rs.
Fixed	10,000
Variable	8,000
Semi-Variable (40% Fixed)	<u>9,000</u>
	27,000



## COST ACCOUNTING - AN INTRODUCTION

In April 1997, the output is likely to increase by 500 units. In this case the budget or estimate expenses will be as follows:

Fixed	Rs. 10,000
Variable $\frac{8000 \times 2500}{2000}$	10,000
Fixed = $9000 \times \frac{40}{100}$	3,600
Variable $(5400 \times \frac{5}{4}) = 9000 \times \frac{60}{100} \times \frac{2500}{2500}$	6,750
	<hr/> 30,350

iii. **Ascertaining Marginal Cost - Decision Making:** A number of decisions of (a) the Extra amount that would have to be spent if an additional activity is undertaken or an alternative course is adopted, and (b) measurement of the benefits resulting therefrom. The extra amount that will have to be spent will only be the variable costs (including materials, labour and variable expenses) and not fixed expenses. Therefore, a distinction between fixed and variable expenses is essential. Marginal costs (or variable costs) afford a number of advantages, in fixing prices in a special market, for a special customer and during a slump or a period of depression, decision on make or buy, shut down or continue etc. The main principal is that if the price available is above the variable or marginal cost, profits would increase or losses would decrease because of additional units sold. This is because of additional units sold. This is because fixed expenses would not increase.

Suppose, a factory having a capacity of 10,000 units per month products and sells 8,000 units @ Rs. 20 each, the total costs being:

Variable	Rs. 100,000
Fixed	<u>40,000</u>
	1,40,000

## COST ACCOUNTING - AN INTRODUCTION

On a sale of 8,000 units @ Rs. 20 (total sales Rs. 1,60,000), there would be a profit of Rs. 20,000. If another 2,000 units can be sold @ Rs. 15, say to the government, the profit would increase to Rs. 25000,

i.e.

Variable Costs	$\frac{1,00,000 \times 10,000}{8,000}$	1,25,000
Fixed Costs		<u>40,000</u>
		1,65,000
Sales: 8,000 units @ Rs.20	1,60,000	
2,000 units @ Rs.15	30,000	<u>1,90,000</u>
Profit		25,000

Profit maximisation is possible only if marginal costs are distinguished. The advantages of marginal costs will be discussed in a later study.

Element-wise Classification :

Based on its elements overheads is classified in the following categories:

- a) Indirect material
- b) Indirect labour
- c) Indirect expenses.(These are already been discussed in detail).

## 5. STANDING ORDER NUMBERS SYSTEMS

In order to have an effective analysis of the expenses, each of the manufacturing, administration, selling and distribution overhead cost is classified into smaller sub-division to ensure that expenses of similar nature are grouped together under one head. This is done through a systems of standing order numbers or syllabus numbers.

In large factories normally, the classification of indirect expenditure is combined with a systems of standing orders. It is a system under which a number is allotted to each item of expense for the purposes of identification, and the same is continued from year to year. Whenever the actual expenses

are incurred, they are appropriately classified into one of these standing order are prepared for comparison with budgets as well as apportioning among the various departments.

Following methods can be used to allot symbols or code numbers to identify each standing order number.

### **i. Numerical coding/ straight numbering method:**

Under this systems each type of expenditure is allotted a fixed number, for example:

S.O.No.      20          Indirect material

S.O.No.      100        Indirect labour etc.

### **ii. Alphanumeric method:**

This method uses alphabets and letters to help the memory, examples:

AD          administration

R.F.B.    Repairs, Factory, Building etc.

### **iii. Decimal method:**

Under this method, the whole number is allotted for the head of the expenditure or master group while decimals are allotted to primary or secondary items. Following schedule is being given for the purpose of understanding this method.

# COST ACCOUNTING - AN INTRODUCTION

## Schedule of Standing Orders Numbers

1.	Factory overheads	2.2.1	Staff salaries
1.1	Indirect materials	2.2.2	Printing and stationery
1.1.1	Oils and grease	2.3	Accounting services
1.1.2	Cotton waste	2.3.1	Staff salaries
1.1.3	Spare parts	2.3.2	Hire on accounting machines
			Selling overheads
1.1.4	Consumable stores	3.	Selling overheads
1.1.5		3.1	Salaries
1.1.6		3.1.1	Sales manager
1.2	Indirect labour	3.1.2	Traveling agents
1.2.1	Stores	3.1.3	Clerks
1.2.2	Internal transport (Drives and crane lifters)	3.1.4	
		3.2	Commissions
1.2.3	Inspection	3.2.1	Sales manager
1.2.4	Oilers and beltmen	3.2.2	Travellers
1.2.5	Sweepers and cleaners	3.3	Catalouges
1.2.6		3.3.1	Catalouges
1.2.7		3.3.2	Circulars and price lists
1.3	Assistant's remuneration	3.3.3	
1.3.1	Salaries	3.3.4	
1.3.2	Production bonus	3.4	Advertisings
1.3.3	Other fringe benefits	3.4.1	Newspaper
1.3.4		3.4.2	Trade magazines
1.3.5		3.4.3	Hoardings
1.4	Depreciation charges	3.4.4	Samples
1.4.1	Plant and machinery	3.4.5	Cinema slides
1.4.2	Building	3.4.6	Neon lights
1.4.3		3.4.7	
1.4.4		3.4.8	
1.5	Insurance	4.	Distribution overheads
1.5.1	Fire	4.1	Warehouse expenses
1.5.2	Third party	4.1.1	Staff salaries
1.5.3		4.1.2	Rent
1.5.4		4.1.3	
1.6	Welfare services	4.2	Delivery van expenses
1.6.1	Sports club	4.2.1	Drivers and cleaners wages
1.6.2		4.2.2	Petrol, oil, etc
1.6.3		4.2.3	Depreciation on delivery van
2.	Administration overheads	4.2.4	Tyres
2.1	Executive and management	4.3	Packings
2.1.1	Meeting fees	4.3.1	Packings staff salaries
2.1.2	Travelling expenses	4.3.2	Packings material
2.1.3		4.3.3	
2.1.4		4.3.4	
2.2	Secretariat services	4.3.5	

### **iv. Field method or numerical code method:**

Under this method codes used are numeric in nature and each code number usually consist of nine digits. The first two digits indicate the nature of expense, i.e. variable or fixed. The next three digits indicate head of expense; the next two digit stands for the analysis of expenses and last two digits indicate the cost centre, where expenses have been incurred. For example, in code 20 130 02 06; 20 stands for variable cost, 130 for idle time; 02 machine break down and 06 for lathe shop.

### **v. Combination of symbol and numbers:**

Under this method, a combination of symbol alphabet and a number is used to represent a code. For example in the code M1 and M2, where M stands for maintenance and 1 and 2 stands for building and machines respectively. Thus,

M1 = Maintenance of building

M2 = Maintenance of machine

## **6. TREATMENT OF FACTORY OVERHEADS**

Generally factory overheads form a substantial portion of the total overheads. It is very important therefore, that such overheads are properly absorbed over the cost of production.

The following are the steps involved in accounting of overheads:

- i. The overhead expenses incurred by various departments are collected and accumulated under appropriate standing order numbers in the overhead expenses ledger.
- ii. Allocation of overhead to production and service departments.
- iii. Apportionment of such overheads which cannot be allocated.
- iv. Re-appointment of service department expenses to production departments.
- v. The total overhead expenses incurred by steps (i) to (v) above represents the total overhead cost of production departments.



- vi. An overhead rate is to be compounded for each department on the basis of estimated, actual or normal expenses and normal rate of working.
- vii. The departmental overheads are applied or charged to the costs of products manufactured by different departments at a rate determined in the foregoing manner.
- viii. Periodical comparison of actuals with absorbed expenses to find out under or over absorption of overheads.

### 7. COLLECTION OF OVERHEADS

When classification of overheads on some scientific and consistent basis is complete, overheads are regularly collected i.e. estimated understanding order code numbers allotted to them. For the collection of overhead expenses the following are some of the primary documents used.

- i. Stores requisitions
- ii. Job cards or tickets
- iii. Invoices or purchase voucher
- iv. Salary or pay bills
- v. Cash book
- vi. Subsidiary records.

Indirect materials originate in store requisitions. Each stores requisitions note specifies the standing order number and the department for which the stores are drawn. The departmentalisation is done at sources. A material issue analysis sheet is prepared from store requisitions. At the end of each month, the total of these items is charged or debited to Factory Overheads Control Account and credited to Stores Ledger Control Account.

Indirect labour is obtained in the first place, from the time cards and pay rolls. Wages paid to workers against each standing order number can be obtained from the time tickets or job cards. From the time tickets, the wages analysis sheet is prepared each month and at the end of the month, the total is

debited to factory Overhead Control Account and credited to the Wages Account.

Indirect expense can come from several sources such as cash book, factory journals or vouchers. In the case of cash outlays, the entry may come from the cash book. Expenses such as depreciation and other adjustment items which do not result from cash outlays are taken from subsidiary records. At the end of the period, the total of factory overheads would be debited to Factory Overhead Control Account and credited to the Cost Ledger Control Account.

Some expenses such as power, lighting, heating, rent, etc. may not be solely applicable to factory overheads, but should be apportioned between factory expenses, selling expenses and Administration expenses.

Each item of overheads may be seen and proper estimate of the amount for the coming period may be prepared. Another way, more expeditious, is to analyse the total overheads into fixed and variable and then arrive at the estimate by adjusting the variable amount by the expected change in output and the fixed amount by such changes as employment of more people, increments etc.

### **8. ALLOCATION AND APPORTIONMENT OF OVERHEADS (Departmentalisation of overheads)**

Most of the manufacturing process functionally are different and performed by different departments in a factory. Where such a division of functions has been made, some of the departments would be engaged in actual production of goods while others in providing services ancillary thereto.

For the efficient working, a factory is divided into a number of sub-divisions. Such subdivisions are referred to as departments. In other words, departmentalisation of overheads means dividing the factory into several called departments or cost overhead to which expenses are charged. This sub-division is done in such a manner so that each department is a division of activity of the organisation such as repairs department, power department, tools department, stores department, etc. The following factors are taken care of while dividing an organisation into number of departments:

- i. Every manufacturing process is divided into its natural divisions in order to maintain natural flow of raw materials from the time of its purchase till its conversion into finished goods and sale.
- ii. The sequence of operations are taken into consideration while determining the location of various departments.
- iii. Divisions of responsibility as far as possible should be clear, without ambiguity and dual control.

The department in a factory can be broadly categorised into the following types:

- i. **Producing or manufacturing departments:** A manufacturing or producing department is one in which manual / machine operations and other process of production of articles or commodities take place. The number of such departments will depend upon the nature of industry, type of work performed and the size of the factory.
- ii. **Service departments:** These departments are not directly engaged in production but they render type of service for the benefit of other departments.
- iii. **Partly producing departments:** In every organisation a few departments such that it is not possible to place these departments into a particular category, since they fall within the purview of both categories, i.e. producing and service departments. For example, if a toolroom manufactures some special tools for utilisation in the main job, it is acting as a productive department though it is a service department.

### **Advantages of Departmentalisation:**

- i. It segregates factory overheads costs and computes the total cost of each service departments.
- ii. It makes possible the establishments of control to keep costs at a minimum.
- iii. Ascertainment of cost of different departments helps in computing the cost of different jobs or products that pass through these departments.

**Allocation of overheads:** After having collected the overheads under proper standing order numbers the next step is to arrive at the amount for each

department or cost centre. This may be through allocation or absorption. According to the Chartered Institute of Management Accountants, London, cost allocation is "that part of cost attribution which charges a specific cost to a cost center or cost unit." Thus, the wages paid to maintenance as obtained from wages analysis book can be allocated directly to maintenance service cost center. Similarly indirect material cost can also be allocated to different cost centers according to use by pricing stores requisitions.

**Apportionment of overheads:** Apportionment refers to the distribution of overheads among department or cost centers on an equitable basis. In other words, apportionment involves charging a share of the overheads to a cost center or cost unit. CIMA, London has defined it as "that part of cost attribution which shares costs among two or more cost centers units in proportion to the estimated benefit received, using a proxy". Apportionment is done in case of those overhead items which cannot be wholly allocated to a particular department. For example, the salary paid to the works manager of the factory, factory rent, general manager's salary etc. cannot be charged wholly to a particular department or cost center, but will have to be charged to all departments or cost centers on an equitable basis.

**Primary distribution of overheads:** Primary distribution of overhead involves allocation or apportionment of different items of overhead to all departments of a factory. This is also known as departmentalisation of overheads. The distribution of different items of overhead in different departments is attempted on some logical and reasonable basis.

**Basis of apportioning overhead expenses:** It is stated that the total overhead expenses of a department comprises direct overhead expenses of other service departments. Expenses directly incurred in the departments which are jointly incurred for several departments have also to be apportioned e.g. expenses on rent, power, lighting, insurance etc. In other words, common expenses have to be apportioned or distributed over the departments on some equitable basis. The following basis are most commonly used for apportioning items of overhead expenses among production and service departments.



Bases	Items of Overheads
1. Floor area	Rent, rates and taxes paid for the building, air conditioning, etc
2. No. of employees or wages of each department	Group insurance, canteen expenses, E.S.I contribution, general welfare expenses, compensation and other fringe benefits, supervisions, etc
3. Capital values	Insurance and depreciation of plants, machinery and equipments.
4. Direct labour hours	Works managers remuneration, general overtime expenses, cost of inter-department transfers, etc
5. No. of light points	Electric light
6. Horse power of machines or machine hours	Electric power
7. Audit fee	Sales or total cost
8. Value or weight of direct material	Stores overheads
9. Weight, volume, tonne, mile	Delivery expenses

**Re-appointment of service department overheads (Secondary Distribution):** Normally products do not pass through service departments. Therefore, it is logical that product cost should bear an equitable share of the cost of service departments. The process of redistribution of the cost of service departments among the production departments is known as secondary distribution.

### Criteria for secondary distribution

- i. **Service or use method:** Under this method overheads are distributed over various production departments on the basis of service received. The greater is the amount of service received by a production department on the basis of the service received. The greater should be the share to be apportioned to that department. This criterion has greatest applicability in cases where overhead cost can be easily and directly traced to departments receiving

the benefits. Since this method is based upon the extent of the benefit received by a department, the expenses are equitably apportioned. This method is considered to be fair as it takes into account the time element and consistent results.

- ii. **Analysis or survey:** In certain cases it may not be possible to measure exactly the extent of benefit which the various departments receive as this may vary from period to period. Therefore, overheads are apportioned on the basis of analysis and survey of existing conditions. This basis of apportionment includes arbitrary elements.
- iii. **Ability to pay:** This method presumes that higher the revenue of a production department, higher should be the proportionate charge for services. This method is simple to apply but it is generally considered inequitable because it penalises the efficient and profitable units of a business to the advantages of the inefficient ones.
- iv. **Efficiency or incentive method:** This basis facilitates scientific distribution of service department cost to production departments. Under this method the apportionment of expense is made on the basis of production targets. If the target is exceeded, the unit cost reduces indicating a more than average efficiency. Opposite is the effect if the assumed levels are not reached. Thus, the department whose sales are increasing is able to show a greater profit and thereby is able to earn greater goodwill and appreciation of the management.
- v. **General use of indicators:** If data relating to actual services rendered cannot be obtained in some situations this method is adopted. The index selected is closely related to assure flow of service department cost to production department. For instance, the service of cost accounting department can be apportioned to production departments on the basis of number of employees in each department.

Following is a list of bases, which are frequently used for apportionment of cost of service departments among production departments:

Service department costs	Basis of apportionment
1. Maintenance department	Hours worked for each department
2. Employment/ personal department	Rate of labour turnover or number of employees in each department
3. Payroll or time department	Direct labour hours, machine hours, number of employees.
4. Stores keeping department	No. of requisitions, quantity or value of materials.
5. Welfare department	No. of employees in each department
6. Internal transport service	Truck hours, truck mileage or tonnage
7. Building service department	Relative area of each department
8. Power house	Floor are, cubic contents.

## Methods of re-appointment or re-distribution:

At first all departments are compiled without making a distinction between production and service departments but, then, the expenses of the service departments are apportioned among the production departments may also be apportioned in part another service department to arrive at the total expenses incurred on the latter department, which will then be distributed among production department.

Following are the method of re-distribution of service department costs to production departments:

- i. **Direct distribution method:** Under this method, the cost of service department are directly apportioned to production departments, without taking into consideration any service departments to another service department.

- ii. **Step method:** In this method the cost of most serviceable department is first, apportioned to another service departments and production departments. The next service department is taken up and its cost is apportioned and this process is going on till the cost of last service department is apportioned. The cost of last service department is apportioned among production departments only.
- iii. **Reciprocal service method:** This method gives cognizance to the fact that where there are two or more service departments, they may render service to each other and therefore these inter-departmental services are to be given due weight in distributing the expenses of service departments. There are three methods available for dealing with inter service-department transfer:
  - (a) **Simultaneous equation method:** Under this method, the true cost of service departments are ascertained first with the help of simultaneous equations. These are then distributed among the production departments on the basis of given percentages.
  - (b) **Repeated distribution method:** According to this method service department costs are apportioned over other departments, production as well as service according to the agreed percentage and this process is repeated until the total costs of the service departments are exhausted or the figures become too small to be considered for further apportionment.
  - (c) **Trial or error method:** In this method the cost of one service department is apportioned to another service department. The cost of another service department plus the share received from the first service department is again apportioned to first service department and this process is continued until the balancing figure becomes nil. For instance, suppose there are two service departments X and Y. These service departments render service to each other. Cost of service department X will be distributed to service department Y. Again cost of service department Y plus the share from service department X will be apportioned to X. The amount so apportioned to X will continue to be repeated till amount involved becomes negligible.

## 9. ABSORPTION OF OVERHEADS

Absorption of overheads refers to charging of overheads to individual products or jobs. The overhead expenses pertaining to a cost center are ultimately to be charged to the products, jobs etc. that pass through that cost center. For the purpose of absorption of overheads to individual jobs, processes or products, overheads absorption rates are applied. The overhead rate of expenses for absorbing them to production may be estimated on the following three basis.

- i. The figure of the previous year or period may be adopted as the overhead rate to be charged on production in the current year.
- ii. The overhead rate for the year may be determined on the basis of the estimated expenses and anticipated volume of production or activity.
- iii. The overhead rate for the year may be determined on the basis of normal volume of output or capacity of the business.

**Actual and pre-determined overheads rate:** The overhead absorption rate by dividing the overhead expenses incurred during the accounting period by the actual quantum (quantity/ value) of the base selected. This rate is determined as follows:

$$\text{Actual overhead rate} = \frac{\text{Actual overhead for the period}}{\text{Actual quantity or value of the base for the period}}$$

This method suffers from the following limitations:

- i. Actual overhead rate cannot be determined until the end of the period.
- ii. Seasonal or cyclical influences cause wide fluctuations in the actual overhead cost and actual volume of activity.
- iii. Actual cost is generally used for comparison with the predetermined figures for the purpose of control. Thus, it is useful only when compared with the established norms or standards.



### **Pre-determined overhead rate:**

Pre-determined overhead rate is determined in advance of the actual production and is computed by dividing the budgeted overhead expenses for the accounting period by the budgeted base for the period i.e.

$$\text{Pre-determined overhead rate} = \frac{\text{Budgeted overhead for the period}}{\text{Budgeted base for the period}}$$

This computation of a pre-determined overhead rate is more practical and has the following advantages:

- i. Pre-determined overhead rate facilitates product cost determination immediately after production is completed.
- ii. In those concerns where the budgetary control systems is in operation, all the data for the purpose of calculation of pre-determined overhead rate is available without any extra clerical cost.
- iii. It is useful when cost plus contracts are undertaken.
- iv. Cost estimating and competitive pricing offer ideal situations for use of predetermined overhead rates.

### **Blanket and multiple overheads rates:**

Blanket overhead rate refers to the use of one single or general overhead rate for the whole factory.

The blanket rate is used in those factories:

- a) Where only one major product in continuous process is being produced.
- b) Where several products are produced it can be applied only if:
  - i. All products pass through all departments ; and
  - ii. All products are processed for the same length of time in each department.

### **This rate calculated as follows:**

$$\text{Blanket overhead rate} = \frac{\text{Overhead cost for the entire factory}}{\text{Base for the period}}$$

When different rates are computed for each producing department, service department, cost center, each product or product line, each production factor, and for fixed overhead and variable overhead, then they are known as multiple rates. It is calculated as under:

$$\text{Overhead rate} = \frac{\text{Overhead cost allocated and apportioned to each cost center}}{\text{Corresponding base}}$$

### 10. METHODS OF ABSORBING PRODUCTION OVERHEADS

Before we describe the various methods, it would be better to know how to judge whether a method will give good results or not. The method selected for charging overheads to jobs or products should be such as will ensure:

- i. that the total amount charged (or recovered) in a period does not differ materially from the actual expenses incurred in that period. In other words, there should not be material over or under -recovery of overheads; and
- ii. that the amount charged to individual jobs or products is equitable. In case of factory overheads, this means-
  - a) that the time spent on completion of each job should be taken into consideration;
  - b) that the distinction should be made between jobs done by skilled workers and those done by unskilled workers. Usually, the latter class of workers need more supervision, as they cause greater wear and tear of machines and tools and waste a larger quantity of materials. Hence jobs done by such workers should bear a corresponding higher burden for overheads; and
  - c) that job done by manual labour and those done by machines should be distinguished. It stands to reason that no machine expenses should be charged to jobs done by manual labour.

### **In addition, the method should:**

- i. be capable of being used conveniently; and
- ii. yield uniform results from period to period as far as possible any change that is apparent should reflect a change in the underlying situation, such as substitution of human labour by machines.

Several methods are commonly employed for computing the appropriate overhead rate to be employed. The more common of these are:

- 1) Percentage of direct materials cost.
- 2) Percentage of prime cost.
- 3) Percentage of direct labour cost.
- 4) Direct labour hour rate.
- 5) Machine hour rate.
- 6) Combined machine hour and labour hour rate.
- 7) Rate per unit of production.

i. **Percentage of direct material cost:** In this method the cost of direct materials used in the manufacture of a product is used as the base absorption of factory overheads. The overhead rate is calculated on the basis of the following formula:

$$\text{Overhead rate} = \frac{\text{Factory overheads} \times 100}{\text{Direct material cost}}$$

This method gives satisfactory results in the following circumstances:

- i. Where the proportion of overheads to the total cost is significant.
- ii. Where the prices of materials are stable.
- iii. Where the output is uniform i.e. only one kind of article is produced.

### **Advantages:**

- i. The calculation of overhead rate is simple as the cost of direct material is easily available.

- ii. This method is more suitable when prices of materials are fairly stable.
- iii. Overhead cost pertaining to upkeep and handling of materials can be absorbed equitably by this method.

ii. **Percentage on prime cost:** An actual or pre-determined rate of overhead absorption is calculated by dividing the overheads to be absorbed by the prime cost incurred or expected to be incurred and expressing the results as a percentage. This is calculated as follows:

$$\text{Prime cost percentage rate} = \frac{\text{Amount of factory overheads} \times 100}{\text{Prime cost}}$$

This method has the advantages of simplicity and is applied because it considers both material and labour which gives rise to overhead expenses.

These two methods are generally considered to be unsuitable on account of the following reasons:

- 1) Manufacturing overhead expenses are firstly a function of time, i.e. time is the determining factor for the incurrence and application of manufacturing overhead expenses. The overhead expenses specially manufacturing expenses, can in the ultimate analysis be regarded as expenditure incurred in providing the necessary facilities and services made available to workers naturally is dependent on the length of the time during which the workers make use of these facilities. It may, therefore, be said that the job or product on which more time has been spent would entail larger manufacturing expenses than the job requiring lesser time. This factor is altogether ignored by the first method.
- 2) When the overhead cost is allocated as a percentage of direct materials or prime cost, the same is the determining factor. As a result, when there are two jobs otherwise absolutely similar and requiring same operational time but using materials having varying prices, their manufacturing overhead cost would be different; these should not normally vary if time taken is the same.

The method of apportioning overhead costs on the basis of prime cost also does not take into consideration the time factor. The fact that the

amount includes labour cost and above materials cost, does not render the prime cost any more suitable; in fact, the results are liable to be more misleading because of the cumulative error of using both the labour and materials cost as the basis of allocation of overhead expenses, on which neither of them are dependent.

- 3) There is no close or direct connection between the manufacturing expenses and the direct materials cost or prime cost of jobs produced.
- 4) Since material prices are prone to frequent and wide fluctuations, the amount of manufacturing overheads recovered, if based on material cost or prime cost, also would fluctuate violently from job to job and from period to period.
- 5) The skill of the workers involved and whether machines were used or not, are ignored.

iii. **Percentage of direct labour cost:** According to this method, the manufacturing overhead expenses are charged as a percentage of direct wages incurred on jobs.

The formula for computing the percentage rate for a period rate for a period is as follows:

$$\frac{\text{Manufacturing overhead expenses} \times 100}{\text{Direct wages or labour cost}}$$

The numerator for overhead expenses and the denominator for direct wages may either be an estimated sum, actual amount or normal amount. As has been stated earlier, overhead rates are usually predetermined and the use of actual figures is not very common.

This method also fails to give due recognition to the element of time which is of prime importance in the accounting for and treatment of manufacturing overhead expenses except in so far as the amount of wages is a product of the rate factor multiplied by the time factor. Thus the time factor is taken to consideration only indirectly or partially in the computation of the overhead percentage rate. This method, therefore, cannot be depended upon to produce very accurate results where the same type of work is performed at the same time by different type of



workers, skilled and unskilled, with varying rates of pay. Also no distinction is made between jobs done by manual labour and those by machines.

In spite of the inaccuracies which may arise under this method, it is widely used in actual practice, because it is simple and does not involve much calculations; for in costing any job the labour cost has to be ascertained anyhow. If, on the other hand, a more scientific method were employed, e.g., the labour hour or the machine hour rate, which gives proper allowance to the time element, these would introduce more complexities in the overhead accounting procedure. Thus, the advantages of elimination of a small error in practice may be a heavy price to pay on account of introduction of complexities aforementioned. Also, under this method, there is no large over or under recovery of overheads.

### **Advantages:**

- i. The method is simple and economical to apply;
- ii. The time factor is given recognition;
- iii. Total expenses recovered will not differ much from the estimated figure since they are not likely to fluctuate much;

### **Disadvantages:**

- i. It gives rise to certain inaccuracies as the time factor is not being given adequate importance;
- ii. Where machinery is used to some extent in the process of manufacture, an allowance for such a factor is not made; and
- iii. It does not provide for varying skills of workers.

It is possible to consider the time factor fully by ascertaining the factory overheads per productive labour hour. Suppose the total of direct productive labour hours is 1,50,000 and the factory overheads total Rs. 3,00,000, then the productive labour hour rate is Rs. 2.

iv. **Direct labour hour rate:** This method is a distinct improvement on the percentage of direct wages basis, as it fully recognises the significance of the element of time in the incurring and application of manufacturing overhead expenses. This method is admirably suited to operations which do not involve any large use of machinery. A direct labour hour rate is calculated for each category of workers. The expenses incurred, other than wages paid to workers, on each category of workers, are listed and totalled for a period. The figure is divided by the number of hours to be put in by that category of workers. Thus, full attention will be paid to the skill of the workers for charging overheads. Productive Labour Hour Rate is a variation of this method. It is computed by dividing the total factory expenses for a period by the total number of hours put in by all the direct workers during that period. Thus, this method, though making no allowance for the skill of workers, gives full recognition to the time factor.

v. **Machine hour rate:** By the machine hour rate method, manufacturing overhead expenses are charged to production on the basis of a number of hours a machine or machines are used on jobs or work orders. There is a basic similarity between the machine hour and the direct labour hour rate methods, in so far as both are based on the time factor. The choice of one or the other method is conditioned by the actual circumstances of the individual case. In respect of departments or operations, in which machines predominate and the operators perform relatively a passive part, the machine hour rate is more appropriate. This is generally the case for operations or processes performed by costly machines, which are automatic or semi-automatic and where operators are needed merely for feeding and tending them rather than for regulating the quality or quantity of their output. In such cases, the machine hour rate method alone can be depended on to correctly apportion the manufacturing overhead expenses to different items of production. What is needed for computing the machine hour rate is to divide overhead expenses for a specific machine or group of machines for a period by the operating hours of the machine or the group of machines for the period. It is calculated as follows:

$$\text{Machine hour rate} = \frac{\text{Amount of overhead}}{\text{Machine hours during a given period}}$$

Usually, the computation is made on the basis of the estimated expense or the normal expense for the coming period. Thus, the machine hour rate

usually is a predetermined rate. Rate for each individual machine may be worked out or, where a number of similar machines are working in a group, there may be a single rate for the whole group.

The following steps are required to be taken for the calculation of machine hour rate :

- i. Each machine or group of machine should be treated as a cost centre.
- ii. The estimated overhead expenses for the period should be determined for each machine or group of machines.
- iii. Overheads relating to a machine are divided into two parts i.e. fixed or standing charges and variable or machine expenses.
- iv. Standing charges are estimated for a period for every machine and the amount so estimated is divided by the total number of normal working hours of the machine during that period in order to calculate an hourly rate for fixed charges. For machine expenses, an hourly rate is calculated for each item of expenses separately by dividing the expenses separately by the normal working hours.
- v. Total of standing charges and machine expenses rates will give the ordinary machine hour rate.

There are two ways of computing the machine hour rate. According to the first method, only indirect expenses directly or immediately connected with the operation of the machine are taken into account, e.g. power, depreciation, repairs and maintenance, insurance, etc. The rate is calculated by dividing the estimated total of these expenses for a period by the estimated number of operating hours of the machines during the period.

It will be obvious, however, that in addition to the expenses stated above there may still be other manufacturing expenses such as supervision charges, shop cleaning and lighting, consumable stores and shop supplies, shop general labour, rent and rates, etc. incurred for the department as a whole and, hence, not charged to any particular machine or group of machines. In order to see that such expenses are not left out of production costs, one should include a proportionate amount of such expenses of machines, before proceeding to compute the machine hour rate. Some

people even prefer to add the wages paid to the machine operator in order to get a comprehensive rate for working a machine for one hour. But it is preferable to include the machine operator's wages in direct wages.

Generally, all expenses are not allocated to machines; it will be, therefore, necessary to calculate another rate for charging the general departmental expenses to production. This second rate will be calculated on the basis of direct labour hours or wages. In effect, therefore, both the machine hour and the labour hour rates will be applied, though separately.

As regards the superiority of one method over the other, it may be considered that the recovery of the direct machine expenses without the proportional of the departmental expenses is likely to be more accurate than when these are made part thereof, because the general departmental expenses are not connected with the actual operation of the machines except remotely. Therefore, when merged with the direct machine expenses for the purpose of computing the machine hour rate, the resultant rate may not be as accurate or as it would be otherwise. But the second method has the advantages of simplifying the routine and procedure of applying manufacturing overheads in as much as only the machine hour rate has to be applied for charging the general departmental overhead.

### **Advantages**

- 1) Where machinery is the main factor in production, it is usually the best method of machine operating expenses to production.
- 2) The under-absorption of machine overheads would indicate the extent the machines have been idle.
- 3) It is particularly advantageous where one operator uses several machines (e.g. automatic screw manufacturing machines) or where several operators are engaged in one machine (e.g., the belt press used in making conveyor belts).
- 4) It is logical method and takes into consideration the time factor completely.

### **Disadvantages**

- 1) Additional data concerning the operating time of machines, not otherwise necessary, must be recorded and maintained.



- 2) As general data concerning rates for all the machines in a department may be suitable, the computation of a separate machine hour rate for each machine or group of machines would mean additional work.
- 3) It gives inaccurate result if hand labour is equally important.

If production is carried on in different departments having different degrees of mechanisation, the best method would be the machine hour rate. The machine may be treated as a small department or cost center and the total cost for, say, a month may be divided by the effective hours for which the machine is usually used. Suppose the total cost of running a machine, including, expenses on rent, lighting, insurance, supervision, depreciation, power, etc. for a month is Rs. 12,600 and the total number of hours is 200 including 20 for maintenance, the machine hour rate is Rs. 70, i.e.  $12,600 / 200 = 70$ . If the machine is used on job for 5 hours, the job should be charged with Rs. 350 i.e.  $Rs. 70 \times 5$  as production overheads.

(In small firms however, quite good results are obtained by working out the percentage of factory overheads to direct wages or by dividing the total factory overheads by the total number of direct labour hours (productive labour hour rate); production overheads may then be charged to jobs or products using one of these methods. Office expenses are usually charged as a percentage of works cost).

### 11. OVER OR UNDER ABSORPTION OF OVERHEADS

Overhead expenses are usually applied to production on the basis of predetermined rates. The predetermined rates may represent estimated actual or normal costs. In either case the amount of expenses actually incurred and the amount of overheads applied to production will seldom be the same. Some difference is inevitable. If the actual expenses fall short of the amount applied, there is said to be an overabsorption of overheads, and conversely, if the actual expenses exceed the amount applied to production, it is a case of under-absorption. Such over or under - absorption may also be termed as overhead variance account, and conversely, the amount of under-absorption by a debit balance.

Treatment of under-absorption and over-absorption of overheads



The treatment will depend on the causes that led to under or over-absorption. The amount

ascribable to abnormal factors should be charged off to costing off to costing profit and

loss account, otherwise costs previously arrives at should be adjusted. The following are

the main methods of disposal of under or over-absorption of overheads.

### **i. Use of supplementary rates**

Where the amount of under or over-absorption is considerable, the cost of jobs or products is adjusted by means of a supplementary rate. This rate is determined by dividing the amount of under or over absorption by the base that was adopted for absorption. This rate may be positive or negative. The amount of under -absorption is set right by a positive rate while a negative rate is determined for adjusting overabsorption. The amount of under/over-absorption at the end of the accounting period is adjusted in work-in-progress, finished stock and cost of sales in production to direct labour hours, or machine hours or the value of the balances in each of these accounts by use of supplementary rate. Subsidiary records or individual items are not corrected. The amount so adjusted will be shown in the balance sheet as deductions from the work-in-progress and finished stock.

### **ii. Writing of to costing profit and loss account**

Where the difference between actual or absorbed overheads is not large the simple method is to write it off to the costing profit and loss account. When there is under absorption due to idle facility, the concerned amount is also written off in this manner, likewise, when there was wasteful expenditure due to lack of control also.

### **iii. Carrying of overheads**

The balance of under/over-absorbed overheads at the end of the year is transferred to an overhead reserve or suspense account and is carried forward to the next year account for absorption. This method is preferably applied when the normal business cycle is more than one year and in the case of new projects and schemes when the output is low in the initial stages of production and cannot bear the entire share of overhead.

## 12. TREATMENT OF ADMINISTRATIVE OVERHEADS

As a class, administrative expenses bear only a remote relationship either to the manufacturing or to the selling functions. The administrative divisions being responsible only for laying down general policies of the company, its benefits, by and large, are intangible and hence difficult to measure. Also, administrative expenses are generally period costs are constant, they are not effected by any fluctuations in the volume of production of sales activity. A careful watch over the variable administrative expenses, e.g. postage, stationery, office maintenance, and upkeep, office transport, repairs, etc., is nevertheless necessary since top executives may sometimes overlook the need for exercising strict economy in expenses with which they themselves are concerned.

There are three distinct methods of accounting for administrative overheads.

### i. **Apportioning between production and sales departments:**

This method recognises only two basic functions of a manufacturing concern, i.e. manufacturing and selling and distribution. Thus administrative overheads are apportioned over production and sales departments. Therefore, each of the departments should be charged with the proportionate share of them. When this method is adopted, administrative overheads lose their identity and get merged with production and selling and distribution overheads.

### ii. **Transfer to profit and loss account:**

As per this method, administration overheads are concerned with the formulation Policies and thus are not directly concerned with either the production or the selling and distribution function. Further administrative overheads are mainly of fixed costs. Lastly, it appears to be no equitable base to charge administration overheads to other functions or the products. In view of these arguments, the administrative overheads are charged to profit and loss account.

### iii. **Treating administrative overheads as a separate addition to the cost of jobs or products:**

This method considers administration as a separate function like production and sales and, as such costs relating to formulating the policy, directing the organisation and controlling the operations are taken as a

separate charge to cost the jobs or a product, sold along with the cost of other functions. The following bases may be adopted for such absorption:

- i. Works cost
- ii. Sales value/quantity
- iii. Gross profit on sales
- iv. Units manufactured
- v. Conversion cost

### 13. TREATMENT OF SELLING AND DISTRIBUTION OVERHEADS

Selling costs or overheads expenses are those incurred for the purpose of promoting the marketing and sales of different products. Distribution expenses, on the other hand, are expenses relating to delivery and dispatched of goods sold. Examples of selling and of distribution expenses have been considered earlier in this Study Lesson. From the above, it is clear that the two types of expenses represent two distinct types of functions. However, it is usual to group together these into one composite class, namely, selling and distribution overhead, for the purpose of cost accounting. Such a course has the merit of simplicity.

#### **Absorption of selling and distribution expenses**

If selling and distribution expenses are small, they may be included in office expenses. If these expenses are considerable, one of the following magnitudes may be followed:

1. **Percentage of works cost:** In this method, on the basis of past years experience the percentage of selling expenses to works cost is ascertained and used for finding out the selling and distribution expenses to be charged to each job or product. This method can be followed successfully if one product is produced or where selling expenses are small. The method will not take into consideration different efforts involved in selling unless the effort is in the same proportion as the cost of production.

2. **A percentage on the selling price:** From an analysis of past years accounts one can determine the percentage which normal selling and distribution expenses bear to the normal turnover. Suppose, on the basis of the previous year's experience it is ascertained that selling expenses are 10% of the turnover, and the cost of production is 9,000, then 10 i.e. 10 or 1,  $100 - 10 = 90 / 9$ , of the cost of production will be charged as selling and distribution expenses. This method can be followed in those cases, where the products are sold at fixed prices and the selling price of each article is known. If prices fluctuate, the method will not give good results.
3. **An estimated rate per unit:** If there is only one product, the total estimated selling expenses can be divided by the total estimated number of unit to be sold to give the selling on cost per unit. It would be better if constant and variable expenses are separately treated, if there are more than one product.

## 14. OVERHEADS COSTS AND MANAGEMENT PROBLEMS

Every management wants to make profits and its every effort is towards increased by increasing the sales turnover or by reducing the cost. In either case, the increase in the margin of profits is, to a large extent, contributed by the extent of fixity in overhead expenses. With increase in sales turnover, the material and labour costs which are available, to a large degree, would also increase, but the overhead, which is variable, only to a small degree, does not increase: on the other hand, it remains static. Similarly, if the sales turnover decreases, the static nature of overhead reduces the profit margin. Therefore every management must, out of necessity, try to utilise the overhead expenses most effectively by spreading it over as large a turnover as possible. Further, the degree of fixity of the overhead expenses has to be carefully studied to know exactly when and to what extent it varies with the variation in production activity and sales turnover.

Overhead is likely to be affected by the following common management problems:

1. Enforced idle capacity;
2. Increased range of products;



3. Extended sales territories; and
4. Expansion or contraction in the size of the business.

When any one mentioned circumstances arises, the effect on the overhead expenses has to be carefully weighted and its effect on the profits should be correctly assessed.

## 15. CONTROL OF OVERHEADS

### Manufacturing Overheads

Control of manufacturing overhead cost can be best achieved by means of the flexible budget. It provides a base for comparing the actual overhead with the budgeted overhead adjusted to the level of activity attained. Fixed budgets may be used for planning purposes. No adjustment is made for actual level of activity attained. Flexible budgets may be prepared by the following two methods:

- (a) Range of activity method of setting flexible budget.
- (b) Fixed plus variable rate method of setting flexible budget.

An item wise budget of overhead expenses can be prepared can be quarterly or monthly to control overhead. The budget should be based on anticipated production capacity and the past expenses. The fixed and variable expenses should be segregated. The actual expenses should be ascertained and controlled.

If the budgets are prepared department wise, controlling cost and fixing responsibility is facilitated.



**Overhead Control reports**

<b>CONTROLLABLE OVERHEAD REPORT</b>				
Department:			Month Ending:	
Office on-charge:			70% Capacity:	
Expenses	Actual this month	Budget for this month	Variations	(Cumulative) Actual expenses for the year till date
Power and light				
Inspection				
Indirect labour				
Supplies				
Repairs				
Spoilage				
Tool expenses				
Total variable				
Fixed charges				
Total				
Direct labour hours				

**A specimen of Overhead Control Report**

The form of periodic budget reports varies from company to company. Departmental control reports makes no distinction between controllable and non-controllable cost but it points out deviations between actual and budgeted cost.

Departmental overhead cost reports should be designed to emphasis the items which can be controlled by the departmental managers and exclude those items which are noncontrollable either directly or indirectly. Variance in non-controllable items is generally due to poor systems of cost allocation or due to obscure effectiveness of the departmental managers effort to control

cost. Moreover, if there are large number of non-controllable items it make the report useless: Hence non-controllable items should be excluded.

Approved departures from budget should also be indicated in the performance reports and allowances for such approved departures should be introduced and variance analysis. In other words, "management by exception" should be applied for effective control of overhead cost.

### **Difficulties in controlling overhead costs**

A certain amount of authority is usually delegated to lower level of management for controlling certain costs within their jurisdiction. However, the following difficulties are faced while controlling overheads:

- i. Few overhead are controllable when authority is delegated, as lower levels of management cannot control all expenses.
- ii. Several causes are jointly controllable by different departments.
- iii. Controllable costs vary with activity level. They tend to be fixed or semi-fixed and indirect with respect to either the product or departments and non-controllable by lower levels of management.
- iv. The decision made do not alter the amount of fixed costs as they are long-term costs.

The following steps should be taken to control manufacturing overhead:

- (a) Overheads should be properly classified as fixed, variable and semi-fixed.
- (b) The overhead cost should be budgeted by each classification and each department.
- (c) Actual and budgeted figures should be compared and classification and each department.
- (d) Standard costing systems should be introduced.

### **Control of Administration Overheads**

A major portion of administrative overhead costs is fixed in nature and are incurred due to management policy. Administration overhead can be classified into two parts, namely, the expenses at varies with volume of office work and fixed expenses. Fixed overheads

e.g. depreciation cannot be controlled at lower levels of management and can be incorporated in a fixed cost budget for informing the top management.

They are usually non-controllable. Though it is difficult to control such costs, the following methods can be used to control administration overheads:

- (a) Preparing control reports and comparing the results with the past.
- (b) Flexible Budget: Budgets are fixed for each items of administration overhead so that periodical comparisons can be made and responsibility can be fixed and to ensure that the actuals do not exceed the budgets.
- (c) Standard Cost Accounting : The most important problem connected with the administrative overhead cost is its costing treatment rather than its control because a major portion of the overhead is not controllable.

### **Control of selling distribution overheads**

It is not easy to identify or link selling and distribution costs with units of production because the costs are normally incurred after production has been completed.

The incidence of these depends upon several factors such as the distance of market, terms of sale, extent of competition etc.

It is difficult to control such cost because of the following reasons:

- (a) Capacity of sales organisation cannot be properly defined,
- (b) It is difficult to exercise control over customers and competitors,
- (c) Strict control cannot be exercised by sales representatives and other field workers,
- (d) Price fluctuation are determined by many factors besides cost factors,

- (e) Market potentials and capacity cannot be properly estimated,
- (f) The difference between selling and not selling is sometimes not clear.

**Such cost can be controlled and reduced by the following:**

- i. Preparing selling and distribution control reports and cost control reports.
- ii. Preparing flexible budgets: The budget should be drafted keeping in mind the potential and anticipated sales of each product in every region. Many of the selling and distribution expenses can be budgeted on this basis. Top management estimates and plans certain expenses like advertisement, credit facilities, sales promotion etc, which cannot be directly linked with sales. Periodical statements can be prepared. Actuals should be compared with budgeted figures and any variations should be corrected.
- iii. Standard costing.
- iv. Comparison with past performance: The expenses incurred in a period can be compared with the corresponding expenditure incurred earlier. Difference in amounts and percentages to sales can be verified and corrective action initiated.

## 16. DETERMINATION OF COST

After the costs are analysed into different elements, the next step is to proceed towards determining the total cost. In arriving at the total cost of the product from the different elements of cost, the build-up is done in four stages successively known as i. Prime Cost, ii. Works Cost or factory Cost, iii. Cost of Production, and iv. Total Cost or Cost of sales. This can be expressed in the form of a chart, as follows:

**Components of Total Cost**

	2nd Stage	
	Prime cost	Works Cost or Factory Cost
1st Stage Direct Materials Direct Labour	Add(+) Factory Overheads or Work Overheads	Add(+) Office and Administration Overheads
3rd Stage Cost of Production Add(+) Selling and Distribution Overheads	4th Stage Total Cost or Cost of Sales	

- i. **Prime Cost:** Direct materials plus Direct Labour constitute the Prime Cost. This is also known as Direct Cost, First Cost, Flat Cost, etc.
- ii. **Works Cost:** Prime Cost Works Overheads together make up the Works Cost. This is also known as Factory Cost, Production Cost, Manufacturing Cost, etc.
- iii. **Total Cost:** Cost of production plus Selling and Distribution Overhead together make up the Total Cost. This is also known as Cost of Sales.

The Selling Price is ascertained as follows:

Total Cost	Add (+) Profit	
or	or	Selling Price
Cost of Sales	Less (-) Loss	

Similarly, the difference between the Selling Price and Cost of Sales will represent Profit or Loss.



## 17. COST SHEET

When costing information is set out in the form of a statement, it is called "Cost Sheet". It is usually adopted when there is only one main product and all costs almost are incurred for that product only. If possible, the cost sheet should have columns for i. Total cost, ii. Percentage to total cost, iii. Cost per unit, and iv. Cost per unit in the pervious period. Of course, there should be clear figures for each element of cost.

### FORMAT OF A COST SHEET

Cost Sheet for the Period: from \_\_\_\_\_ to \_\_\_\_\_

Production \_\_\_\_\_ Units.

# COST ACCOUNTING - AN INTRODUCTION

<u>Particulars</u>	<u>Total Cost</u>			<u>Cost Per Unit</u> <u>Rs.</u>	<u>% of Total Cost</u>	<u>Cost per Unit</u> <u>Previous Period</u>
	Rs.	Rs.	Rs.	Rs.	% Rs.	Rs.
<b>Direct Materials</b>						
Opening Stock	xx					
+ Purchases	xx					
+ Carriage/Freight Inwards	xx					
- Closing Stock	xx					
- Scrap	xx					
= Direct Material Consumed		xx				
<b>+ Direct Wages</b>		xx				
<b>+ Direct Expenses</b>		xx				
<b>= PRIME COST</b>			xxxx			
<b>Factory Overheads</b>						
Indirect Materials		xx				
+ Loose Tools		xx				
+ Indirect Wages		xx				
+ Rent (Factory)		xx				
+ Lighting (Factory)		xx				
+ Power & Fuel (Factory)		xx				
+ Repairs (Factory)		xx				
+ Cleaning		xx				
+ Depreciation		xx				
+ Insurance (F.A.Factory)		xx				
+ Insurance (Stock & FG)		xx				
+ Opening Stock		xx				
- Closing Stock		xx				
<b>= FACTORY &amp; Admin Overheads</b>			xxx			

## COST ACCOUNTING - AN INTRODUCTION

<u>Particulars</u>	<u>Total Cost</u>			<u>Cost Per Unit</u> <u>Rs.</u>	<u>% of Total Cost</u>	<u>Cost per Unit</u> <u>Previous Period</u>
	Rs.	Rs.	Rs.	Rs.	% Rs.	Rs.
<b>Office &amp; Admin Overheads</b>						
+ Rent (Offices)		xx				
+ Salaries (Office)		xx				
+ Lighting (Office)		xx				
+ Insurance (Office)		xx				
+ Telephone & Postages		xx				
+ Printing & Stationeries		xx				
+ Depreciation (Office)		xx				
+ Legal Expenses		xx				
+ Audit Fees		xx				
+ Bank Charges		xx				
<b>Cost of Production</b>			<b>xxx</b>			
Selling & Distribution Overheads						
Showroom Rents		xx				
+ Lighting		xx				
+ Salesman's Salaries		xx				
+ Commission		xx				
+ Traveling Expenses of Sales Personnel		xx				
+ Printing & Stationeries (Sales)		xx				
+ Advertising		xx				
+ Postage		xx				
Carriage/Freight Onwards		xx				
+ Samples		xx				
+ Gifts		xx				
			<b>xxx</b>			

## COST ACCOUNTING - AN INTRODUCTION

<u>Particulars</u>	<u>Total Cost</u>			<u>Cost Per Unit Rs.</u>	<u>% of Total Cost</u>	<u>Cost per Unit Previous Period</u>
	Rs.	Rs.	Rs.	Rs.	% Rs.	Rs.
<b>Finished Stock</b>						
+ Opening Stock		xx				
- Closing Stock		xx				
Net Finished Stock Adjustment			xxx			
<b>= Cost of Sales</b>			xxxx			
<b>+ Profit / (Loss)</b>			xxx			
<b>= Sales</b>			xxxx			

Note >> Items which are an apportionment of profit should not be charged to cost of product viz. Income tax, dividends, commission out of profits to partners / directors, capital loss, interest on term loan, donations, capital expenditures, discount shares / debentures, underwriting commissions, writing off goodwill, etc.

### Illustration 1

The following particulars have been extracted from the books of a manufacturing company for the month of August, 1997:

	Rs.
Stock of material as on 1st August, 1997	47,000
Stock of material as on 1st August, 1997	50,000
Materials purchased during the month	2,08,000
Factory salaries	9,600
Counting house salaries	14,000

Out of 48 working hours in a week, the time devoted by the Manager to the factory and office was on an average 40 hours and 8 hours respectively throughout the month. 10,000 units were produced and sold; there was no opening or closing stock of it.

Prepare a cost sheet showing the following:

- i. Cost of Materials Consumed;
- ii. Prime Cost;
- iii. Works Overhead;
- iv. Works Cost;
- v. Office and Administration Overhead;
- vi. Cost of Production;
- vii. Selling and Distribution Overhead; and
- viii. Total Cost or Cost Sales.



# COST ACCOUNTING - AN INTRODUCTION

Solutions:

## Cost Sheet of ..... Manufacturing Co. For the month of August, 1997

Particulars	Rs.	Rs.	Total Cost Rs.	% of total Cost	Cost per unit Rs.
Stock of materials as on 1st April, 1996		47,000			
Add: Purchase of materials	2,08,000				
Carriage on purchases	<u>8,200</u>	<u>2,16,200</u>			
Total material available for Consumption		2,63,200			
Less: Stock of Materials as On 31st August, 1997		<u>50,000</u>	2,13,200	47.89	2.132
Direct labour or productive wages			<u>1,40,000</u>	<u>31.45</u>	<u>1.400</u>
<b>Prime Cost</b>			3,53,200	79.34	3.532
Add: Works Overheads:					
Factory salaries		9,600			
Repairs of plant, machinery and tools		10,600			
Rent, rates taxes and insurance (factory)		3,000			
Depreciation on plant machinery and tools		7,100			
Gas and water charges (factory)		1,500			
Manager salary ( <u>40</u> x 12,000)					
48		<u>10,000</u>	<u>41,800</u>	<u>9.39</u>	<u>0.418</u>
<b>Works cost or Factory Cost</b>			3,95,000	88.73	3.950
Add: Office and Administrative Overheads:					
Counting house salaries		14,000			
Rents, rates, taxes and insurance (office)		1,000			
Depreciation on office furniture		600			
Directors fees		6,000			
Gas and water charges (office)		300			
General charges		5,000			
Managers salary ( <u>8</u> x 12,000)					
48		<u>2,000</u>	<u>28,900</u>	<u>6.49</u>	<u>0.289</u>
<b>Cost of Production</b>			4,23,900	95.22	4.239
Add: Selling and Distribution Overheads:					
Carriage on sales		5,100			
Bad debts written off		4,700			
Traveling expenses		3,100			
Travelers salaries and commission		<u>8,400</u>	<u>21,300</u>	<u>4.78</u>	<u>0.123</u>
<b>Total Cost or Cost of sales</b>			<u>4,45,200</u>	<u>100.00</u>	<u>4.452</u>

Note: Cash discount allowed is a matter of pure finance and hence it is excluded from costs.

### Illustration 2

The following information has been obtained from the records of ABC Co. Ltd. for the month of June, 1997:

	Rs.
Cost of raw material on 1 June, 1997	30,000
Purchase of raw material during the month	4,50,000
Wages paid	2,30,000
Factory overheads	92,000
Cost of work-in-progress on 1 June, 1997	12,000
Cost of raw material on 30 June, 1997	25,000
Cost of work-in-progress on 30 June, 1997	15,000
Cost of stock of finished goods on 1 June, 1997	60,000
Cost of stock of finished goods on 30 June, 1997	55,000
Administration overheads	30,000
Selling and distribution overheads	20,000
Sales	9,00,000

Prepare: (i) Cost Sheet showing the cost of production of goods manufactured, and (ii) Statement showing the cost of sales and the profit earned.

**Solution:****Cost Sheet of ABC Ltd. for the month of June, 1997**

	Rs.	Rs.
Direct materials consumed:		
Cost of raw material on 1.6.1997	30,000	
Add: Purchases of raw materials during the month	4,50,000	
	4,80,000	
Less: Cost of raw-materials on 30.6.1997	25,000	4,55,000
Direct Labour-wages paid		2,30,000
Prime Cost		6,85,000
Factory overheads		92,000
		7,77,000
Add: Cost of work-in-progress on 1.6.1997		12,000
		7,89,000
Less: Cost of work-in-progress on 30.6.1997		15,000
Works Cost or Factory Cost		7,74,000
Administration overheads		30,000
Cost of production of goods manufactured		8,04,000

**Statement showing the Cost of Sales and  
Profit for the month of June, 1997**

	Rs.
Cost of Stock of finished Goods on 1.6.1997	60,000
Add: Cost of goods manufactured during the month	8,04,000
Cost of total available for sale	8,64,000
Less: Cost of stock of finished goods on 30.6.1997	55,000
Cost of goods sold during the month	8,09,000
Add: Selling and distribution overhead	20,000
Total Cost or Cost of Sales	8,29,000
Sales Price	9,00,000
Profit during the month	71,000

**Notes:**

1. Costs of opening and closing stock of work-in-progress have to be adjusted after the factory overhead is added to the Prime Cost but before the works cost is arrived at since Factory overhead expenses are also incurred on work-in-progress.
2. Selling and distribution overhead expenses can be incurred only on the goods sold, but not on the goods lying in stock.

**Illustration 3**

Messer's Toy Cycle Co., Kanpur manufactures three kinds of tri-cycles, viz., "Grand", "Regal" and "Super". From the following particulars prepare a statement showing the cost per cycle and also profit per cycle sold for each of the brands:

	Materials	Labours	Number of Cycles Manufactured during the year 1997	Number of Cycles sold During the year 1997	Sale price per cycle
	Rs.	Rs.			Rs.
Grand	70,000	90,000	2,000	2,000	175
Regal	48,000	60,000	1,200	1,200	200
Super	18,000	22,000	400	400	225

Factory expenses are 100% of labour whereas office and administrative expenses amount to 20% of works cost.



Solution:

**Cost Sheet of M/s Toy Cycle Co. Kanpur for the year, 1997**

	Grand: Output 2,000		Regal: Output 1,200		Super: Output 400	
	Total Cost	Cost per Unit	Total Cost	Cost per Unit	Total Cost	Cost per Unit
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Direct Materials	70,000	35	48,000	40	18,000	45
Direct Labour	<u>90,000</u>	<u>45</u>	<u>60,000</u>	<u>50</u>	<u>22,000</u>	<u>55</u>
Prime Cost	1,60,000	80	1,08,000	90	40,000	100
Add: Factory Overheads @ 100% of labour	90,000	45	60,000	50	22,000	55
Works Cost or Factory Cost	2,50,000	125	1,68,000	140	62,000	155
Add: Office and Administrative Overheads @ 20% of Works Cost	<u>50,000</u>	<u>25</u>	<u>33,600</u>	<u>28</u>	<u>12,400</u>	<u>31</u>
Cost of Production	<u>3,00,000</u>	<u>150</u>	<u>2,01,600</u>	<u>168</u>	<u>74,400</u>	<u>186</u>

## Statement showing the Profit per cycle

	Grand Rs.	Regal Rs.	Super Rs.
Selling price per cycle	175	200	225
Less: Cost per cycle	<u>150</u>	<u>168</u>	<u>186</u>
Profit per cycle	25	32	39

**Illustration 4**

Crane, Bolt and Driver on business as engineers in partnership, sharing profits and losses equally Crane devotes to the business only so much time as he thinks fit, Bolt acts as works manager and Driver as office manager. The following figures for the month of September, 1997 were extracted from their books:

## COST ACCOUNTING - AN INTRODUCTION

	Rs.		Rs.
Purchase of materials	49,500	Advertising	3,000
Works wages-direct	32,000	Power	1,050
-indirect	4,000	Income-tax	9,500
Office salaries	9,390	Selling agents commission	4,500
Carriage- inward	300	Maintenance of plant	3,660
outward	2,800	Rates, light and insurance	1,000
Sales 1,60,000		(9/10 for works)	
		Discount received	300
Inventory 1st Sept., 1997		Bad debts	500
Materials	17,500	Sundry expenses -works	1,400
Finished goods (600 units)	4,500	-Office	2,600
Work-in-progress	6,500	Building Repairs	100
Travelling expenses (sales)	1,200	Partners salaries - Bolt	1,200
Interest on capital			
Crane	1,500	Depreciation - plant	1,900
Bolt	800	-building	800
Driver	700		
		Sale of scrap	1,000

On 30th September, 1997 materials on hand totalled Rs. 19,000, whereas the work-inprogress on that date was estimated at Rs. 7,700. 15,000 units were produced out of which 700 remained unsold. The premises were assessed by municipal authorities as worth Rs. 14,400 a year.

# COST ACCOUNTING - AN INTRODUCTION

Prepare cost sheet and show the profit earned.

## Cost Sheet of ..... for September 1997

(Production: 15,000 Units)

	Rs.	Total Rs.	Percentage to total Cost Rs.	Cost Per Unit Rs.
Materials used:				
Opening stock	17,500			
Purchases	49,500			
Carriage	<u>300</u>			
	67,300			
Less: Closing stock	<u>19,000</u>	48,300	51.00	3.22
Direct wages		<u>32,000</u>	<u>33.79</u>	<u>2.13</u>
Prime Cost		80,300	84.79	<u>5.35</u>
Works Overheads:				
Indirect wages	4,000			
Power	1,050			
Maintenance of plant	3,660			
Rates, light and				
Insurance (9/10)	900			
Sundry expenses	1,400			
Building repairs (9/10)	90			
Bolt's salary	1,200			
Depreciation:				
Plant	1,900			
Building (9/10)	720			
Rent [ <u>9</u> x <u>14,400</u> ]				
10 12	<u>1,080</u>			
	16,000			
Less: Sales of scrap	<u>400</u>	<u>15,600</u>	<u>16.48</u>	<u>1.04</u>
		95,900	101.27	6.39
Add: Work-in-progress				
On 1st September		<u>6,500</u>	<u>6.86</u>	<u>0.43</u>
		1,02,400	108.13	6.82
Less: Work-in-progress on 30th Sept.		<u>7,700</u>	<u>8.13</u>	<u>0.51</u>
Cost of Production		<u>94,700</u>	<u>100.00</u>	<u>6.31</u>

**Statement of profit & loss**

	Units	Rs.	Rs.
Opening stock of finished goods	600		4,500
Add: Cost of goods produced	15,000		<u>94,700</u>
	15,600		99,200
Less: Closing stock of finished Goods (valued at Rs.6.31 each)	700		<u>4,417</u>
Cost of goods sold	14,900		<u>94,783</u>
Administration Overheads:	Rs.		
Office salaries			
Rates, light and insurance (1/10)	9,390		
Sundry expenses	100		
	2,600		
Building repairs (1/10)	10		
Drivers salary	1,000		
Depreciation of building (1/10)	80		
Rent (1/10)	120	<u>13,300</u>	
Selling Overheads:			
Carriage outward	2,800		
Traveling expenses	1,200		
Advertising	3,000		
Agents commission	4,500		
Bad debts	<u>500</u>	<u>12,000</u>	<u>25,300</u>
Cost of Sales			1,20,083
Profit			<u>39,917</u>
Sales			<u>1,60,000</u>

**Notes:**

- i. One should note that (1) rent has been included although not paid, and (2) incometax, discounts received and interest on capital have been excluded, being financial items. As notional rent is included in cost, the depreciation on building could be omitted.
- ii. Bad debts can also be treated as an item of financial accounts and, therefore, excluded in cost accounts.

**ANALYSIS AND CLASSIFICATION OF COST****(Illustrations with Solutions)****Illustration 1 (Cost Sheet & Profit or Loss)**

The following information is obtained from the books of accounts of ABC Ltd. for the year ended 31.03.2000:

Inventories:	Debit	Credit
	Rs.	Rs.
Raw materials	1,40,000	
Work-in-process	2,00,000	
Finished stock	80,000	
Office appliances	17,500	
Plant & machinery	4,60,500	
Building	2,00,000	
Sale	7,68,000	
Sales returns and rebates	14,000	
Materials purchased	3,20,000	
Freight on materials	16,000	
Purchase return	4,800	



## COST ACCOUNTING - AN INTRODUCTION

Inventories:	Debit	Credit
	Rs.	Rs.
Direct labour	16,000	
Direct expense	4,800	
Indirect labour	1,60,000	
Factory supervision	50,000	
Factory repairs and upkeep	18,000	
Heat, light and power	10,000	
Rates and taxes	14,000	
Miscellaneous expenses (Factory)	65,000	
Sales commission	6,300	
Sales travelling	18,700	
Sale promotion	33,600	
Distribution Dept. salaries & expenses	11,000	
Office salaries and expenses	22,500	
Interest on borrowed funds	18,000	
Dividend income	8,600	
Bad debts Debit	2,000	

### **Additional information:**

(1) Closing inventories: Raw material Rs. 1,80,000 Work-in-process Rs. 1,92,000 and Finished stock Rs. 1,15,000.

(2) Accrued expenses: Direct labour Rs. 8,000 : Indirect labour Rs. 1,200 and Interest on borrowed funds Rs. 2,000.

(3) Depreciation to be provided on: Office appliances at 5%, plant and machinery at 10% and Buildings at 4%.

(4) Distribution of the common expenses would be as follows :

(a) Heat, light and power: in the ratio of 8 : 1: 1 to factory, office, and selling and distribution.

(b) Rates and taxes: two-thirds to factory and one - third to office.

(c) Depreciation on buildings: in the ratio of 8: 1: 1 to factory, office, and selling and distribution.

(i) Prepare a cost sheet of ABC Ltd. For the year ended 31.3.2000 showing : (a) Prime costs; (b) Factory Overheads; (c) Cost of production and (d) Cost of sales.

(ii) Also show profit or loss as per cost accounts for the above period

**ABC LTD.****Cost Sheet**

<b>Production</b>	<b>Year ended 31.03.2000</b>		
Materials consumed	Rs.	Rs.	Rs.
Material purchased (gross)	3,20,000		
Less : Return	4,800		
Materials purchased (net)	3,15,200		
Add : Freight	16,000		
Cost of materials at works	3,31,200		
Add: Opening inventory	1,40,000		
Total material for consumption	4,71,200		
Less : Closing inventory	1,80,000	2,91,200	
Direct labour	1,60,000		
Add : Accrued	8,000	1,68,000	
Direct expenses		50,000	
Prime Cost			5,09,200
Add: Factory overheads:			
Indirect labour	18,000		
Add : Accrued	1,200	19,200	
Supervision		10,000	
Repair and upkeep		14,000	
Heat, light and power (8/10 x 65,000)		52,000	
Rate and taxes (2/3 x 6,300)		4,200	
Misc. expenses		18,700	
Depreciation			
Plant (0.10 x 4,60,500)	46,050		
Building (0.04 x 2,00,000 x 8/10)	6,400	52,450	1,70,550
Works cost before adjustment for inventories			6,79,750
Add : Opening work-in-process		2,00,000	

## COST ACCOUNTING - AN INTRODUCTION

Less : Closing work-in-process		1,92,000	8,000
Works cost (net)			6,87,750
Add : Administrative overheads:			
Heat light and power (1/10 x 65,000)		6,500	
Rates and taxes (1/3 x 6,300)		2,100	
Office salaries and expenses		8,600	
Depreciation : Building (1/10 x 8, 000)	800		
Office appliances (.05 x 17, 400)	870	1,670	18,870
Cost of production			7,06,620
Add : opening inventory of finished stock		80,000	
Less : Closing inventory of finished stock		1,15,000	(-)35,000
Cost of production available for sale			6,71,620
Add : Selling and Distribution overheads:			
Heat light and power (1/10x65,000)		6,500	
Sales commission		33,600	
Sales travelling		11,000	
Sales promotion		22,500	
Distribution salaries and expenses		18,000	
Depreciation on building (1/10 x 8,000)		800	92,400
Cost of sales			<u>Rs.7,64,020</u>

### Statement of Profit or Loss for the year ended 31.03.2000

	Rs.	Rs.
Sales	7,68,000	
Less : Return and rebates	14,000	
Net sales		7,54,000
Less : Cost of sales (see Cost Sheet)		<u>7,64,020</u>
Loss as per Cost accounts		<u>Rs.10,020</u>

Note : Interest on borrowed funds (Rs. 2,000 + Rs. 2,000, bad debts (Rs. 5,000) and dividend income (Rs. 20,000) are financial items and are not included in cost accounts (for details see chapter 8).

## **Illustration 2 (Cost Statement Estimate Cost & Price)**

The accounts of Steelways Engineering Co. Ltd. show the following for the year 1995:

	Rs.
Materials used	1,80,000
Manual and machine labour wages directly chargeable	1,60,000
Works overhead expenditure	40,000
Establishment and general expenses	19,000

Show the works cost and total cost, the percentage that the works overhead cost bears to the manual and machine labour wages and the percentage that the establishment and general expenses bear to the works cost.

What price should the company quote to manufacture a machine which, it is estimated, will require an expenditure of Rs. 8,000 on materials and Rs. 6,000 on wages so that it will yield a profit of 25% on the total cost or 20% on selling price?



(a)	Statement of cost	Year: 1995
		Rs.
Direct materials used		1,80,000
Direct wages		1,60,000
Prime cost		3,40,000
Works overhead		40,000
Works cost		3,80,000
Establishment and general expenses		19,000
Total cost		Rs. 3,99,000
Percentage of works overhead to manual and machine labour		2.5.%
	$\frac{(40,000 \times 100)}{1,60,000}$	
Percentage of establishment and general expenses to works cost		5%
	$\frac{(19,000 \times 100)}{3,80,000}$	

**(b) Statement of Estimate cost**

Machine (Details):	Estimate Time:	
	Payment Terms:	
	Rs.	Rs.
Direct materials	8,000	
Direct wages	6,000	
Prime cost		14,000
Works overhead (2.5% of wages)		1,500
Works cost		15,500
Establishment and general expenses (5 % of works cost)		775
Total cost		16,275
Profit (25% on cost)		4,069
Price to be quoted		Rs. 20,344

**Illustration 3 (Cost Sheet with Adjustment for Inventories)**

A manufacturing company submits the following information on 31st March, 2000:

	Rs.	Rs.
Sales for the year		2,75,000
Inventories as on 1.4.1999		
Materials		3,000
Work-in-progress		4,000
Finished goods		8,000
Raw material purchased		1,10,000
Direct labour		65,000
Chargeable expenses		10,000
Inventories as on 31.03.2000		
Materials		4,000
Work-in-progress		6,000
Finished goods		7,000

Other expenses:

    Factory overhead: @ 50% of direct labour

    Administration overhead: 10% of works cost

    Selling overhead: 5% of sales

Prepare a cost sheet.

**Cost Sheet for the year ended 31.03.2000**

	Rs.	Rs.
Materials Consumed		
Materials purchased	1,10,000	
Add: Opening stock	<u>3,000</u>	
	1,13,000	
Less: Closing stock	4,000	1,09,000
Direct labour		65,000
Chargeable expenses		<u>10,000</u>
Prime cost		1,84,000
Factory overhead (50% of direct labour)		<u>32,500</u>
		2,16,500
Adjustment for inventories		
Add: Opening work-in-progress	4,000	
Less: Closing work-in-progress	<u>6,000</u>	<u>(-)2,000</u>
Works Cost		2,15,500
Administration overhead (10% of works cost)		<u>21,450</u>
Cost of goods manufactured		2,35,950
Adjustment for inventories:		
Add: Opening finished goods	8,000	
Less: Closing finished goods	<u>7,000</u>	<u>1,000</u>
Cost of good sold		2,36,950
Add: Selling overhead (5% of sales)		<u>13,750</u>
Cost of sales		2,50,700
Profit (balancing figure)		<u>24,300</u>
Sales		<u>Rs. 2,75,000</u>

Workings:

1. Total weights for allocation of direct materials cost:

$$\left. \begin{array}{l} P : 40,000 \times 2 = 80,000 \\ \hline Q : 1,20,000 \times 1 = 1,20,000 \end{array} \right] \text{ or } 2 : 3 \text{ ratio}$$

That is

$$\begin{array}{l} P : (\text{Rs. } 4,00,000 \div 5) \times 2 = \text{Rs. } 1,60,000 \\ Q : (\text{Rs. } 4,00,000 \div 5) \times 3 = \text{Rs. } 2,40,000 \end{array}$$

Weights for allocation of direct wages:

$$\left. \begin{array}{l} P : 40,000 \times 1 = 40,000 \\ \hline Q : 1,20,000 \times 0.6 = 72,000 \end{array} \right] \text{ Or } 5 : 9 \text{ ratio}$$

That is

$$\begin{array}{l} P : (\text{Rs. } 2,24,000 \div 14) \times 5 = 80,000 \\ Q : (\text{Rs. } 2,24,000 \div 14) \times 9 = 1,44,000 \end{array}$$

Weights for allocation of production overhead:

$$\left. \begin{array}{l} P : 40,000 \\ \hline Q : 1,20,000 \end{array} \right] \text{ Or } 1 : 3 \text{ ratio}$$

That is

$$\begin{array}{l} P : (\text{Rs. } 96,000 \div 4) \times 1 = \text{Rs. } 24,000 \\ Q : (\text{Rs. } 96,000 \div 4) \times 3 = \text{Rs. } 72,000 \end{array}$$

Note: To practise problems on the above topic, please refer to the books given under “Suggested Reading” at the end of this book.

**REFERENCE MATERIAL**

Click on the links below to view additional reference material for this chapter

**[Summary](#)**

**[PPT](#)**

**[MCQ](#)**

**[Video1](#)**

**[Video2](#)**



# 2

## MATERIALS

---

### 1. INTRODUCTION

The material usually forms a major part of the total cost and constitutes one of the most important assets in the majority of the business enterprises. The materials are of two types, namely:

- (i) Direct materials, and
- (ii) Indirect materials.

The materials which can be easily identified and attributed to the individual units being manufactured are known as direct materials. These materials also form part of finished product. All costs which are incurred to obtain direct material are known as direct materials costs. Indirect materials, on the other hand, are those materials which are of small value such as nuts, pins, screws, etc. and do not physically form part of the finished product. Costs associated with indirect materials are known as indirect material costs. Factory supplies, office supplies and selling supplies are generally termed as stores.

The success of business concern depends to a large extent upon efficient purchasing, storage accounting, control and consumption. Keeping this in view, the discussion has been taken up in the following sections:

- (i) Inventory Control
- (ii) Purchase Control and Purchase Procedure

(iii) Stores Control

(iv) Issue of Materials

(v) Accounting and Control of Normal and Abnormal Wastages etc.

## **2. INVENTORY CONTROL**

The Institute of Chartered Accountants of India define inventory as "tangible property held (i) for sale in the ordinary course of business or (ii) in the process of production for sale or (iii) for consumption in the production of goods or service for sale, including maintenance supplies and consumables other than machinery spares."

The American Production and Inventory Control Society states that inventories are:

Stock-keeping items which are held in a stock-point and which serve to decouple successive operations in the process of manufacturing a product and getting it to the consumer. The basic decoupling function of inventories has two aspects:

- (i) Inventories are necessary because it takes time to complete an operation and to move the product from one stage to another-in process and movement of inventories;
- (ii) Inventories employed for organisational reasons, such as to let on the unit schedule its operations more or less independently of another.

Inventory control is the core of materials management. The need and importance of inventory varies in direct proportion to the idle time, cost of men and machinery, and the urgency of requirements. If men and machinery in the factory could wait and so could customers, materials would not lie in want for then and no inventories, need be carried. But it is highly uneconomical to keep men and machines waiting and the requirements of modern life are so urgent that they cannot wait for materials to arrive after the need for them has arisen. Hence firms must carry inventories.

Because materials constitute a significant part of the total production cost of a product and since this cost is controllable to some extent, proper planning and controlling of inventories are of great importance. Inventory control is a

planned method of determining what to indent, so that purchasing and storing cost are minimum without affecting production or sale. Without proper control, inventories have a tendency to grow beyond economic limits. Funds are tied up unnecessarily in surplus stores and stocks, productive operations are stalled, and finances of the plant are a wastage as operatives are liable to become careless with irrational supply of materials.

### **3. OBJECTIVES OF INVENTORY CONTROL**

Scientific control of inventories should serve the following purposes:

- (i) To provide continuous flow of required materials, parts and components for efficient and uninterrupted flow of production.
- (ii) To minimise investment in inventories keeping in view operating requirements.
- (iii) To provide for efficient store of materials so that inventories are protected from loss by fire and theft and handling time and cost are kept at a minimum.
- (iv) To keep surplus and obsolete items to minimum.

It might seem axiomatic that inventory control is efficient as long as inventory level is going down. But the fact is that if inventory control are minimised without guaranteeing adequate operations, inventories have been mismanaged rather than controlled efficiently. Thus the two basic objectives are decrease in amount and time as related to sales requirements and production schedules.

Responsibility for control of inventories is that of the top management, though decisions in this regard might well be based upon the combined judgement of the production manager, controller, the sales manager and the purchasing manager. This is desired in view of the financial considerations involved in the problem and also because of need for coordinating the different kinds of inventories and conflicting view points of different departments. For example, sales manager, purchasing executive and production manager usually favour, though for different reasons, the policy of carrying larger amount of stock whereas the financial manager will prefer to keep investment in inventories at the lowest possible level. However in a

larger number of organisations inventory control is generally made the specific responsibility of purchasing department.

### **4. METHODS OF INVENTORY CONTROL**

The following are the common techniques of inventory control:

(i) The ABC plan

(ii) Fixation of various levels

(i) **The ABC plan:** With the numerous parts and materials that enter into each and every industrial product, inventory control lends itself, first and foremost, to a problem of analysis. Such analytical approach is popularly known as ABC analysis (Always Better Control), which is believed to have originated in the General Electric Company of America. The ABC plan is based upon segregation of materials for selection control. It measures the money value, i.e., cost significance of each material item in relation to total cost and inventory value. The logic behind this kind of analysis is that the management should study each item of stock in terms of its usage, lead time, technical or other problems and its relative money value in the total investment in inventories. Critical, i.e. high value items deserve very close attention, and low value items need to be devoted minimum expense and effort in the task of controlling inventories.

Under ABC analysis, the different items of stock may be ranked in order of their average inventory investment or on the basis of their annual rupee usage. The important steps involved in segregating materials or inventory control are:

(i) Find out future use of each item of stock in terms of physical quantities for the review forecast period.

(ii) Determine the price per unit for each item.

(iii) Determine the total project cost of each item by multiplying its expected units to be used by the price per unit of such item.

(iv) Beginning with the item with the highest total cost, arrange different items in order of their total computed under step above.

- (v) Express the units of each item as a percentage of total costs of all items
- (vi) Compute the total cost of each item as a percentage of total costs of all items.

If it is convenient, different items may be classified into only three categories and labelled as A, B, and C respectively depending upon whether they are high value items, middle value items or low value items. If need be, percentage of different items may be plotted on chart

**(ii) Fixation of various levels:** Certain stock level are fixed up for every item of stores so that stock and purchases can be efficiently controlled. These are:

- (a) **Maximum Level:** This represents the minimum quantity above which stocks should not be held at any time.
- (b) **Minimum Level :** This represents the minimum quantity of stock that should be held at all times.
- (c) **Danger Level:** Normal issues of stock are usually stopped at this level and made only under specific instructions.
- (d) **Ordering level:** It is the level at which indents should be placed for replenishing stocks
- (e) **Ordering Quantity:** It is the quantity that is ordered.

**(a) Maximum Level:**

It is normally a matter of policy. The various factors that should be taken into consideration are:

- (a) **Capital Outlet:** Investment to be made in stores, raw materials and other bulk items is an important consideration.
- (b) **Storage space available.**
- (c) **Storage and insurance cost.**
- (d) **Certain materials deteriorate if stored over a long period.** This limits the quantity of maximum stock kept.



## MATERIALS

- (e) If certain goods are subject to obsolescence, the spare parts and components etc. of such products stocked should be limited.
- (f) Consumption per annum.
- (g) The lead time.
- (h) Certain goods are seasonal in nature and can be purchased only during specific period. Hence maximum level will be fixed for each season.
- (i) Price advantage arising out of bulk purchases should be availed.
- (j) The Economic Order Quantity also influences the maximum level.

Maximum stock level can be computed as follows:-

Maximum stock level = Re-order level + Re-ordering quantity -  
(Minimum consumption x Minimum reorder period).

### Illustration 1

Materials X and Y are used as follows:

Minimum usage - 50 units each per week

Maximum usage -150 unit each per week

Normal usage -100 units each per week

Ordering quantities    X = 600 units

                                 Y =1,000 units

Delivery period        X = 4-6 weeks

                                 Y = 2-4 weeks

Calculate for each material (i) Maximum level (ii) Minimum level and (iii) Ordering level.

## Solution

### Material X

Ordering level = Maximum usage x Maximum delivery period

$$= 150 \times 6$$

$$= 900 \text{ units}$$

Minimum level = Ordering level - (Normal usage x Normal delivery period)

$$= 900 - (100 \times 5)$$

$$= 400 \text{ units}$$

Maximum level = (Ordering level + Ordering quantity)

(Minimum usage x Minimum delivery period)

$$= 900 + 600 - (50 \times 4)$$

$$= 1,500 - 200$$

$$= 1,300 \text{ units}$$

### Material Y

Ordering Level = Maximum usage x Maximum delivery period

$$= 150 \times 4 = 600 \text{ units}$$

Minimum Level = Ordering level - (Normal usage x Normal delivery period)

$$= 600 - (100 \times 3) = 300 \text{ units.}$$

Maximum Level = (Ordinary level + Ordering quantity) - (Minimum Usage x Minimum delivery period)

$$= 600 + 1,000 - (50 \times 2)$$

$$= 1,600 - 100 = 1,500 \text{ units.}$$

Normal delivery period has been computed as follows:

$$\text{Material X} = \frac{4 + 6}{2} = 5 \text{ weeks}$$

$$\text{Material Y} = \frac{2 + 4}{2} = 3 \text{ weeks}$$

### **(b) Minimum Level**

The minimum level is also a matter of policy and is based on:

- (a) Consumption per annum
- (b) The lead time
- (c) The production requirement
- (d) The minimum quantity that could be advantageously purchased.
- (e) If an item is made to order then no minimum level is necessary.

Minimum level = Re-order level - (Normal consumption x Normal re-order period).

### **(c) Danger or Safety Level**

Material consumption varies from day-to-day, week-to-week and hence accurate forecasting is not possible. A safety or reserve stock is kept to avoid stock-out. The desirable safety stock level is that amount which minimises stock-out costs and also the carrying costs.

This level is a level of stock between the minimum level and nil stock. It is calculated for those items which can be utilised for multiple orders or products. The storekeeper usually does not issue once the danger level is reached. Usually priority is given to some order/product for the use of these items. This level is fixed up specially for control of production so that priority items can be produced.

This level is sometimes fixed above the minimum level. In this case, this level is preventive. If the level is below the minimum level, this level is corrective.

The safety stock level can be computed as follows:

Safety stock level = Ordering level - (Average rate of consumption x Re-order period)

Or (maximum rate of consumption - Average rate of consumption) x Lead time.

### **(d) Ordering Level**

The annual consumption of an item and the time lag between ordering and receiving can be collected from past records. Based on these facts and policies, the ordering level and ordering quantity can be calculated, as follows:

Ordering level = Minimum level + Consumption during time lag period  
or Maximum consumption x Maximum re-ordering period.

The ordering level should be fixed so that when an indent is placed at the ordering level, the stock reaches the minimum level when the replenishment is received. The ordering level is calculated from the following factors:

- (a) The expected usage
- (b) The minimum level
- (c) The lead time.

The order point is calculated keeping in mind the worst conditions so that minimum stock is always maintained.

### **(e) Economic Ordering Quantity**

The basic problem of inventory control are two viz., What quantity of an item should be ordered at a time and when should an order be placed. While deciding economic ordering quantity, the efforts are directed to ascertain the ideal order size. While deciding the ideal order size, factors such as inventory carrying charges and the ordering cost associated with the placement of purchase orders are to be considered; the total of both has to be minimised. The inventory carrying charges include interest on the capital invested in the stores of materials, rent for the storage space, salaries and wages of store-keeping department, any loss due to pilferage and deterioration, stores insurance charges, stationery, etc. used by the stores, taxes on inventories, etc. Ordering costs may include rent for space used by

the purchasing department, the salaries and wages of officers and staff in the purchasing department, the depreciation on the equipment and furniture used by the department, postage, telegraph charges and telephone bills, the stationery and other consumables required by the purchasing department, any travelling expenditure incurred, and the costs of inspection etc., on receipt of material.

The optimum ordering quantity, i.e., the quantity for which the cost of holding plus the costs of purchasing is the minimum is known as Economic ordering Quantity and is calculated by following formula:

$$E.O.Q. = \sqrt{\frac{2U * P}{S}}$$

Where,

E.O.Q. = Economic Ordering Quantity

U = Annual consumption (units) during the year.

P = Cost of placing an order

S = Annual cost of storage of one unit

While deciding the question as to what should be the economic ordering quantity one has to ensure that the cost incurred should be minimum. An ideal order size, therefore, is at the quantity where the costs is minimum i.e., cost of holding the stock and ordering cost intersect each other.

## **5. Stock Valuation**

Stock valuation is the ascertainment of quantities of stocks e.g. raw materials consumable stores, semi-finished components, work-in-process, finished goods, etc. and valuing them on an equitable basis. Any error ..... adversely affect the profit and loss account and the balance sheet.

### **Methods of measuring the quantity:**

a) Physical Balance Method: This is the most acceptable method. Physical counting, weighing etc. are commonly adopted.



- b) Book Balance Method: If the perpetual inventory system and a continuous system of stock verification is in vogue, the book balances at the end of the year can be adopted.
- c) Derived or Calculated Balances: There are problems in valuing the work-inprogress. Theoretical formulae can be used to calculate the value or the value can be derived from records.

### **Methods of Valuing the quantities**

The three main methods of valuing materials are at cost, at market price and the lower of the cost or market price.

The cost price method gives a correct picture of cost. But this method will not be suitable when market prices are lower than the cost prices. In this case, the market price will be realistic but it will not reflect the actual cost.

The lower of cost and market price method is based upon the accounting doctrine that all losses should be provided for but no credit should be taken for profits not actually realised.

The cost of purchases are related to the actual cost incurred. Hence, the stock value at any date will depend on the value at which the consumption is written off. Herein comes the importance of selecting a proper method of pricing issues.

Under the method "cost or market price whichever is lower" the quantities of each item are listed. It is then valued at cost and market prices. Under the pick and choose method, the lower of the two for each item is added and the total is taken as the value of stock. Under the global method, the total cost of all items is calculated and the total market price of all items is calculated. The lower of the two is taken as the value of the stock.

The method adopted should be continued every year. It should be changed only after the permission of the income-tax authorities and only with valid reasons.

## **6. Pricing of Material Issues**

There are numerous pricing issues. They may be classified as follows:

### **i. Cost Price Methods**

- (a) Specified Price
- (b) First-in First-out (FIFO)
- (c) Last-in First-out (LIFO)
- (d) Base Stock.

### **ii. Average Price Method**

- (a) Simple Average
- (b) Weighted Average
- (c) Periodic Simple Average
- (d) Moving Simple Average
- (e) Moving Weighted Average

### **iii. Notional Price Methods**

- (a) Standard Price
  - i. Current Standard
  - ii. Basic Standard
- (b) Inflated Price
- (c) Market Price
  - i. Replacement Price
  - ii. Realisable Price

### **I. (a) Specified Price (Identifiable) Method**

Sometimes materials are purchased to be utilised in a particular job or issues can be identified with a particular receipt. In these cases, the actual purchase price can be charged. This method can be adopted when prices are stable or when the materials are covered by price control orders. This method has limited application only.

### **(b) First-in First-out (FIFO)**

The principle is that materials received first are issued first

#### **Example**

Receipts

20th Oct. 500kgs. @ 5.00 per kg.

23rd Oct. 250kgs. @ 5.50 per kg.

25th Oct. issue of 600 kgs. Will be valued as follows:

500 kgs. @ Rs. 5 per kg.

100 kgs. @ Rs. 5.50 per kg.

#### **Advantages:**

- i. It is a good inventory management system since the oldest units are used first and inventory consists of the latest stock.
- ii. It is logical.
- iii. It is easy to understand and operate.
- iv. It facilitates inter-firm and intra-firm comparisons.
- v. Valuation of inventory and cost of finished goods is consistent and realistic.

#### **Disadvantages:**

- i. The cost of production is not linked to the current prices.
- ii. If prices are rising, production cost is understated. But if stock turnover rate is high, the inventory will reflect current prices. The effect of current market prices is not revealed in issues when prices are rising.

## MATERIALS

- iii.If does not present the true picture when many lots are purchased at different prices. The calculation become complicated.
- iv.The pricing of material returns is difficult
- v.High inflation creates problems in replacing used materials, this aspect is not dealt with in FIFO.
- vi.Usually more than one price has to be adopted for a particular issue.
- vii.Cost comparisons between low batches of production becomes difficult when issues are priced differently.

### **This system is suitable when:**

- i. The size of raw materials are large/bulky and unit price is high.
- ii. Materials are easily identifiable.
- iii. Materials are received one at a time.
- iv. When price are steady.

### **(c) Last-in First-out (LIFO) Method**

The principle adopted is that the materials used in production is the latest. The inventory is priced at the oldest costs. As the method applies the current cost of materials to the cost of units, it is also known as the replacement cost method. It is the most significant method in matching cost with revenue in the income determination procedure.

### **Example**

Assuming the same facts as given under FIFO, the issues will be valued as follows:

250 kgs. @ Rs. 5.50 per kg. 350 kgs. @ Rs. 5.00 per kg.

### **Advantages:**

- i. It is simple and useful when transaction are few.
- ii. It is a good method for avoiding tax.

- iii. It is a systematic method. It matches current costs with current revenues in a better way
- iv. It reveals real income in times of rising prices.
- v. It minimises unrealised inventory gains and losses and tends to stabilise reported operation profits especially when the industry is prone to sharp price fluctuations.

### **Disadvantages:**

- i. When rates of material receipts are highly fluctuating, the method becomes complicated.
- ii. More than one price may have to be adopted for an issue.
- iii. Cost of different batches vary greatly, making inter-firm and intra-firm comparison difficult.
- iv. The stocks require to be adjusted during falling prices.
- v. Unless purchases and sales occur in equal quantities the current costs, cannot be easily matched with current revenue.
- vi. The company can plan the purchases to cause high or low costs thus changing reported income at will.
- vii. Other disadvantages include prohibition of the use of this method, e.g. the Cost Accounting Standards Board, USA does not permit defence contractors to use this method.

### **ii. (a) Simple Average Method**

The simple average is the average of prices ignoring the quantities involved. It can be used when the prices are normally stable and the stocks purchased are in equal quantities or the stock value is small. It is calculated by dividing the total rates of materials by the number of rates of prices. A new average is worked out after every receipt.



**Example**

Assuming the facts given in FIFO the average will be:

$$\text{Rs. } \frac{5+5.50}{2} = \text{Rs. } 5.25 \text{ per kg.}$$

**(b) Weighted Average Method**

In this method, the total quantities and total costs are taken into account while calculating the average price. It is calculated after every purchase by adding the quantity received to the stock in hand and the cost of this purchase to the cost of stock in hand. The total cost is divided by the total quantity to arrive at the value. This method avoids price fluctuations and reduces the numbers of calculations and gives an acceptable figure to stock.

**Example**

The weighted average will be calculated as follows (with previously gives data):

$$= \frac{5 \times 500 + 5.50 \times 100}{600} = \text{Rs. } 5.083$$

**Advantages:**

- i. It is logical and consistent.
- ii. Change in prices do not affect issues and inventory.
- iii. The values reflect actual costs.

**Disadvantages:**

- i. It involves considerable amount of clerical work.
- ii. When prices change frequently, it is inconvenient and complex.
- iii. As it is not the actual price, it is not realistic.

**Example**

If the receipts during the month were at the rates of Rs.5, Rs.5.50, Rs.6 and Rs. 4.50.

The periodic simple average will be:

Total prices of Materials

Total number of prices

$$= \frac{5 + 5.50 + 6 + 4.50}{4} = 5.25$$

### **Disadvantages:**

- i. Pricing of issues ignores heavy fluctuations in price during the current period.
- ii. It is not an exact cost method.
- iii. It involves heavy clerical work.

### **(c) Periodic Weighted Average Method**

The average price is calculated periodically and not every time the material is received. It is calculated by dividing the total value of materials purchased during a period by the total quantity purchased.

### **Example**

If the total receipts during a month is 1,000 kg. Costing Rs. 25,000, the periodic weighted average will be

$$= \frac{\text{Rs. } 25,000}{1,000} = \text{Rs. } 25 \text{ per kg.}$$

### **Advantages:**

- i. Clerical costs are reduced.
- ii. It is useful in process costing.
- iii. The issue price is not affected by short-term fluctuations.

### **Disadvantages:**

- i. At the end of the accounting period, heavy clerical work is involved.
- ii. Violent fluctuations are ignored till the end of the period.

- iii. Closing stock can be erroneously valued and nil stock may have a residual value.

#### (d) Moving Simple Average Method

In this method, periodic simple average prices are further averaged. By dividing periodic average prices by the number of periods taken, the moving average is calculated. The period chosen should cover the period in which the material is issued.

The value of closing stock may be under valued or over valued. When prices are rising, the issue price worked out is lower than the periodic average prices for the period concerned and vice versa.

#### Example

#### 7. Waste

Month	Period Average Price (Rs.)	Moving Average Price (Rs.)
January	2.50	
February	2.60	2.60
March	2.70	2.72
April	2.85	2.85
May	3.00	3.03
June	3.25	

Waste comprises of invisible loss, visible loss that cannot be collected and also the unsaleable portion of the collected loss. Waste is excluded from output quantity. Examples of waste are smoke, dust, gases, slag, etc.

In certain cases, the waste involves further costs of disposing it, e.g. cost incurred for disposal of effluent, obnoxious gases etc.

### **8. Scrap**

Scrap represents the unusable loss which can be sold. It is a residue which is measurable and has a minor value. It may result from the processing of materials, obsolete stock or defective parts. The sale value is credited to the concerned department which produced it. If the value is negligible, it is credited to the Costing Profit and Loss Account.

### **9. Spoilage**

Spoilage are those materials or components which are so damaged in the manufacturing process that they cannot be repaired or reconditioned. Some spoilage may be sold as seconds. If they are badly spoiled they can be sold as waste or scrap. Spoiled units do not attain the quality required and it is not economic to correct them.

Spoilage occurs due to some defect in operations or materials. Sometimes the entire production in a batch may have to be rejected or a part of it may be rejected.

### **10. Control of Waste, Scrap Spoilage and Defectives**

While designing a control system, controllable and uncontrollable losses should be distinguished. The system should determine standard levels which can be attained. Losses may be uncontrollable in the short-term but controllable over a period of time. Moreover, it takes time to control a new process. The various levels should be frequently reviewed. Losses can be minimised by proper storage, proper handling, maintenance of suitable inventory levels etc.

A control system should calculate and report production and data regarding waste, scrap, spoilage and defectives should be regularly collected. Period reports help to evaluate performance and also in taking corrective action. Standards should be set. Variances of actuals from standards should be examined so that it can be effectively controlled.

The control of waste, scrap, spoilage and defectives can be exercised at three levels:

- i. Occurrence
- ii. Recovery, handling and storage
- iii. Disposal

### **i) Control Over Occurrence**

Losses are incurred due to nature of the product, quality control, method of production etc. The causes may be summarized as follows:

- (a) Labour-related causes: Lack of training errors committed by machine operator, inadequate supervision, damage caused by handling carelessness, fatigue etc.
- (b) Causes related to manufacturing method: Defective equipments, pitfall in design, machine jams, trials and adjustments, overloading and excessive utilisation of resources, problems associated with new products, standards set etc.
- (c) Materials related causes: Defective materials, obsolescence, evaporation, deterioration
- (d) Other: Strict inspection, thefts, etc.

### **ii) Control Over Recovery Handling and Storage**

As soon as stores are received they should be handled and stored properly. Different types of losses should be identified at different stages of production. Items to be rectified should be identified. Good handling and proper storage protect goods from damage, theft and misappropriation.

### **iii) Control over Disposal**

To maximise the sales value of waste, scrap, spoilage etc. the following points are to be considers:

- i. Make the goods ready for sale
- ii. Select the best buyer
- iii. Control the quantities of losses.



## MATERIALS

Bids may be obtained and prices obtained should be comparable with market prices.

Physical control should be exercised over the quantities of scrap, spoilage leaving the factory and the quantities produced, repaired and sold must be continuously reviewed.

**REFERENCE MATERIAL**

Click on the links below to view additional reference material for this chapter

**[Summary](#)**

**[PPT](#)**

**[MCQ](#)**

**[Video1](#)**

**[Video2](#)**

# 3

## ACTIVITY BASED COSTING

---

### 1. PROBLEMS OF TRADITIONAL COSTING

Traditional costing can lead to undercosting or overcosting of products or services. Undercosting results when a product or service consumes a relatively high level of resources but is allocated a relatively low cost. Overcosting results when a product or service consumes a relatively low level of resources but is allocated a relatively high cost. Over or undercosting of products distorts cost information. A poor quality of cost information causes management to make poor decisions for pricing, product emphasis, make or buy, etc. Then the very objectives of having a costing system are hardly said to have been achieved.

Why does traditional costing lead to over or undercosting of products/services? It occurs because overhead or indirect costs are recovered based on volume only, e.g. machinehour rate, labour hour rate, etc. We have computed absorption rates in Chapter 5 based on volume. In the traditional method of allocation, costs are indiscriminately averaged, or spread over products/services evenly, irrespective of demands on resources or activities. The basic assumption in the cost allocation process is the higher the volume, the greater the share of indirect costs to a product or service-line, and vice versa. Does such a simplistic assumption hold good in reality?

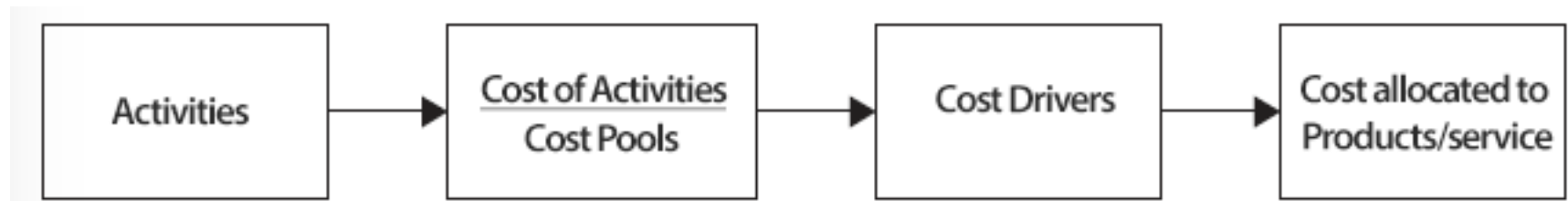
In a multi-product or multi-service firm, different products/services consume different activities which may be disproportionate to the volume of production or service. Complexity of production or service because of diverse

specifications results in different demands on resources or activities. In such a situation, the conventional methods of allocation of overhead cost based on a single or two-volume rates distorts product or service costs.

## 2. ACTIVITY BASED COSTING (ABC)

Activity-based costing focuses on activities as the fundamental cost objects.

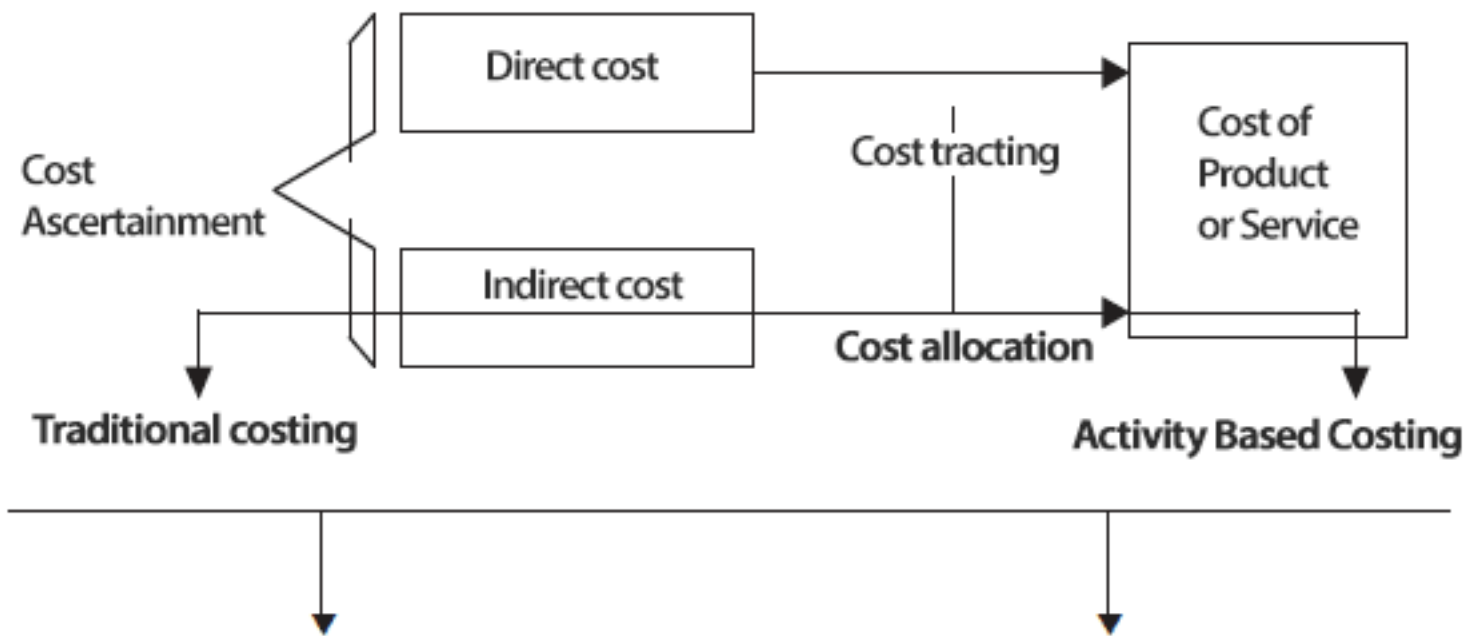
**Fig.5.1 Activity Based Costing**



An activity is a process or procedure that causes work. In relation to ABC, by activities we only mean the activities of the support or service departments, such as, material handling machine set-up, engineering change, quality testing, inspection, etc. This means that ABC differs from traditional system only in respect of allocation of overhead or indirect cost. Direct costs are identified with or assigned to the cost object, in the same manner as done in case of traditional costing system. Overhead costs are linked to the cost objects based on activities. This is shown in Fig. 5.2.

Activities drive costs. Costs are, therefore, allocated based on appropriated cost drivers. Cost drivers are allocation bases. Cost drivers are the factors or transactions that are significant determinants of costs. For example, purchasing department costs depend on the number of purchase orders placed, cost of warehousing depend on the number of items in stock, machine set-up costs depend on the number of set-ups per period, etc. We give below a few examples of activities and the relevant cost drivers.

## ACTIVITY BASED COSTING



Volume-based allocation bases e.g.  
Labour hours, machine hours, etc.

Cost-drives are used as  
the allocation bases e.g.

Set-up hours for allocating set-up costs;

Inspection hours for allocating inspection costs; testing hours for allocating quality cost etc.

**Fig. 5.2. Traditional Costing and Activity Based Costing**



## ACTIVITY BASED COSTING

<b>Activity</b>	<b>Cost driver</b>
Machine set-up	Number of production runs
Purchasing materials	Number of orders placed
Warehousing	Items in stock
Material handling	Number of parts
Inspection	Inspection per item
Quality testing	Hours of test time
Receiving materials	Number of receiving orders
Packing	Number of packing orders
Store delivery	Number of store deliveries
Line item ordering	Number of line items

In ABC, a cause-and-effect relationship is established. Costs are allocated based on the demand on resources. The relationship between resources-activities-costs can be explained diagrammatically as in Fig. 5.3.

## ACTIVITY BASED COSTING

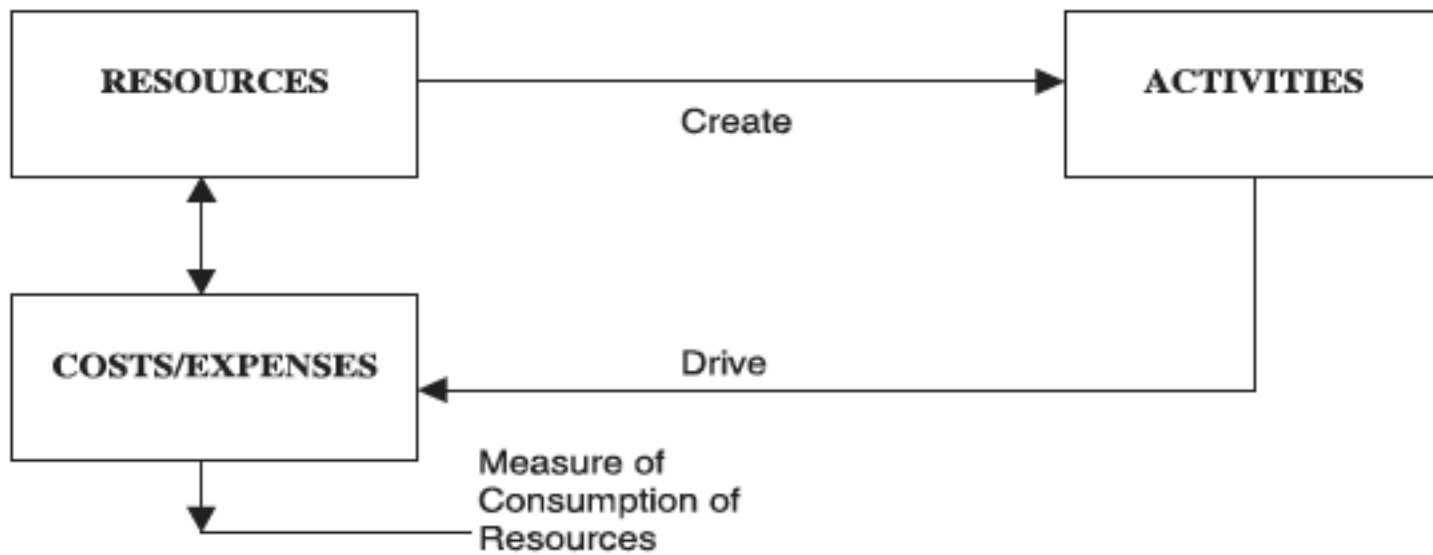


Fig. 5.3 Resources-Activities-Cost Relationship

ABC focuses on activities for cost management. Traditional system focuses on cost-the effect rather than on the cause, the activity.

ABC is not an alternative costing system to job costing or process costing. It is rather an approach to developing more logically and accurately the cost numbers used in the existing costing systems. ABC alone may not provide total solution to cost control, analysis or product costing/pricing. It provides the star and then leads to various strategic exercises such as value chain analysis, benchmarking, target costing, etc., to bring in overall operational improvement.

### 3. TRANSACTION-BASED COST DRIVERS

Cooper and Kaplan illustrate the distortion in product costs that can arise - if volume related cost drivers are used to trace support department costs to products. Under most circumstances, the cost of support departments, such as set-up, inspections, material handling, scheduling, etc. will not vary in the short-run, but will definitely begin to rise as the increasing complexity, of the production processes place additional demands on support departments. Thus support departments grow intermittently. Cooper and Kaplan believe that the key to understanding what causes overhead costs (i.e. what drives these costs) is the transactions undertaken by the support departments. Thus, transactions undertaken by the support department personnel are the

appropriate cost drivers. The following are some of the transaction-based cost drivers.

1. The number of goods received orders drives the costs of the receiving department.
2. The number of dispatch orders drives the cost of the dispatch department.
3. The number of production runs undertaken drives production scheduling, inspection material handling and set-up costs.
4. The number of purchase, supplies and customer orders similarly drive the costs associated with raw material inventory, work-in-progress and finished goods inventory.

With the activity-based costing system, a cost pool is established for each cost driver. For example, the total costs of inspections might constitute one cost pool. To arrive at a charging out rate, the total costs of the cost pool would be divided by the number of transactions or activities that generated these costs. For example, if there were 1,000 inspection hours during a period and the total costs traced to the cost pool were Rs. 2,00,000, then the charging-out rate would be Rs. 200 per inspection hour. To determine the inspection cost for a particular product, the number of inspection hours for the product would be multiplied by Rs. 200. Activity-based costing would trace other non-volumerelated overhead costs to products using a similar approach. In short, ABC system enhances the understanding of cost behaviour and hence more accurate determination of product costs.

#### **4. COST ANALYSIS UNDER ABC**

Resources made by Robin Cooper, Robert S. Kaplan and others show that many of the firms, resources, those represented by the so-called fixed costs, can be explained not by the amount of output produced but by the diversity of company products, customers, distribution channels, and product lines. As organisation try to expand output, they do not increase the sales of a single product to a single customer. They expand output by introducing new models, new lines of business, new distribution channels, and new customers. In the process of increasing diversity and complexity, the organisational infrastructure increases to meet the demands created by the

new products, customers and distribution channels. The activity-based approach is an attempt to show that most if not all of them are really variable.

There are three major kinds of activities in the organisations:

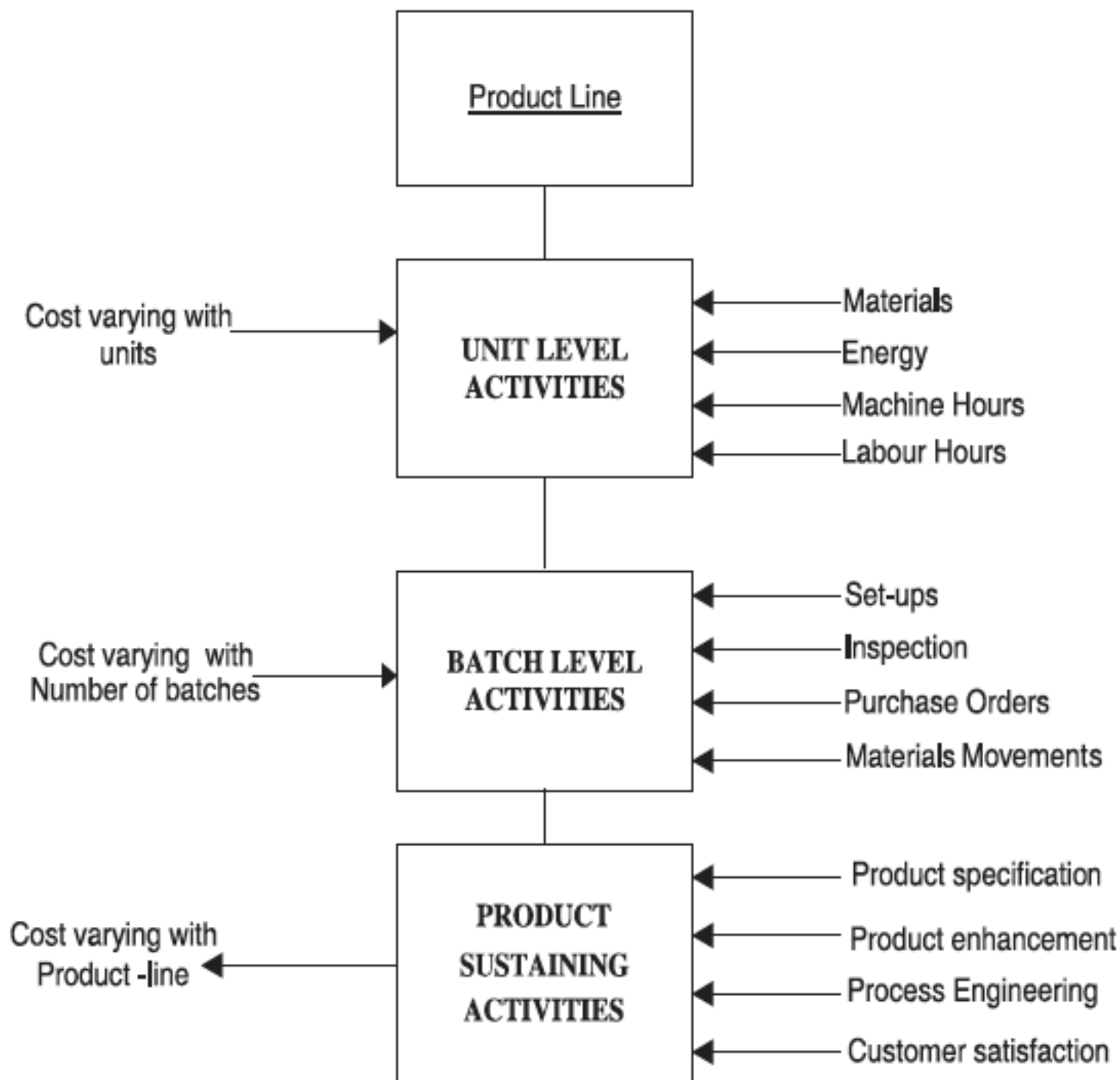
- (a) Unit level activities;
- (b) Batch level activities; and
- (c) Product sustaining activities;

The above major activities drive costs or expenses which can be classified according to above three major activities as follows:

- (a) Costs at the unit level;
- (b) Costs at the batch or production-run level; and
- (c) Product sustaining costs;

Unit level costs correspond to short-run variable costs e.g. materials, energy, temporary labour, etc. The unit level measures resources that are consumed proportionately with the number of units produced. Many overhead costs are incurred, not in proportion to the number of units produced but by other product-related activities. Some costs are incurred by activities that are performed each time a batch of product is produced. Such activities relate to the length of set-ups or the number of set-ups performed. They vary with how many set-ups are done and how many batches are run, but are fixed with respect to the number of units produced in a batch, e.g., set up costs, cost of inspection, purchase orders, etc. The third category of costs relate to activities that enable firms to produce each specific product. These costs (e.g. product specification, process engineering, product enhancement, etc.) will tend to increase as more products are added to the product-line. They are easily traceable to a product line but are fixed with respect to how many batches of that product are run or how many units of the product are produced. Fig. 5.4 explains the position clearly.

## ACTIVITY BASED COSTING



**Fig. 5.4. Activity-related Product Costs**

If the contribution approach is followed then unit level contribution margin for individual products may be computed by subtracting all unit level costs from revenues (price multiplied by production or sales volume). From this unit-level margin, subtract batch-related costs and product sustaining costs to compute product level margin. Such a product-level margin can be calculated for each product in the product line no allocations are required. Costs are not allocated below the level at which they are incurred. This enables us to see when we have profitable products but unprofitable product lines because the margins earned by all the products are not sufficient to cover the costs incurred at other levels. It involves looking at a much broader set of activities that cause costs to vary. In addition to our traditional unit



level costs, we have batch-level, product-sustaining, product-lines, and customer-related costs.

### **5. FULL COSTS AS THE PRODUCT COSTS UNDER ABC**

Managers have tremendous interest in being able to allocate all costs down to the unit level because price is a unit level driver. But with the kind of classification of costs based on major activities of the firm costs can be assigned to individual products without much trouble and without arbitrary. Multiple cost-drivers in addition to, or in replacement of, traditional cost drivers, such as labour hours, machine hours, materials consumption, etc., should be selected keeping in view the major activities of the firm and how each item of cost is linked up with these activities at different levels. Costs incurred at the batch may be described below.

1. Identify activities.
2. Identify cost of each activity.
3. Identify primary cost driver of each activity and treat it as the cost center or cost pool.
4. Compute the allocation or absorption rate by dividing total cost of the cost pool by the number of transactions or activities that generated the cost.
5. Allocate costs to products e.g. multiply recovery rate by cost drivers for the concerned product/service.

For example, the following cost-drivers (allocation bases) may be used for costs incurred at the batch-level: set-up hours, production orders, materials requisitions, materials movement etc. Similarly, for allocating product-sustaining costs suitable cost-drivers (allocation bases) may be selected for allocation of costs. ABC analysis strives to assign costs to factors that cause them. In ABC, allocation of activity costs is done based on multiple cost drivers. Each cost driver is selected for its relationship to the activity. The more precise relationship yield more realistic product costs than under traditional system that may use a single allocation base.

## ACTIVITY BASED COSTING

### Illustration

Manufacturing Activity	Cost of Activity	Cost driver chosen as application base	Cost per unit of Application base (Rs.)
1. Material Handling	Rs. 8,000	Number of parts (80,000)	0.10
2. Machine	Rs. 5,000	Machine hours (250)	20.00
3. Assembling	Rs. 4,800	Number of parts (8,000)	0.60
4. Inspecting	Rs. 1,400	Number of finished units (1,000)	1.40

Now if the cost of direct materials of a product, which uses 8 units of materials, 1/4th machine hour and 8 assembly parts, is Rs. 100, and that of power etc. is Rs. 10 the total cost may be built up as follows:

	Rs.	Rs.
Direct materials		100
Power, etc.		10
Variable costs		<u>10</u>
	110	
Other costs:		
Materials handling (8 parts x Rs. 0.10)	0.80	
Machining (1/4 x Rs.20)	5.00	
Assembling (8 parts x 0.60)	4.80	
Inspecting (1 finished unit x Rs. 1.40)	<u>1.40</u>	
	<u>12</u>	
	<b>Rs.</b>	<b><u>122</u></b>

The detailed breakdown of costs by activity pinpoints opportunities for cost control. For example , machining costs of Rs. 5 per unit may be too high. Managers could take action to bring machining cost down. In a traditional

## ACTIVITY BASED COSTING

costing system, this information may not be available and cost may escalate without manager's notice.

Managers are also concerned about full product cost which includes the costs of upstream activities and downstream activities in the value chain - upstream activities manufacturing and downstream activities follow it:

Per unit (Rs.)

Upstream activities:

Product design (assumed)	10
--------------------------	----

Total manufacturing cost	122
--------------------------	-----

Downstream activities:

Marketing, customer service

(Assumed)	<u>22</u>
-----------	-----------

Full product cost	<u>154</u>
-------------------	------------

Internal decision, such as cost control and product pricing, will focus on the components of full product cost. ABC gives managers better information for decision-making, e.g. product pricing, dropping an activity, make or buy, etc.

## 6. BENEFITS AND WEAKNESS OF ABC

ABC is more expensive than the traditional system. So as a cost-benefits analysis is desirable.

The benefits of **ABC** are many.

1. In the traditional system cost analysis is done by product. In ABC managers focus attention on activities rather than products because activities in various departments may be combined and costs of similar activities ascertained, e.g. quality control, handling of materials, repairs to machines, etc. If detailed costs are kept by activities, the total company costs for each activity can be obtained, analysed, planned and controlled.

2. Because costs are identified with activities and then allocated to products or services based on appropriate cost drivers, more accurate product/service costs result. Since overhead or indirect costs occupies a significant proportion of the total costs of the firm, the overall impact of allocation of indirect costs are managed well, cost will fall and resulting products will be more competitive.
3. Managers manage activities and not products. Changes in activities lead to changes in costs. Therefore, if the activities are managed well, costs will fall and resulting products will be more competitive.
4. Allocation overhead cost to production based on a single cost driver (allocation base) can result in an unrealistic product cost because the traditional system fails to capture cause-and-effect relationship. To manage activities better and to make wiser economic decisions, managers need to identify the relationship of causes (activities) and effects (costs) in a more detailed and accurate manner. ABC focuses on this aspect. It may be mentioned that activities drive costs. Therefore, costs should be assigned to factors that cause them.
5. ABC highlights problem areas that deserve management's attention and more detailed analysis. Many actions are possible on pricing, on process technology, on product design, on operational movements and on product mix, once management realizes that a large number of its products and customers may be breakeven or unprofitable. The ABC systems are useful in setting priorities for managerial attention and action.

**ABC** is not free from certain weakness, as argued by the critics. They are mentioned below :

1. **ABC** fails to encourage managers to think about changing work processes to make business more competitive.
2. **ABC** does not conform to generally accepted accounting principles in some areas. For example, **ABC** encourages allocation of such non-product costs as research and development to products while committed product costs such as factory depreciation are not allocated to products. In the USA , most companies have accordingly used ABC for internal analysis and continued using their traditional costing for external reporting.

3. Using **ABC** for short-run decision may sometimes prove costly in the long run. Consider, for example, the decision about lowering.....order handling costs by eliminating small orders that generate lower margins. While this strategy reduces the number of sales orders (the driver), customers may want frequent delivery at small lots at infrequent intervals. In a competitive environment (when other companies may be willing to meet the customers' needs) long term profits may suffer due to elimination of small orders.
4. **ABC** does not encourage the identification and removal of constraints creating delays and excesses. An overemphasis on cost reduction without regard to the constraints does not create an environment for learning about the problems and their management.

### 7. FACTORS INFLUENCING APPLICATION OF ABC

The following factors influence the application of ABC.

1. **High incidence of overhead cost:** If the proportion of overhead cost to total cost is relatively high, it is necessary that overhead cost is applied to products fairly accurately in order to prevent overcosting of some products and under-costing of others. The extent of automation, complexity of production, etc. generally increases the overhead cost today. In such a situation, cost assignment should be based on the suitable cost drivers - the factors that cause costs. Conventional costing systems are simplistic because they only consider volume or unit based assignment. As a result, product costs are distorted. Actions/decisions taken on the basis of distorted product costs cannot give good results in the long run.
2. **Product complexity or diversity:** When products consume activities and inputs in different proportions, product diversity occurs. In such a situation, there is a difference in the size, complexity, material components or other characteristics and demands made on a firm's resources by product lines. Complex products. Unless, therefore, the complexity, or diversity of the product, is given due weightage in absorption of costs, product costs are likely to be distorted. Traditional volumebased methods should be discarded and ABC should be used to remedy the situation.



### Illustration - 1

	Product A	Product B
Units Produced	20	20
Material moves per product unit	6	14
Direct labour hours per unit	870	870
Budgeted material handling Rs. 1,74,000		

#### Required:

- Determine cost per unit of the product using the volume-based allocation method (direct labour hour rate)
- Determine cost per unit of the products using ABC, and
- Comment on the results.

$$\begin{aligned}
 \text{(a) Direct labour hour rate} &= \frac{\text{Budgeted overhead}}{\text{Budgeted direct labour hours}} \\
 &= \frac{\text{Rs. 1,74,000}}{(20 \times 870) + 20 \times 870} = \text{Rs. 5}
 \end{aligned}$$

	Product A	Product B
Total direct labour hours taken (870x20)	17,400	17,400
Labour hour rate	Rs. 5	Rs. 5
Total material handling cost absorbed (17,400 @ 5)	Rs. 87,000	Rs. 87,000
Units produced	20	20
Cost per unit	Rs. 4,350	Rs. 4,350

As shown above, each unit of products A and B absorbs the same amount of material handling costs even though product B consumes more material moves than product A. In other words, conventional volume-based application rate fails to trace the large number of material moves for product B.



## ACTIVITY BASED COSTING

a) Number of material moves causes material handling costs and use of this cost driver gives a better result as shown below:

$$\begin{aligned} \text{Rate per material move} &= \frac{\text{Budgeted material handling costs}}{\text{Budgeted material moves}} \\ &= \frac{\text{Rs. 1,74,000}}{6 + 14} = 8,700 \end{aligned}$$

	Product A	Product B
Total material moves	6	14
Material handling costs applied @ Rs. 8,700		
Per material move	Rs. 52,200	Rs. 21,800
Units produced	20	20
Material handling cost per unit	Rs. 2,610	Rs. 6,090

Product B that requires more material moves, correctly receives more material handling costs under ABC. In other words, the complexity or diversity of product B is taken care of when overhead costs are assigned to this product, using the appropriate cost driver.

### Illustration 2

The particulars relating to two products are given below. Product A is a new undeveloped product with production and quality problems requiring many engineering changes. Product B is, however, a mature product and does not, therefore, require much engineering attention.

	Product A	Product B
Units Produced	200	200
Engineering change notices per product line	20	6
Units cost per engineering change notice	Rs. 2.50	Rs. 2.50
Machine hours per unit	4	6

Required :

a) Compute overhead cost per unit of each product using the traditional machine hour rate method;

## ACTIVITY BASED COSTING

b) Compute overhead cost per unit of each product using ABC

a) Machine hour rate = Budgeted engineering change cost

Budgeted machine hours

$$= \frac{(20 + 6) \times \text{Rs.}250}{(200 \times 4) + (200 \times 6)} = \frac{\text{Rs. } 6,500}{2,000} = \text{Rs. } 3.25 \text{ per hour}$$

	Product A	Product B
Total machines hours	800	1,200
Cost applied @ Rs. 3.25 per hour	Rs. 2,600	Rs. 3,900
Units produced	200	200
Cost per unit	Rs. 13	Rs. 19.50

Conventional costing shows that product A has a much lower cost per unit even though it consumes more than three times as much engineering change activity as product B. A volume-based cost assignment fails to trace the high number of engineering changes for product A because product B takes more of the machine hours, this product, under conventional method, incorrectly absorbs more of the engineering costs.

The position can be described as a cross-subsidy in which one produce absorbs costs that correctly belong to another product. Product A appears to cost less because the conventional costing averaged the overhead costs. But it is not machine hours but engineering change notices that drive engineering costs.

## ACTIVITY BASED COSTING

(b) Under ABC, engineering change notice costs are applied to products based on engineering change notices rather than on machine hours. The position is shown below:

	Product A	Product B
Engineering change notices per product line	20	6
Cost per engineering notice	Rs. 250	Rs. 250
Engineering change notice costs applied per product line	Rs. 5,000	Rs. 1,500
Units produced	200	200
Engineering change notice cost per unit	Rs. 25.00	Rs. 7.50

The fact that product A consumes more than three times as much engineering change activity as product B is reflected on cost per unit arrived at using **ABC**.

**3. Volume diversity:** Volume diversity occurs when there is a difference in the number of units manufactured by product lines. For example, different products may be produced in different batch sizes in multi product factories. The complexity of the product line and the special handling required for special low volume product cause large amounts of overhead. In such a situation, if overhead costs are allocated across all products based on volume only, inaccurate product costs result hindering many important decision.

### Illustration

	Product C	Product D
Units produced	2,000	200
Machine hours per unit	4	4
Machine set up hours per product line	10	10
Budgeted machine set up related costs      Rs.17,600		

## ACTIVITY BASED COSTING

Required:

(a) Compute overhead cost per unit of each product traditional costing system, and

(b) Compute overhead cost per unit of each product using ABC.

(a) Machine hour rate =  $\frac{\text{Budgeted machine related costs}}{\text{Budgeted machine hours}}$

$$= \frac{\text{Rs. 17,600}}{(2,000 \times 4) + (200 \times 4)} = \text{Rs. 2}$$

	Product C	Product D
Total machine hours worked	8,000	8,000
Total machine related cost applied @ Rs. 2 per hour	Rs. 16,000	Rs. 1,600
Units produced	2,000	200
Machine related cost per unit	Rs. 8	Rs. 8

As a high volume product, C consumes 10 times the machine hours and, therefore, receives 10 times the machine related cost, even though it requires only 10 set up hours for production of 2,000 units against equal number of machine set up hours for production of only 200 units of D. Thus, conventional costing over-cost product C, the high volume product, and under-cost product D, the low volume product. This is because the conventional system averages out product costs after than reflecting volume based differential.

(b) When **ABC** is used, the cost driver is the number of set-ups. Thus,

Rate per machine set-up hour =  $\frac{\text{Budgeted machine set up costs}}{\text{Budgeted machine set-up hours}}$

$$= \frac{\text{Rs. 17,600}}{10 + 10} = \text{Rs. 800 per set up.}$$

## ACTIVITY BASED COSTING

	Product C	Product D
Total machine set-up hours	10	10
Machine set-up related cost applied @ Rs.880	Rs. 8,800	Rs. 8,800
Units produced	2,000	200
Cost per unit	Rs. 4.40	Rs. 44.00

Each product receives Rs. 8,800 machine set up related costs because same amount of engineering attention is required for each. It has nothing to do with volume except that higher volume leads to lower average cost per unit (for product C).

### 8. ABC AS RESOURCES USAGE MODEL

In an article Cooper and Kaplan explain ABC as resources usage model. According to them, ABC estimates the cost of resources used in organizational processes to produce outputs. The measurement of unused capacity provides the critical link between the costs of resources used, as measured by an ABC model and the costs of resources supplied or available, as reported by the organization's financial statements. The following equation, defined for each major activity performed by the organization's resources,

formalizes this relationship :

Activity available = Activity used + Unused activity.

The periodic financial statements provide information on the cost of activities supplied each period (the classification may not be strictly in terms of major activities always) while the activity-based cost system provides information on the quantity and the costs of activities actually used in a period. The relationship between resources, activities and expenses in an **ABC** has been shown earlier (see Fig. 5.3).

**ABC** focuses on the important distinction between measuring the costs of resources supplied and the costs of resources used in terms of activity. Some resources are required as needed e.g., materials, power, temporary daily labour (the costs supplying such resources are referred to `variable costs). There are other resources which are supplied in advance of usage

## ACTIVITY BASED COSTING

e.g., land and buildings, plant and machinery, employees, etc. In this case, the expense of supplying the resources will be incurred each period, independent of how much of the resource is used.

The distinction between supplied as needed and resources supplied prior to (but in anticipation of) usage suggests that a relatively simple system can be used for periodic measurements of expense and income. In this system, short-term contribution is measured as revenues less the cost of resources acquired as needed (e.g. materials, power, overtime, temporary wages, etc.). By assumption the remaining operating expenses represent resources that have been acquired prior to actual usage. The costs of these resources should be unaffected by actual activity levels during the period. The periodic income statement can report, for each activity, the costs of resources used for outputs and the costs of resources unused during the period:



**Illustration****ABC Income Statement**

Sales			Rs.
			40,000
Less: Expenses of resources supplied as used:			
		Rs.	
Materials		15,200	
Energy		1,200	
Short-term labour		<u>1,800</u>	<u>18,200</u>
Contribution			21,800
Less: Activity Expenses: Committed resources			
	Used	Unused	
	(Rs.)	(Rs.)	
Permanent direct labour	2,800	400	
Machine run-time	6,400		
Purchasing	1,400	200	
Receiving Inventory	900	100	
Production runs	2,000	200	
Customer administration	1,400	400	
Engineering changes	1,600	(100)	
Parts administration	<u>1,500</u>	<u>300</u>	
Total expenses of committed resources	<u>18,000</u>	<u>1,400</u>	<u>19,400</u>
Operating profit			2,400

Managers may be encouraged to modify their use of resources in the short-run based on information on unused capacity. For example, when excess capacity exists, they can temporarily decrease batch size. Alternatively, they may be expected to adjust downward the quantity of resources supplied when substantial amounts of unused capacity persist for several periods.

**9. INSTALLATION OF ABC**

The activity-based costing system was developed about two decades ago. Many firms in the U.S.A, U.K. Canada and Japan have been increasingly switching over to ABC is, however, limited.

Because of changes in economic policy and many other consequential changes, Indian firms have now to operate in a competitive environment where there is no room for inefficiency and cost pertaining to the same. So large Indian companies which are using conventional costing leading to arbitrary allocation of overhead costs need to switch over to the ABC system.

The macro-economic factors which justify the implementation of ABC are : (a) relatively high proportion of overhead costs, (b) product complexity and (c) volume diversity. We discuss below the steps involved in installation of ABC:

- A. Primary steps: These include feasibility study, creating IT infrastructure convincing the line-employees and value-chain analysis.
- B. Operational steps: They represent identification of activities, costs and cost drivers computation of absorption rates and allocation of overhead costs based on the activities/transactions.

The above-mentioned steps may now be discussed in brief in the following paragraphs.

**1. Feasibility study:** Installation of ABC requires considerable efforts and costs. Two types of costs are needed (a) cost of development of the system (development cost) and (b) cost of running the system (operational cost). The expected benefits are:

- I. More accurate cost information for product pricing;
- II. More accurate profit analysis by product, customer, process or department;
- III. Improved performance measures; and
- IV. Improved insight into cost causation.

The expected benefits should outweigh the costs so as to justify the installation of ABC.

**2. IT support:** For ABC a lot of information is required to be generated. The efficacy of ABC depends on the analysis of each and every activity/resources deployed and incurrence of IT infrastructure is to be built-up to provide necessary support.

**3. Selling the concept to the line-employees:** One of the problems encountered by many Canadian firms in implementing ABC was difficulty in selling the concept to line-employees. Often employees offer resistance to new systems because they are more concerned with job security. Group discussions, training programmes, case study demonstration, etc., help considerably to sell the concept to the employees. Successful implementation of the system depends considerably on the hearty participation of line-employees. This is an important issue and should be sorted out properly.

**4. Strategy and value chain analysis:** The ABC system should fulfil two basic strategic requirements:

- I. Providing information and analytical support, and
- II. Providing impetus for development of new and revised strategy.

Value chain analysis on the strategic perspective and various activities within the firm. Certain activities of the value chain may be considered as non-strategic and may, therefore, be eliminated or merged. In some cases, activities may be also considered to be out-sourced. The purpose of value chain analysis is to determine where managers can lower costs from design to distribution in the company's segment of the chain. It, therefore, promotes operational efficiency and rationalization of cost structure with activities.

**5. Inventorisation and screening of activities:** The distinctive feature of ABC is its focus on activities as the fundamental cost objects. The entire process of a firm operations-from product development to marketing-are represented by several essential activities. Resources are employed, or costs are incurred, for carrying out these activities. Hence, the success of ABC depends on a comprehensive inventorisation of all activities and their screening. In doing so it is necessary to ensure that all activities are covered and nothing is missed out.

Identification of operation and process may provide the basis from which a detailed listing of activities can be obtained in a structural manner. In addition, senior executives may be requested to list down the activities under their control. To cross check, all the employees may also be required to fill in the forms detailing what work they do. Many companies involve grass-root level employees to better understand their activities and cost drivers. This

method may provide more accurate information than interviewing senior managers who are away from daily operations.

Once the activities have been inventorised screening is necessary to improve efficiency into the system. The following questions may, therefore, be pertinent:

- Is the activity necessary?
- Is It possible to club the activities?

Ultimately, a final list of activities after going through the screening process should be prepared. Companies which have successfully implemented ABC usually limit the number of activity to 5-10 per department, at least in the initial implementation. More activities can be added later if additional complexity is warranted. The danger with identifying too many activities is that the company may get bogged down in a morass of details and the implementation may fail.

**6. Identification of costs and cost drivers:** Resources deployed, or costs incurred, for carrying out the activities should be identified. Identification of costs vis-à-vis activities may not be an easy task.

Three approaches may be adopted for identification of costs and cost drives : (a) personal observation and measurement by each line-manager in respect of activity under his/her control; (b) analysis of cost and operation records; and (c) feedback about the experience of other organization. In practice, a combination of the above may lead to better result.

The objective of the above analysis is to have :

- Indirect cost pools, and
- Indirect cost allocation bases

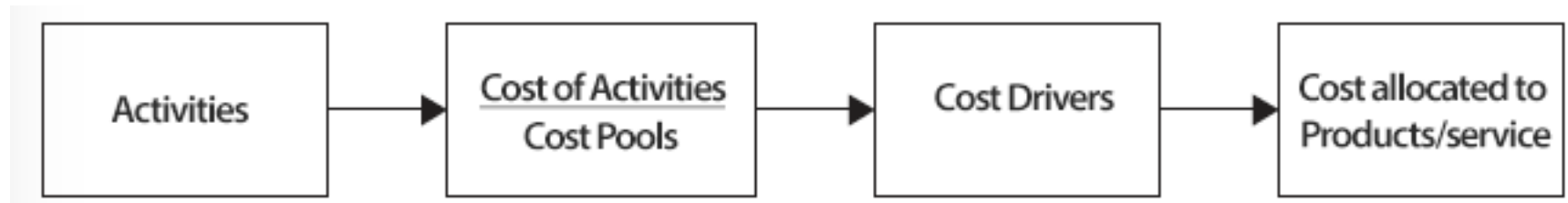
which will produce more accurate cost numbers.

A cost pool represents a group of individual cost items. For indirect or support department costs which need allocation to products or services, such pools are to be formed. One essential characteristic of a cost pool is that it comprises costs that have the same or similar cause-and-effect relationship with the allocation base. A cost pool may be employed for every identified activity or sub-activity.

## ACTIVITY BASED COSTING

As stated earlier, a cost allocation base is a factor that drives or determines costs. A cost driver is the cost allocation base. When there are a number of cost drivers for any particular cost pool, costs should be allocated based on the primary cost driver, that is, based on the factor that has the most significant influence on the incurrence of cost. Alternatively, some consideration may be given for segmenting the pool further to establish linkage with individual cost drivers.

The entire process may now be briefly shown below.



It should be emphasized that ABC is more complex than the traditional system. A complex system is more costly to implement and operate than a simple system. But its utility lies in helping managers and others make "better decisions". Getting "better cost numbers" is a means towards that end. It is not an end in itself.

**REFERENCE MATERIAL**

Click on the links below to view additional reference material for this chapter

**[Summary](#)**

**[PPT](#)**

**[MCQ](#)**

**[Video1](#)**

**[Video2](#)**

**[Video3](#)**

**[Video4](#)**



# 4

## BUDGETARY CONTROL

---

### 1. BUDGET

In his "A Dictionary for Accounts", Kohler defines budget as:

1. Any financial plan serving as an estimate of and a control over future operations.
2. Hence, any estimate of future costs.
3. Any systematic plan for the utilisation of manpower, material or other resources.

The Chartered Institute of Management Accountants, London, (terminology) defines a budget as "a plan expressed in money. It is prepared and approved prior to the budget period and may show income, expenditure and the capital to be employed. It may be drawn up showing incremental effects on former budgeted or actual figures, or be compiled by zero-based budgeting." A budget, thus is precise statement of the financial and quantitative implications of the course of action that management has decided to follow in the immediate next period of time (usually a year).

Thus the essential features of a budget are as follows:

- i. It is statement expressed in monetary and/or physical units prepared for the implementation of policy formulated by the management.
- ii. It is laid down prior to the budget period during which it is followed.
- iii. It is prepared for the definite future period.

iv. The policy to be followed to attain the given objective must be laid before the budget is prepared.

### **2. BUDGETARY CONTROL**

Budgetary control is intimately connected with budgets. The Chartered Institute of Management Accountants, London defines Budgetary control as "the establishment of budgets, relating the responsibilities of executive to the requirement of a policy and the continuous comparison of actual with budgeted results either to secure by individual action the objectives of that policy or to provide a firm basis for its revision". A budgetary control system secures control over performance and costs in the different parts of a business:

- i. By establishing budgets
- ii. By comparing actual attainments against the budgets; and
- iii. By taking corrective action and remedial measures or revision of the budgets, if necessary.

The budget is a blue-print of the projected plan of action expressed in quantitative terms and for a specified period of time. The plan is a concrete form and follow up action should be taken to see that plan is implemented to complete the systems of control. In other words, while budgeting is the art of planning, budgetary control is the act of adhering to the plan. In fact, budgetary control involves continuous comparison of actual results with the budgets and taking appropriate remedial action promptly.

It is well recognised that a control system involves fixing of targets (in the form of specific tasks), collection of information regarding actuals and continuous comparison of actuals with the targets with a view to reporting for action. A budgetary control system, in this sense is also a control systems. It is an excellent system for decentralisation of authority without losing control over the operations of the firm.

One should not consider (budgets or) budgetary control as something rigid or straitjacket. It is one of the system whereby dynamism is infused into an organisation through the process of targets, the achievement of which will mean progress; of allowing a good deal of freedom of action within the

delegated field of executives and of seeing to it that all concerned will work in a manner which helps in achieving the firms objectives. There is always a good scope for initiative and drive but not for recklessness or too much caution. De Paula has put the main idea of budgetary control through an analogy thus "the position may be linked to the navigation of a ship across the sea. The log is kept written regarding happenings and position of the ship from hour to hour and valuable lessons are to be learnt by the captain from a study of the factor that caused the misadventures in the past. But to navigate his ship safely over the seven seas the captain requires his navigating officer to work out the course ahead and constantly to check his ships position against the predetermined one. If the ship is off its course, the navigating officer must report immediately so that the captain may take prompt action to regain his correct course.

"Exactly so it is with the industrial ship; the past records represents the log and the auditor is responsible for verifying so far as he can that those records are correct and reveal a true and fair view of the financial position of the concern. But what modern management requires for day-to-day operating purposes is forecasts showing in detail anticipated course of business for (say) the coming year. During the course of the years operations the management requires immediate reports of any material variance from the predetermined course together with explanation of the reasons for variations".

In short, budgetary control means laying down in momentary and quantitative term what exactly has to be done and how exactly it has to be done over the coming period and then to ensure that results do not diverge from the planned course more than necessary. The word "necessary" is not to be loosely interpreted. Divergence due to inefficiency is not necessary.

### **3. FORECAST AND BUDGET**

A forecast is an assessment of probable future events. Budget is an operating and financial plan of a business enterprise. At planning stage it is necessary to prepare forecasts of probable course of action for the business in future. Budget is a sort of commitment or a target which the management seek to attain on the basis of the forecasts made. Forecasts denotes some degree of flexibility while a budget denotes a define target.

## BUDGETARY CONTROL

The following points of distinction can be noted between forecast and budget:

	Forecast	Budget
i.	Forecast is a mere estimate of what is likely to happen. It is a statement of probable events which are likely to happen under anticipated conditions during a specified period of time	Budget shows that policy and programme to be followed in a future period under planned conditions.
ii.	Forecasts, being statements of future events, do not have any sense of control	A budget is a tool of control since it represents actions which can be shaped according to will so that it can be suited to the conditions which may or may not happen.
iii.	Forecasting is a preliminary step for budgeting. It ends with the forecast of likely events.	It begins when forecasting ends. Forecasts are converted into budgets.
iv.	Forecasts have a wider scope, since it can be made in those spheres also where budgets cannot interfere.	Budgets have a limited scope. It can be made of a phenomenon not capable of being expressed quantitatively.

### **4. OBJECTIVES OF BUDGETARY CONTROL**

The objectives of budgetary control are the following:

- 1) To use different levels of management in a co-operative endeavour for achievement of the objectives of the firm.
- 2) To facilitate centralised controls with delegated authority and responsibility.
- 3) To achieve maximum profitability by planning income and expenditures through optimum use of the available resources.
- 4) To ensure adequate profitability by planning income and expenditure through optimum use of the available resources.
- 5) To reduce losses and wastes to the minimum.

- 6) To bring out clearly where effort is needed to remedy the situation.
- 7) To see that the firm is not deflected from marching towards its long-term objectives without being overwhelmed by emergencies.
- 8) Various activities like production, sales purchase of materials etc. are co-ordinated with the help of budgetary control.

### **5. ADVANTAGES OF BUDGETARY CONTROL**

Budgetary control makes all the differences between drifting in an uncharted sea and following a well plotted course towards a predetermined distinction. It serves as a valuable aid to management through planning, co-ordination and control.

The principal advantages of a budgetary control system are enumerated below:

- 1) Budgetary control aims at maximisation of profits through effective planning and control of income and expenditure - directing capital and resources to the best and most profitable channel.
- 2) There is a planned approach to expenditure and financing of the business so that economy is affected in the utilisation of funds to the optimum benefit of the concern.
- 3) It provides a clear definition of the objectives and policies of the concern and a tool for objecting these policies to periodic examination.
- 4) The task of managerial co-ordination is facilitated through budgetary control.
- 5) Since each level of management is aware of the task and is fully conscious as to the best way by which it is to be performed, maximum effective utilisation of men, materials and resources can be attained.
- 6) Reports are furnished under the principles of management or control by exception. Only deviations from budgets which point out the weak spots and inefficiencies are properly looked into.



## BUDGETARY CONTROL

- 7) It cultivates in the management the habit of thinking ahead-making careful study of the problems in advance before taking decisions.
- 8) A budgetary control systems assists delegation of authority and is a powerful tool of responsibility accounting.
- 9) Budgets are the fore-runners of standard costs in the sense that they create necessary conditions to suit setting up of standard costs.
- 10) The method of evaluating performance against budgets provides a suitable basis for establishing incentives systems of remuneration by results as also spotting people with exceptional qualities of leadership and management.
- 11) Since it involves foreseeing difficulties of various types, it will lead to their removal in time.

### **6. LIMITATIONS OF BUDGETARY CONTROL**

- 1) Budgetary control starts with the formulation of budgets which are mere estimates. Therefore, the adequacy or otherwise of budgetary control systems, to a very large extent, depends upon the adequacy or accuracy with which estimates are made.
- 2) Budgets are meant to deal with business conditions which are constantly changing. Therefore, budget estimates lose much of their usefulness under changing conditions because of their rigidity. It is necessary that budgetary control system should be kept adequately flexible.
- 3) The system of budgetary control is based on quantitative data and represents only an impersonal appraisal to the conduct of business activity unless it is supported by proper management of personal administration.
- 4) It has been found that in practice the organisation of budgetary control systems become top heavy and, therefore, costly specially from the point of view of small concern.
- 5) Budgets and budgetary control have given rise to a very unhealthy tendency to be regarded as the solvent of all business problems. This approach ultimately results in failure of budgetary control system.

- 6) It is a part of human nature that all controls are resented to. Budgetary control which places restrictions on the authority of executive is also resented by the employees.

The limitations stated above merely point to the need of maintaining the budgetary control system on a realistic and dynamic basis rather than as a routine.

### **7. PRELIMINARIES FOR THE ADOPTION OF A SYSTEMS OF BUDGETARY CONTROL**

For the successful implementation of a systems of budgetary control certain pre-requisites are to be fulfilled. They are summarised below:

- 1) There should be an organisation chart laying out in clear terms the responsibilities and duties of each executive and the delegation of authority to the various levels.
- 2) The objectives, plans, and policies of the business should be defined in clear cut and unambiguous terms.
- 3) The budget factor or the key factor (s) which be the starting point of the preparation of the various budgets should be indicated.
- 4) For formulation and efficient execution of the plan, a Budget Committee should be set up.
- 5) There should be an efficient system of accounting to record and provide data in line with the budgetary control systems.
- 6) There should be a proper system of communication and reporting between the various levels of management.
- 7) There should be Budget Manual wherein all details regarding the plan and its procedure of operation are given as also the length of the budget period.
- 8) The budget should primarily be prepared by those who are responsible for performance.

## BUDGETARY CONTROL

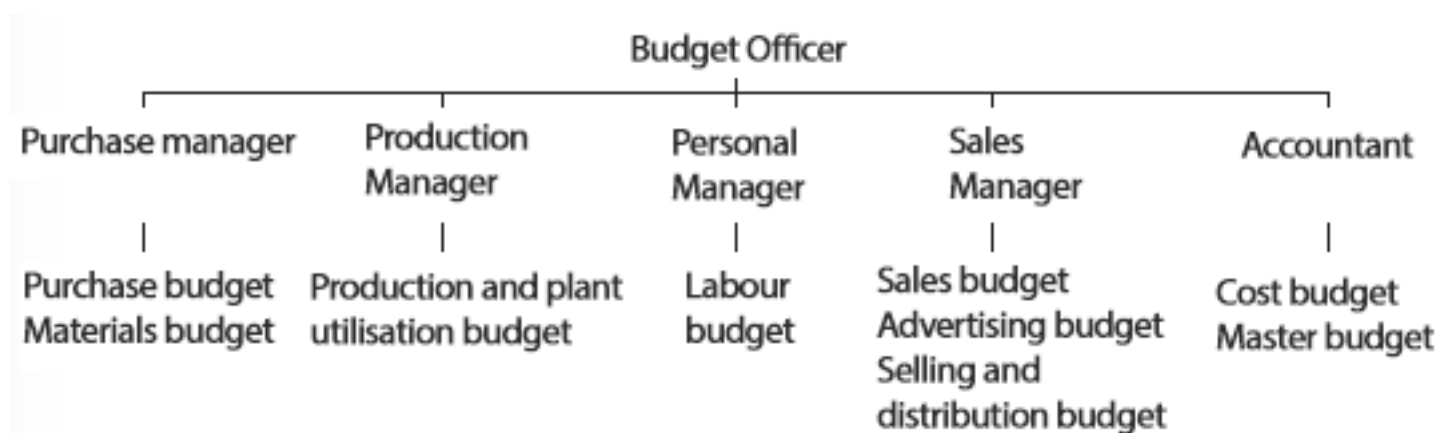
- 9) The budgets should be comprehensive, complete, continuous and realistic to attain.
- 10) There should be an assurance from the top management executives for co-operation and acceptance of the budgetary control system.
- 11) For the success of a budgetary control system, it is essential there should be a sound organisation for budget preparation, budget maintenance, and budget administration. The budgetary control organisation is usually headed by a top executive who is known variously as the Budget Controller, Budget Director, or Budget Officer, who may have under him a Budget Committee constituted with the representatives of various departments like purchases, sales, production, development, administration and accounts.

Unless the philosophy of budgeting and budgetary control is accepted by every one in authority, the system may work only haphazardly. The full and frank and active cooperation of all is required while framing budgets. Then only they will feel committed to achievements of targets set for them.

### 8. INSTALLATION OF BUDGETARY CONTROL SYSTEM

The following steps should be considered in detail for sound budgets and for successful implementation of the budgetary control systems.

- i. **Organisation Chart:** An organisational chart is statement defining functional representatives of executives responsible for accomplishment of organisational objectives. This chart shows a functional responsibility of a particular executive.



Relative position of a functional head with heads of other functions. An organisation chart for budgetary control may be as follows:

- ii. **Budget Center:** A budget center is a section of the organisation of the undertaking defined for the purpose of budget control. Budget center should be established for cost control and all the budgets should be related to cost centers. Budget centers will disclose the sections of the organisation where planned performance is not achieved. Budget center must be separately delimited because a separate budget has to be set with the help of the department concerned. To illustrate, production manager has to be consulted for the preparation of production budget and finance manager for cash budget.
- iii. **Budget Manual:** A budget manual is a document which sets outstanding instructions governing the responsibilities of persons and the procedures, forms and records relating to the preparation and use of budgets and it is a booklet containing standing instructions regarding the procedures to be followed and the time schedules to be observed. The following are some important matters dealt with in the budget manual:
  - i. The dates by which preliminary forecasts and plans are to be submitted;
  - ii. The form in which these are to be submitted and the persons to whom these are to be forwarded.
  - iii. The important factors that must be considered for each forecast or plan.
  - iv. The categorisation of expenses, e.g. variable and fixed, and the manner in which each category is to be estimated and dealt with;
  - v. The manner of scrutiny and the personnel to carry it out;
  - vi. The matters which must be settled only with the consent of the managing director, departmental manager, etc.;
  - vii. The finalisation of the functional budgets and their compilation into the master budgets;
  - viii. The form in which the various reports are to be made out, their periodicity and dates, the persons to whom these and their copies are to be sent;
  - ix. The reporting of the remedial action;



- x. The manner in which budgets, after acceptance and issuance, are to be revised or amended; and
- xi. The matters, included in budgets, on which action may be taken only with the approval of top management.

The main idea of the budget manual is to inform line executives beforehand about procedures to be followed rather than issuing frequent instructions from the controller office regarding procedures and informs to be used. Such frequent instructions can be a source of friction between the line and staff management.

iv. **Budget Controller:** To line up the various function of Budget Committee, to bring them together and to co-ordinate their efforts in the matter of preparation of target figures, there should be a person usually designed as the Budget Controller, who can provide ready data relating to all the functions. He is more or less the secretary to the budget committee. The Budget Controller does not control; he is staff man; he advises but does not issue instructions. His duties will comprise mainly of:

- 1) Helping in preparation of the various budgets and their co-ordination and compilation and into the master budget;
- 2) Compiling of information about actual performance on a continuous basis comparing it against the budget figures, ascertaining causes of deviation and preparing reports based thereon and sending them to the appropriate executive;
- 3) Bringing to the notice of the management the need for revision of budgets and assisting them in the task; and
- 4) Compiling information of all types for the purposes of efficient preparation of budgets and proper reporting.

v. **Budget Committee:** The budget committee is a group of representatives of various function in an organisation. As all functions are inter-related and as any change in ones target will have its impact on that of the other, it is necessary to discuss the targets so that a mutually agreed programme is determined. This really co-ordination in budget making, "It is a powerful force in knitting together the various activities of the business and enforcing real control over operations. The budget manual should specify the

responsibilities and duties of the budget committee, which should include the following:

- 1) Receive and review budget estimates from the respective divisions or departments and make recommendations.
- 2) Recommended decisions or budget matters where there may be conflicts between department and divisions.
- 3) Recommended changes and approval of the revised budget.
- 4) Receive, study and analyse periodic reports comparing the budget with actual performance. Consider policies with respect to follow-up procedures.
- 5) Consider and make recommendations for revision of the budget when conditions warrant.
- 6) Consider recommendation for revision of the budget policies and procedures.
- 7) Make recommendation for the budget manual.

vi. **Budget Period:** CIMA defines budget period as "the period for which a budget is prepared and used which may then be sub-divided into control periods". It refers to the period of time covered by a budget. The broad classification in this regard has already been stated as "long-term budget" and "short-term budget".

The short-term budget itself could be bifurcated into yearly and quarterly budgets. Long-term budgets provide the perspective, since one would be able to have a view of what is likely to be achieved and what the chief problems are likely to be, such as, competition from new products. Short-term budgets, say, for a year are quite exact and those for quarter even more so. These are particularly suitable for control purposes. A short-term budget need not necessarily be for one year. It is generally long enough to cover one season or business year.

In determining the length of the budget period the following factors should be considered:

- i. The budget period should be long enough to complete production of the various products.



- ii. For the business of a seasonal nature the budget period should cover at least one entire seasonal cycle.
- iii. The budget period should be long enough to allow for the financing of production well in advance of actual needs.
- iv. Major operations and drastic changes in plant lay-out or manufacturing methods must be planned far in advance to determine financial requirements.
- v. The budget period should coincide with the financial accounting period to compare actual results with budgeted estimates.

A budget period should be distinguished from "control period". The latter indicates the period with which reports are sent to the various levels of management. It need not be the same as the budget period. Reports are sent usually at shorter intervals so that corrective action may be taken within the budget period. This would ensure that the overall variation between budget and actual is minimised. The periodicity of the reports is also dependant upon the urgency and significance of the matter under report.

vii. **Budget Key Factor:** A budget key factor or principal budget factor is described by the CIMA London terminology as: "a factor which will limit the activities of an undertaking and which is taken into account in preparing budgets". The limiting factor is usually the level of demand for the products or services of the undertaking but it could be a shortage of one of the productive resources, e.g. skilled labour, raw material or machine capacity. In order to ensure that the functional budgets are assessed, as noted already, all the functions in all organisation are interlinked. The target of one has influence on that of the other. If the sales department could sell only 50,000 units, it is no use of producing 1,00,000 units. If the production department has the capacity for 50,000 units, sales potential of 1,00,000 units is not of much consequence. Deliberations in the budget committee would lead to a decision regarding steps to get over a limited factor. If one limiting factor is got over, another may creep up. Thus, there is a possibility of varying limiting factors under different circumstances. Decision will have to be taken resulting in optimum production keeping in view of the different limiting factors. The basic issue is an enquiry into the future. All probabilities under different circumstances are to be worked out to fix the target at the optimum level. This may sometimes involve lengthy mathematical calculations.

The following is a list of principal budget factors which will influence the targets:

(a) customer demand, (b) plant capacity (c) availability of raw material, skilled labour and capital, (d) availability of accommodation for plant, raw materials and finished goods and (e) governmental restrictions.

If a limiting factor cannot be got over by any means, then the whole budget involving all functions will have to be built around that factor. For instance, if the production capacity is 50,000 units and it cannot be increased in the short run, all budgets, say, the sales budget and raw materials purchase budget, will have to be based on the production of 50,000 units. To achieve profitability, a key factor must be overcome, if not, at least should be least efforts should be made to minimise its adverse effect.

viii. **Budget Reports:** Performance evaluation and reporting of variance is an integral part of all control systems. Establishing budgets in it- self is one of no use unless a comparison is made regularly between the actual expenditure and the budgeted allowances, and the results reported to the management. For this purpose, budget reports showing the comparison between the actual and budgeted expenditure should be presented periodically and promptly. The reports should be prepared in such a manner that they reveal the responsibility of a department or an executive and give full reasons for the variances so that proper corrective action may be taken. The reporting should be on the principle of exception and both favourable and unfavourable variances should be shown and commented upon. In brief, a budget report is a comparison of the actuals with the budgets both for the month and cumulative up to the current month. The variations from budgets are worked out in respect of each items of expenses so as to locate the responsibility and facilitate corrective action.

A budget report, to be effective in the purpose, must be:

- i. Simple in its form so as to be easily intelligible to the recipient concerned: It should bear a suitable heading and make the period in which it relates;
- ii. Regularly and promptly presented;
- iii. Designed to give only essential information required and avoid unnecessary details;

## BUDGETARY CONTROL

- iv. Expressed as far as possible in direct figures;
- v. Correlated to a "money value" wherever possible;
- vi. Free from personal bias of the person preparing it; and
- vii. Dated and signed by those who prepare and check it.

Every budget report should be followed up till finally desired results are achieved. This follow-up would require either a discussion with the individual responsible for taking the necessary action or whose action alone can prevent recurrence of such variations; or revision in the budget itself arising out of errors or changes in policy.

A specimen budget report for expenses is given below:

### BUDGET REPORT

Department.....		Period.....				
Expenses	Budgeted	Actual	Difference		Cumulative	Reasons
			Increase	Decrease	Variance	
	Rs.	Rs.	Rs.	Rs.	Rs.	
A. Controllable						
Repairs						
Mach. Maintenance						
Elect. Maintenance						
Power						
Lighting						
Lubrication						
B. Non-controllable						
Expense						
Floorspace						
General						
Prorated						
Total						

Date of preparation

Copies to:

Prepared by

1

Checked by

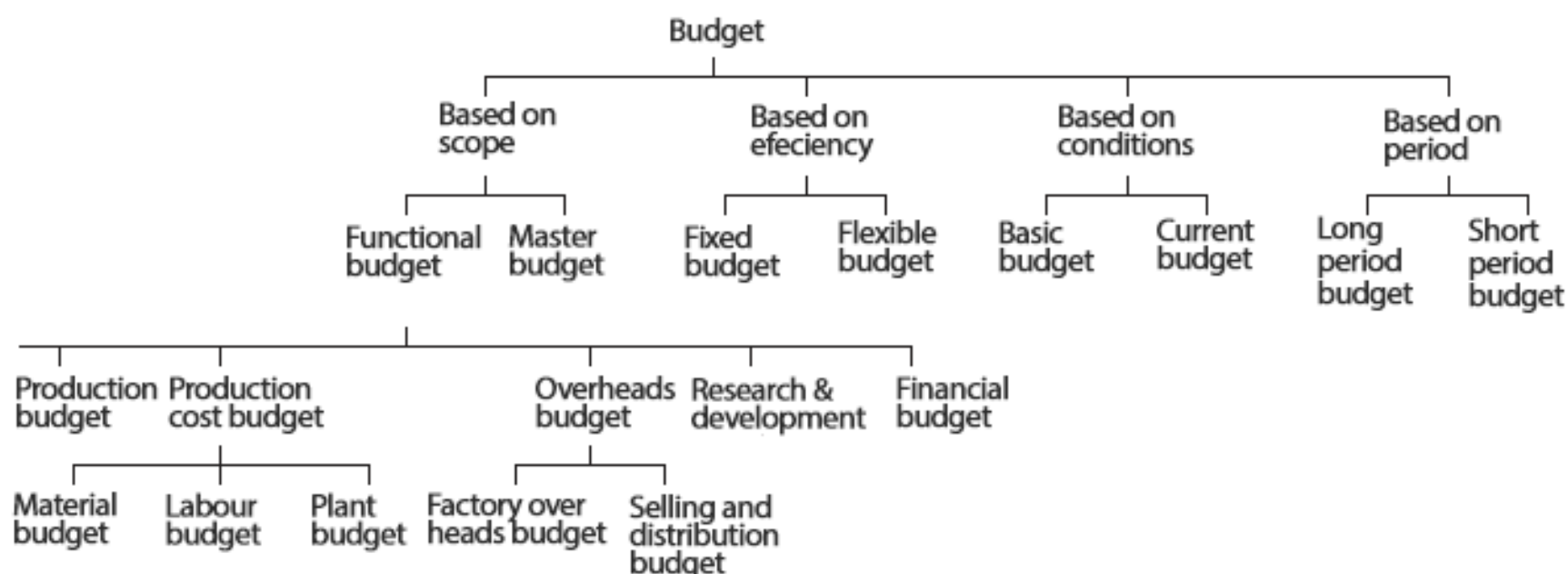
2

Submitted by

3

## 9. CLASSIFICATION OF BUDGETS

Depending upon the various bases adopted, budgets may be classified into different categories. Budgets may be classified on the basis of i. The coverage or scope they encompass ii. The capacity or efficiency to which they are related iii. The conditions on which they are based and iv. The periods which they cover. This is clearly shown with the help of the following diagram:



**Functional and Master Budgets:** Budgets for a period are really classified according to the various activities in the organisation. All activities are interrelated. The forecasts for individual activities are prepared and co-ordinated with those of other activities and then consolidated to show the total effect of all the activities as a whole. Approved targets for individual functions are known as "functional budgets". The consolidation of all functional budgets is known as the "Master Budget". This is nothing but the targeted profit and loss statement and balance sheet of the organisation.

**Principal functional budgets are:**

- (1) **Sales Budget:** The sales budget is a forecast of total sales, expressed in terms of money and quantity. The first step in the preparation of the sales budget period. Sales forecasts are influenced by a variety of factors, external as well as internal. External factors include general business conditions, Government policy, etc. The sales-budget is based on sales forecasting which is the responsibilities of the sales manager and market research staff. The sales budget is regarded as the keystone of budgeting.
- (2) **Production Budget:** The production budget is a forecast of the production for budget period. It is prepared in two parts, viz. production value budget for the physical units of the products to be manufactured and the cost of



manufacturing budget detailing the budgeted costs. The main steps involving in the preparation of a production budget are production planning; consideration of capacity; integration with sales forecasts, inventory-policies, management overall policies. The operation of a production budget results in various advantages, main being: optimum utilisation of productive resources of the enterprise, production of goods according to schedule enabling the concern to adhere to delivery dates, proper dates, proper scheduling of factors of production.

- (3) **Materials Budget:** Materials requirement budget, commonly known as materials budget, assist the purchase department in suitably planning the purchases. Fixing the maximum levels of materials, components etc. The timing and amount of funds which will be needed to make purchases are also known with the help of the materials budget.
- (4) **Direct Labour Budget:** The labour content of each item of production as per the production budget is determined in items of grades of the workers required and the labour time for each job, operation and process. The rates of pay, allowances, bonus, etc. of each category are then considered and labour cost to be set for each budget center is calculated by multiplying the wage rate with the labour hours for the number of units of products budgeted.
- (5) **Manufacturing Overhead Budget:** The following steps are required to be taken up to prepare the manufacturing overhead budget:
  - i. Classification of expenditure into fixed, variable and semi-variable and collection thereof in accordance with a schedule of standing order numbers;
  - ii. Departmentalisation of expenditure;
  - iii. Determining the level of activity for setting the overhead rates; and level of activity may be actual, budgeted level or normal capacity; and
  - iv. Establishing the variable overhead rates per unit of production or productive hour.
- (6) **Administration Cost Budget:** The administrative expenses include items of expenditure relating to higher management function as well as expenses of the legal, financial, accounting and other services departments. Since most of the items of administration overhead are of a fixed nature, there is not much difficulty in establishing budgets for these items. The budgeted expenses are

determined on the basis of amounts spent in previous years and the minimum requirements for the efficient operation of each department.

- (7) **Selling Expenses Budget:** The selling expenses include all items of expenditure on the promotion, maintenance and distribution of finished products. This budget which is closely related to the sales budget is the forecast of the cost of selling and distribution, for the budgeted period. Selling and distribution expenses may be fixed or variable with regard to the volume of sales; separate budgets are usually established for fixed or variable selling and distribution expenses.
- (8) **Research and Development Budget:** This depends mostly on management decisions regarding the research and development effort-the projects already in hand and the proposed projects.
- (9) **Cash Budget:** Cash forecast precedes a cash budget. A cash forecast is an estimate showing the amount of cash which would be available in a future period. This budget is usually of two parts giving detailed estimates of i. Cash receipts and ii. Cash disbursements. Estimates of cash-receipts are prepared on a monthly basis and depend upon estimated cash-sales, collection from debtors and anticipated receipts from other sources such as sale assets, borrowing etc. Estimate of cash disbursements are based on estimated cash purchases, payment to creditors, employees remuneration, bonus, advances to suppliers, budgeted capital expenditure for expansion etc.

The main objectives of preparing cash budget are as follows:

- i. The probable cash position as a result of planned operation is indicated and thus the excess or shortage of cash is known. This helps in arranging short term borrowings in advance to meet the situations of shortage of cash or making investments in items of cash in excess.
- ii. Cash can be co-ordinated in relation to total working capital, sales investment and debt.
- iii. A sound basis for credit for current control of cash position is established.
- iv. The effect of sudden and seasonal requirements, large stocks, delay in collection of receipts etc. on the cash position of the organisation is revealed.

A cash budget can be prepared by any of the following methods:

- i. Receipts and payments method



ii. Adjusted profit and loss account method

iii. Balance and method

**Receipts and Payments Method:** In this method the cash receipts from various sources and cash payments to various agencies are estimated. Delay in cash receipts and lag in payments are taken into account for making estimates. Since this method is based on the concept of cash accounting, accruals and adjustments obviously cannot find place in the preparation of cash budgets. The opening balance of cash of a period and the estimated cash receipts are added and from this, the total of estimated cash payments are deducted to find out the closing balance.

### **Master budget:**

Master budget is consolidated summary of the various functional budgets. A master budget is the summary budget incorporating its component functional budget and which is finally approved, adopted and employed. It is the culmination of the preparation of all other budgets like the sales budget, production budget, purchase budget etc. It consists in reality of the budgeted profit and loss account, the balance sheet and the budgeted funds flow statement.

The master budget is prepared by the budget committee on the basis of co-ordinated functional budgets and becomes the target of the company during the budget period when it is finally approved. This budget acts as the company's individualised key to successful financial planning and control. It provides the basis of computing the effect of any changes in any phase of operations, such as sales volume, product mix, prices, labour costs, material costs or change in facilities. It segregates income, costs and profits by areas of responsibility. Master budget presents all this information to the depth appropriate for the top management action.

In the master budget, costs are classified and summarised by types of expenses as well as by departments. This information extends the range of usefulness of master budget. It is considered as the best mode of undertaking the company's micro-economic position relating to the forthcoming budget period. Master Budget is not merely a compendium of theoretical calculations. The figures that it contains, are the reflection of the actual intentions of the company relating to different areas for the forthcoming budget period.

**Fixed Budget:** A budget may be established either as a fixed budget or a flexible budget. A fixed budget is a budget designed to remain unchanged irrespective of the level of activity actually attained. A fixed budget is one which is designed for a

specific planned output level and is not adjusted to the level of activity attained at the time of comparison between the budgeted and actual costs. Obviously, fixed budgets can be established only for a small period time when the actual output is not anticipated to differ much from the budgeted. However, a fixed budget is liable to revision if due to business conditions undergoing a basic change or due to other reasons, actual operations differ widely from those planned in the fixed budget. These budgets are most suited for fixed expenses but they have only a limited application and is ineffective as a tool for cost control.

**Flexible Budgets:** The Chartered Institute of Management Accountants, London defines flexible budget as a budget which recognising different cost behaviour patterns, is designed to change as volume of output changes. It is a budget prepared in a manner so as to give the budgeted cost for any level of activity. It is a budget which by recognising the difference between fixed, semi-fixed and variable cost is designed to change in relation to the activity attained. It is designed to furnish budgeted cost at any level of activity attained.

Flexible budgeting is desirable in the following cases:

- i. Where the level of activity during the year varies from period to period. Either due to the seasonal nature of the industry or to variation in demand.
- ii. Where the business is a new one and is difficult to foresee the demand.
- iii. Where the undertaking is suffering from shortage of a factor of production such as materials, labour, plant capacity, etc.

The main characteristic of flexible budget is that it shows the expenditure appropriate to various levels of output. If the volume changes the expenditure appropriate to it can be established from the flexible budget for comparison with actual expenditure as a means of control. It provides a logical comparison of budget allowances with actual cost. When flexible budget is prepared, actual cost at actual activity is compared with budgeted cost at actual activity i.e. two things to a like base. For preparation of flexible budget, items of cost have to be analysed individually to determine how different items of cost behave to change in volume. Therefore, in-depth cost analysis and cost identification is required for preparation of flexible budget. Following are the striking features of flexible budgets:

- i. They are prepared for a range of activity instead of a single level.
- ii. They provide a very dynamic basis for comparison because they are automatically geared to changes in volume.

- iii. They provide a tailor-made budget for a particular volume.
- iv. These are based upon adequate knowledge of cost behaviour pattern.

Flexible budgets may be prepared in the following method:

- i. Tabular method or multi-activity method.
- ii. Formula method or ratio method and
- iii. Graphic method.

**Basic budgets:** Basic budget has been defined as a budget which is prepared for uses unaltered over a long period of time. This does not take into consideration current conditions and can be attainable under standard conditions.

**Current budgets:** A current budget can be defined as a budget which is related to the current conditions and is prepared for use over a short period of time. This budget is more useful than basic budget, as the target it lays down will be corrected to current conditions.

**Long-term budgets:** A long-term budget can be defined as a budget which is prepared for periods longer than a year. These budgets help in business forecasting and forward planning. Capital expenditure are just examples of long-term budgets.

**Short-term budgets:** This budget is defined as a budget which is prepared for a period than a year and is very useful to lower levels of management for control purposes. In an ideal situation a short-term budget should perfectly fit into a long-term budget.

## **10. CONTROL RATIOS**

These important ratios are commonly used by the management to find out whether the deviations of actuals from budgeted results are favourable or otherwise. These ratios are expressed in percentage. These ratios are the following:

(i) Activity ratio: It is a measure of the level of activity attained over a period. It is calculated as follows:

$$\text{Activity ratio} = \frac{\text{Standard hours for actual production}}{\text{Budgeted hours}} \times 100$$

(ii) Capacity ratio : This ratio indicates whether and to what extent budgeted hours of activity are actually utilised.

$$\text{Capacity ratio} = \frac{\text{Actual hours worked}}{\text{Budgeted hours}} \times 100$$

(iii) Efficiency ratio : This ratio indicates the degree of efficiency attained in production.

$$\text{Efficiency ratio} = \frac{\text{Standard hours for actual production}}{\text{Actual hours worked}} \times 100$$

## **11. ZERO BASE BUDGETING**

Zero base budgeting is a revolutionary concept of planning the future activities and there is a sharp contradiction from conventional budgeting. Zero base budgeting, may be better termed as "De nova budgeting" or budgeting from the beginning without any reference to any base-past budgets and actual happening. Zero base budgeting may be defined as "a planning and budgeting process which requires each manager to justify his entire budget request in detail from scratch (hence zero base) and shifts the burden of proof to each manager to justify why should spend any money at all. The approach requires that all activities be analysed in decision packages which are evaluated by systematic analysis and ranked in order of importance". CIMA defines zero base budgeting as " a method of budgeting whereby all activities are re-evaluated each time a budget is set. Discrete levels of each activity are valued and a combination chosen to match funds available".

## BUDGETARY CONTROL

It is technique which complements and links the existing planning, budgeting and processes. It identifies alternative and efficient alternative and efficient methods of utilising limited resources in effective attainment of selected benefits. It is a flexible management approach which provides a credible rational for reallocating resources by focusing on systematic review and justification of the funding and performance levels of current programmes of activities.

The concept of zero base budgeting was developed in U.S.A. Under zero-base budgeting, each programme and each of its constitute part is challenged for its vary inclusion in each years budget. Programme objectives are also re-examined with a view to start things afresh review analysis and evaluation of each programme in order to justify its inclusion or exclusion from final budget.

Following steps are usually involved:

- i. Describing and analysing all current or proposed programme usually called "decision packages". This consist of identification, analysis and formulation assists an evaluation in terms of purpose, consequence, performance measures, alternatives and causes and benefits. Decision units are the lowest level programmes or organisational entity for which budgets are prepared.
- ii. Ranking of decision packages along with documents in support of these packages.
- iii. The sources are allocated in accordance with the ranking.

Zero-base budgeting is based on the premise that every rupee of expenditure requires justification. The traditional budgeting approach includes expenditures of previous year which are automatically incorporated in new budget proposals and only increments are subjected to debate. Zero base budgeting assumes that a responsibility center manager has had no previous expenditure. Important features of zero-base budgeting are:

- i. Concentration of efforts is not simply on " how much" a unit will spend but "why" it needs to spend.
- ii. Choices are made on the basis of what each unit can offer for a specific cost.
- iii. Individual units objects are linked to corporate targets.
- iv. Quick budget adjustment can be made if, during the operating year costs are required to maintain expenditure level.
- v. Alternative ways are considered.



vi. Participation of all levels in decision-making.

Following are the point of difference between traditional budgeting and zero base budgeting:

- i. Traditional budgeting is accounting-oriented. Main stress happens to be on previous level of expenditure. Zero base budgeting makes a decision oriented approach.
- ii. In traditional budgeting, first reference is made to past level of spending and then demand is made for inflation and new programmes. In zero base budgeting a decision unit is broken into understandable decision packages which are ranked according to importance to enable top management to focus attention only on decision packages which enjoy priority to others.
- iii. In traditional budgeting, some managers deliberately inflate their budget request so that after the cuts they still get they want. In zero base budgeting, a rational analysis of budget proposal is attempted.
- iv. Traditional budgeting is not as clear and responsive as zero base budgeting.
- v. In traditional budgeting, it is for top management to decide why a particular amount should be spent on a particular decision unit. In zero base budgeting this responsibility is shifted from top management to the manager of decision unit.
- vi. Traditional budgeting makes a routing approach while zero base budgeting makes a very straight-forward approach and immediately spotlights the decisions packages enjoying priority over others.

### **Advantages of zero base budgeting:**

- i. Zero base budgeting is not based on incremental approach, so it promotes operational efficiency because it require managers to review and justify their activities or the fund requested.
- ii. Since this system requires participation of all managers, preparation of budgets, responsibility of all levels at management in successful execution of budgetary system can be ensured.
- iii. This technique is relatively elastic because budgets are prepared every year on a zero base. This system makes it obligatory to develop financial planning and management information system.



- iv. This system weeds out inefficiency and reduces the cost of production because every budget proposal is evaluated on the basis of cost benefit analysis.
- v. It provides the organisation with a systematic way to evaluate different operations and programmes undertaken by the management. It enables management to allocate resources according to priority of the programmes.
- vi. It is helpful to the management in making optimum allocation of scarce resources because a unique aspect of zero base budgeting is the evaluation of both current and proposed expenditure and placing it some order of priority.

### **Criticism against zero base budgeting:**

- i. Defining the decision units and decision packages is rather than difficult.
- ii. Zero base budgeting has been referred to as very threatening process in which manager have to justify their budget request in complete details taking nothing for granted.
- iii. Zero base budgeting requires a lot of training for managers. It has to be impressed upon managers that zero base budgeting gives them an opportunity to be heard by top management and therefore, they should use their innovation and efforts to maximum limits.

## **12. PERFORMANCE BUDGETING**

The concept of performance budgeting relates to greater management efficiency specially in government work. With a view to introducing a system's approach, the concept of performance budgeting was developed and as such there was a shift from financial classification to 'cost' or 'objective' classification. Performance budgeting, is therefore, looked upon as a budget based on functions, activities and projects and is linked to the budgetary system based on objective classification of expenditure.

According to National Institute of Bank Management, Bombay, performance budgeting technique is, the process of analysing identifying, simplifying and crystallising specific performance objectives of a job to be achieved over a period in the frame work of the organisational objectives, the purpose and objectives of a job. The technique is characterised by its specific direction towards the business objectives of the organisation. Thus, performance budgeting lays immediate stress on the achievement of specific goals in a period of time. It

requires preparation of periodic performance reports. Such reports compare budget and actual data and show any existing variances.

The purpose of performance budgeting is to focus attention upon the work to be done, services to be rendered rather than things to be spent for or acquired. In performance budgeting, emphasis is shifted from control of inputs to efficient and economic management of functions and objectives. Performance budgeting takes a system view of activities by trying to associate the inputs of the expenditure the input of the expenditure with the output of accomplishment in terms of services, benefits etc. In performance budgeting, the objectives of the budget makers and setting the task and sub-task for accomplishment of the defined objectives are to be clearly decided well in advance before budgetary allocations of inputs are made. Each homogeneous function is broken down into a number of subordinate functions.

The main purposes of performance budgeting are:

1. To review at every stage, and at every level of the organisation, so as to measure progress towards the short-term and long-term objectives.
2. To inter-relate physical and financial aspects of every programme, project or activity.
3. To facilitate more effective performance audit.
4. To assess the effects of the decision-making of supervisor to the middle and topmanagers.
5. To bring annual plans and budgets in line with the short and long-term plan objectives.
6. To present a comprehensive operational document showing the complete planning fabric of the programmes and prospect as their objectives interwoven with the financial and physical aspects.

A performance budget presents estimate for expenditure and earnings in terms of functions, programmes, activities and projects. For introducing performance budgeting financial requirement are put up in relation to:

- (a) Programmes and outlay indicating the range of work to be done by each categorised agency.
- (b) Object-wise classification showing objects of expenditure, e.g. office establishment, etc. is usually shown in the conventional budgets.

(c) Sources of financing.

However, performance budgeting has certain limitations such as difficulty in classifying programmes and activities, problems of evaluation of various schemes, relegation to the background of important programmes. Moreover, the technique enables only quantitative evaluation scheme and sometimes the needed results cannot be measured.

### **13. RESPONSIBILITY ACCOUNTING**

Eric. L. Kohler defines Responsibility Accounting as-

"A method of accounting in which costs are identified with persons assigned to their control rather than with products or functions is known as responsibility accounting."

Responsibility accounting is a system of management accounting under which accountability is established according to the responsibility delegated to various levels of management and management information and reporting system instituted to give adequate feed-back in items of the delegated responsibility. Under this system division of units of an organisation under specified authority in a person are developed as a responsibility center and evaluated individually for their performance. A good system of transfer pricing is essential to establish at the performance and results of each responsibility center. Responsibility accounting is thus used as a control technique.

Responsibility accounting is a method of accounting in which costs and revenues are identified with persons assigned to their control rather than with products or functions. It classifies costs and revenues according to the responsibility centers that are responsible for incurring the cost of generating the revenues. Responsibility accounting also classifies the cost assigned to each responsibility center according to whether they are controllable or non-controllable. Controllable costs are classified by items. The aim is to show up the results of operation by each section or division having control over resources and their use.

Briefly speaking, responsibility accounting requires that costs be classified.

- i. By the responsibility centers;
- ii. Within each responsibility center whether controllable or non-controllable; and

iii. Within the controllable classification by cost elements, in sufficient detail to provide useful basis for analysis.

Responsibility accounting is specially designed according to the organisation structure and no tailor made systems could be recommended for an individual firm; it is distribution of responsibility and authority amongst its managers that will decide the system to be introduced. One of the difficult tasks is the assignment of responsibility for each activity and for each corresponding item of expense, income, capital expenditure and asset investment. In establishing a responsibility accounting system, the management should decide on certain guidelines for assigning costs to individuals costs to individuals for reporting. The American Accounting Association has recommended the following:

- (a) If the person has authority over both acquisition and the use of the service, he should be charged with the cost of such services.
- (b) If the person significantly influence the amount of cost through his own action, he may be charged with such costs.
- (c) Even if the person cannot significantly influence the amount of cost through his own direct action, he may be charged with those elements with which the management desires him to be concerned, so that he will help to influence those who are responsible.

Under the conventional systems of cost accounting, overheads accumulated are allocated to different 'cost center' for the purpose. A cost center, as we know is the organisation unit in which the individual in charge administers his activities directly. Obviously this definition of cost centers seems necessary from the point of view of cost-control and to determine responsibility. Cost allocation at best is loaded with assumption and in many cases highly arbitrary methods of apportionment are employed in practice.

Product is not an appropriate unit for cost control. Through this system an individual in charge of a 'cost center' is burdened by a large number of overheads over which he has little control. Hence, a system of responsibility accounting is recommended whereby the persons controlling or initiating a particular cost should be held responsible for it.

The problem becomes particular acute in the allocation of service department costs, especially where responsibilities overlap. This problem can be circumvented by the use of standard costs.

Responsibility accounting follows the basic principles as for any system of cost control like budgets and standard costs, with the difference that it has a bias towards fixation of responsibility on individuals, departments or machines.

The principles are as follows:

- i. A plan of objectives is set up in terms of a target, budget, standard or estimate. The plan is broken up for allocation of each responsibility area or center and is communicated to the concerned level of management.
- ii. The performance is evaluated i.e. the results of actual operation by each responsibility are ascertained.
- iii. The variances from the plan are analysed as to fix responsibility area or center. The variances are reported to higher management.
- iv. Corrective action is taken and communicated to the individual responsible.

The main requirement of a system of responsibility accounting is that the organisation should be such that the responsibility of each individual may be clearly defined. Each executive should know that he is required to do and what performance is expected from him with regard to the cost which is controllable by him. The system of accounting and reporting is fitted into the various responsibility areas so that the performance of each area is evaluated and reported for improvement. Thus, responsibility accounting lays stress on planning and cost control rather than cost ascertainment and its advantages lies in the prompt reporting of performance of executives at various levels of management.

## **14. SOCIAL REPORTING**

The concept of social reporting is gaining popularity in recent times. Society is becoming increasingly conscious about the cost benefits of corporate activity and expect corporations to take care of the interest of society as a whole and of the varied group of people comprising society. Social reporting is becoming essential on account of the following:

- i. Increasing awareness of society about the corporate social contribution.
- ii. Providing means of identifying and rewarding business for social contribution.
- iii. Identifying adverse effects on the environment.
- iv. Improving credibility and reputation of business.



v. Transferring cost of social activities to other segments of society.

While designing the contents to be included in social reporting it should be taken care of to see that it does not conflict with the shareholders interest. The objectives of social reporting are:

- i. To identify and measure the net social contribution of an individual firm which includes not only the costs and benefits of a firm internally but also those arising from external factors affecting the different segments of the society.
- ii. To determine whether the individual forms strategies and practices are consistent with widely shared social principles. For example, discrimination on the basis of caste, creed or sex will not be permitted.
- iii. To make available in optimal manner relevant information about the firms goals, policies, programmes, performances, use of and contribution to scarce resources etc. for example, Indian Companies have to disclose their use and earnings of foreign exchange. Relevant information is that which provides for public accountability and also facilitates public decision making regarding capital choices and social resources allocation.

Social reporting format tends to vary from one company to another company usually information regarding the following may be provided, about the product or service as regards the following may be provided, about the product or service as regards its safety and other effects, employees environment, etc.

Social reporting is being included in the Annual Reports either as a special section in the Chairman's address, or as a part in the Director's Report.

**SOLVED PROBLEMS**

**PROBLEM 1; XYZ Ltd.** manufactures a single product P with a single grade of labour. The sales budget and finished goods stock budget for the 1st quarter ending 30.6.19X4 are as follows-

Sales	1400 units
Opening finished goods	100 units
Closing finished goods	140 units

The goods are imported only when production work is completed, and it is budgeted that 1-% of finished work will be scrapped

The standard direct labour content of the product P is 3 hours. The budgeted productivity ratio for direct labour is only 80%.

The company employs 36 direct operatives, who are expected to average 144 working hours each in the 1st quarter.

**You are required to prepare-**

- (a) production budget
- (b) direct labour budget and
- (c) comment on the problem that your direct labour budget reveals and suggest how this problem might be overcome.

**BUDGETARY CONTROL, LEARNING CURVE AND RESPONSIBILITY****ACCOUNTING**

14.43

**Solution:**

(a) Production budget:	Units
Sales	1,400
Add: Closing stock	140
	1,540
Less: Opening stock	100
Production of "good output"	1,400
Wastage (10% of total production assumed)	160
Total production required	1,600

## BUDGETARY CONTROL

(b) Direct labour budget:

Total standard hrs. reqd. (1600 units x 3)	4,800 hrs.
Productivity ratio	0.8 or 80%
(i) Actual hours reqd. (4800/0.8) or	6,000 hrs.
(ii) Budgeted hrs. available (36 men x 144 hrs.)	5.184 hrs.
Hence, short fall	816 hrs.

(c) The direct labour budget indicates that there will not be enough direct labour hours to meet production required. This problem may be solved by working hours, reducing closing stock, improving efficiency or reducing wastage.

**Problem 2:** Star Ltd. has specialised in the manufacture of three kinds of sub-assemblies required by the manufacturers of certain equipments. The current pattern of sales of subassemblies is in the ratio of 1:2:4 for sub-assemblies P, Q, R respectively.

The sub-assemblies consist of the following components:

Sub-assembly	Selling price				
	Rs.	Frame	Part X	Part Y	Part Z
P	430	1	10	2	8
Q	500	1	2	14	10
R	600	1	6	10	2
Purchase price (Rs.)		40	16	10	6

The direct labour hours required for the manufacture of each of the sub-assemblies are:

Sub-assemblies	Skilled hours	Un-skilled hours
P	4	4
Q	3	4
R	3	6
Wastage rate per hour (Rs.)	6	5

The labourers work for 8 hours a day for 2 days a month.

Variable overheads per sub-assembly are- P Rs. 10, Q Rs. 8, R Rs. 7.

## BUDGETARY CONTROL

The estimate of opening stocks of subassemblies and components for the month of July 19X2 are as under

Sub-assemblies		Components	
P	600	Frames	2,000
Q	1,400	Part X	800
R	3,200	Part Y	20,000
		Part Z	8,000

### 14.44 COST ACCOUNTING METHODS AND PROBLEMS

Fixed overheads budget per month is as under: -

	Rs.
Production	15,80,000
Selling and distribution	7,28,000
Administration	6,76,000

All fixed overheads are incurred evenly throughout the year.

The target of profit for the current year is Rs. 120 lakhs before tax. The company has plan to reduce The closing of sub-assemblies and compared to the opening stock.

Required:

- (i) Sales (in quantities) budgets for July 1992;
- (ii) Production in quantities;
- (iii) Material usage;
- (iv) Material purchase in quantities and value
- (v) Manpower budget for both categories of labour including wages payable.

**Solution: Profit desired-**

The target profit for the year (given) = Rs. 1,20,00,000/ 12 or Rs. 10,00,000 p.m.

## BUDGETARY CONTROL

						P	Q	R
Unit selling price						Rs. 430	Rs. 500	Rs.600
Unit costs								
						P	Q	R
						Price		
Materials						No.	No.	No.
						Rs.		
Frame						40	40	40
Parts:	X	10	2	6	16	160	32	96
	Y	2	14	10	10	20	140	100
	Z	8	10	2	6	48	60	12
Labour						Hrs.	Hrs.	Hrs.
						Rate (Rs.)		
	X	4	3	3	6	24	18	18
	Y	4	4	6	5	20	20	30
V. overhead						<u>10</u>	<u>8</u>	<u>7</u>
Total V. cost						<u>322</u>	<u>318</u>	<u>303</u>
Contribution						108	182	297
Sales mix						1	2	4
Contribution of weighted sales mix						108	364	1,188
						<u>1,660</u>		

	Rs.
Contribution required per month	15,80,000
Fixed overheads	7,28,000
Selling and distribution	6,76,000
Administration	10,00,000
Profit	39,84,000

Number of mixes required to be produced  $39,84,000/1,600=2,490$



**BUDGETARY CONTROL, LEARNING CURVE AND RESPONSIBILITY****ACCOUNTING****14.45****(i) Sales budget**

	P	Q	R	
Sales mix 1 2 3				
No. of units from 2,400 mixes	2,400	4,800	9,600	
Selling price (Rs.)	430	500	600	
Sales value (Rs.)	10,32,000	24,00,000	57,60,000	91,92,000

**Production budget**

Sales quantity	2,400	4,800	9,600	
Add: Closing stock				
(10% less than opening stock)	540	1,260	2,880	
	2,940	6,060	12,480	
Less: Opening stock	600	1,400	3,200	
Production	2,340	4,660	9,280	

**Material usage budget**

	P	Q	R	Total
Production	2,340	4,660	9,280	
	P	Q	R	
Frame parts 1 1 1	2,340	4,660	9,280	16,280
X 10 2 6	23,400	9,320	55,680	88,400
Y 2 14 10	4,680	65,240	92,800	1,67,720
Z 8 10 2	18,720	46,600	18,560	83,880

## BUDGETARY CONTROL

### Purchase budget

	Frame	Parts		
		X	Y	Z
Material usage budget	16,280	88,400	1,62,720	83,880
Add: Closing stock (10% less than opening stock)	1,800	720	18,000	7,200
Total	18,080	89,120	1,80,720	91,080
Less: Opening stock	2,000	800	20,000	8,000
	16,080	88,320	1,60,720	83,080
Purchase price	Rs. 40	Rs. 16	Rs. 10	Rs.6
Purchase value (Rs.)	6,43,200	14,13,120	16,07,200	4,98,480

41,62,000

### Manpower budget

	Skilled	Un-skilled	Production	Skilled	Un-skilled
P	4	4	2,340	9,360	9,360
Q	3	4	4,660	13,980	18,640
R	3	6	9,280	27,840	55,680
				51,180	83,080
Man-hours per month 8 x 25				200	200
No. of workers required per month				256	419
Wages rates per month/man				1,200	1,000
Wages budget				3,07,200	4,19,000

=7,26,200

## BUDGETARY CONTROL

Problem 3: Prepare a cash budget for the three months ending 30th June, 19x6 from information given below-

(a)	Month	Sales Rs.	Material Rs.	Wages Rs.	Overhead Rs.
	February	14,000	9,600	3,000	1,700
	March	15,000	9,000	3,000	1,900
	April	16,000	9,200	3,200	2,000
	May	17,000	10,000	3,600	2,000
	June	18,000	10,400	4,000	2,300

(b) Credit terms are:

--	--	--

Sales/Debtors - 10% of sales, 50% of the credit sales are col

credit

lected next month and the balance in the following month.

Creditors      -      materials      2 months  
                      -      wages            1/4 month  
                      -      overheads      1/2 month

(c) Cash and bank balance on 1st April, 19x6 is expected to be Rs. 6,000

(d) Other relevant information is:490

(i) Plant and machinery will be installed in February 19x6 at a cost of Rs. 96,000. The monthly instalment of Rs. 2,000 is payable from April onwards.

(ii) Dividend @ 5% on preference share capital of Rs. 2,00,000 will be paid on 1st June.

(iii) Advance to be received for sales of vehicles Rs.            9,000 in June.

(iv) Dividends from investments amounting to Rs.            1,000 are expected to be received in June.

(v) Income tax (advance) is to be paid in June.

## BUDGETARY CONTROL

### Solution:

#### Cash budget - April, May and June 19x6

Particulars	April Rs.	May Rs.	June Rs.	Total Rs.
A. Opening balance	6,000	3,950	3,000	6,000
B. Receipts	-	-	-	
Sales/debtors [notes (i)]	14,650	15,650	16,650	46,950
Dividend	-	-	1,000	1,000
Advance against sales of vehicle	-	-	9,000	9,000
Total	14,650	15,650	26,650	56,950
C. Payments -				
Creditors for material	9,600	9,000	9,200	27,800
Wages [notes (iii)]	3,150	3,500	3,900	10,550
Overheads	1,950	2,100	2,250	6,300
Capital expenditure	2,000	2,000	2,000	6,000
Dividend on preference shares			10,000	10,000
Income-tax advance	-	-	2,000	2,000
Total	16,700	16,600	29,350	62,650
D. Surplus/ (deficit) (B - C)	(2,050)	(950)	(2,700)	(5,700)
E. Closing balance (A - D)	3,950	3,000	300	300

## BUDGETARY CONTROL

(i)

Month	Calculation	Collection from sales/debtors		
		April	May	June
February	$(14,000 - 10\% \text{ of } 14,000) \times 50\%$	6,300	-	-
March	$(15,000 - 10\% \text{ of } 15,000) \times 50\%$	6,750	6,750	-
April	$(10\% \text{ of } 16,000)$	1,600	-	-
	$(16,000 - 10\% \text{ of } 16,000) \times 50\%$	-	7,200	7,200
May	$10\% \times 17,000$	-	1,700	-
	$(17,000 - 10\% \text{ of } 17,000) \times 50\%$	-	-	7,650
June	$(10\% \times 18,000)$	-	-	1,800
		<u>14,650</u>	<u>15,650</u>	<u>16,650</u>

(ii) Wages: 75% of the month + 25% of previous month.

(iii) Overheads: 50% of the month + 50% of previous month



**REFERENCE MATERIAL**

Click on the links below to view additional reference material for this chapter

**[Summary](#)**

**[PPT](#)**

**[MCQ](#)**

**[Video1](#)**

**[Video2](#)**

# 5

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

---

### 1. INTRODUCTION

The cost-volume-profit (CVP) analysis helps management in finding out the relationship of costs and revenues to profit. The aim of an undertaking is to earn profit. Profit depends upon a large number of factors, the most important of which are the cost of manufacture and the volume of sales effected. Both these factors are interdependent. Volume of sales depends upon the volume of production, which in turn is related to costs. Cost, again, is the resultant of the operation of a number of varying factors. Such factors affecting cost are:

- i. Volume of production;
- ii. Product mix;
- iii. Internal efficiency;
- iv. Methods of production; and
- v. Size of plant; etc.

Of all these, volume is perhaps the largest single factor which influences costs and which in turn can be divided into fixed costs and variable costs. Volume changes in a business are of frequent occurrence, often necessitated by outside factors over which management has no control and as costs do not always vary in production to changes in levels of output. Managerial control of the factors of volume presents a peculiar problem.

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

As profits are affected by the interplay of costs and volume, the management must have at its disposal analysis that can allow reasonably accurate presentation of the effect of a change in any of these factors which would have on profit performance. Cost-volume-profit analysis furnishes a picture of the profit at various levels of activity. This enables management to distinguish between the effect of sales volume fluctuation and the results of price or costs changes upon profits. This analysis helps in understanding the behaviour of profits in relation to output and sales.

There is a growing complexity of costs incurred by a company in its efforts to attain sales volume that can permit a satisfactory level of profits. An important segment of profit forecasting revolves around the determination of how costs change with output. This information can be presented in chart form after making the distinction between fixed and variable costs.

Fixed costs would be the same during any designated period regardless of the volume of output accomplished during the period (provided the output is within the present limits of capacity). These costs are prescribed by contract or are incurred in order to ensure the existence of an operating organisation. Their inflexibility is maintained within framework of a given combination of resources and within each capacity stage such costs remain fixed regardless of the changes in the volume of actual production. As fixed costs do not change with production, the amount per unit declines as output rises.

Absorption or full costing system seeks to allocate the fixed costs to products. It creates the problem of apportionment and allocation of such costs to various products by their very nature, the fixed costs have little relationship to the volume of production.

Variable costs are related to the activity itself. The amount per unit remains the same. These costs expand or contract as the activity rises or falls. Within a given time span, distinction has to be drawn between costs that are free of ups and downs of production and those that vary directly with these changes.

Study of behaviour of costs and C.V.P. relationship, needs proper definition of volume or activity.

Volume is usually expressed in terms of sales capacity expressed as a percentage of maximum sales.

Value of sales; unit of sales etc. production capacity is expressed as a percentage of maximum production.

Production in revenue or physical terms; direct labour hours or machine hours.

Analysis of costs-volume-profit involves consideration of the interplay of the following factors:

Volume of sales;

Selling price;

Product mix of sales;

Variable costs per unit; and

Total fixed costs.

The relationship between two or more of these factors may be (1) presented in the form of reports and statements, (2) shown in charts or graphs, or (3) established in the form of mathematical deduction.

## **2. OBJECTIVES OF COST -VOLUME-PROFIT ANALYSIS**

The objectives of costs-volume-profit analysis are given below:

- a) In order to forecast profit accurately, it is essential to know the relationships between profit and costs on the one hand and volume on the other.
- b) Costs-volume-profit analysis is useful in setting up flexible budgets which indicate costs at various levels of activity.
- c) Cost-volume-profit analysis is of assistance in performance evaluation for the purposes of control.
- d) For reviewing profit achieved and costs incurred the effects on costs changes in volume are required to be evaluated.
- e) Pricing plays an important part in stabilizing and fixing up volume.

Relationship may assist in formulating price policies to suit particular circumstances by projecting the effect which different price structures have on costs and profit.

As predetermined overhead rates are related to a selected volume of production, study of cost-volume relationship is necessary in order to know the amount of overhead costs which could be charged to product costs at various levels of operation.

### **3. PROFIT-VOLUME RATIO**

The ratio or percentage of contribution margin to sales is known as P/V ratio. This ratio is also known as marginal income ratio, contribution to sales ratio, or variable profit ratio. P/V ratio, usually expressed as a percentage, is the rate at which profit increases with the increases in volume. The formulae for P/V ratio are:

Sales - Variable cost = Contribution

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

Or

$\frac{\text{Sales value} - \text{Variable Cost}}{\text{Sales value}}$

Or

$\frac{\text{Fixed Cost} + \text{Profit}}{\text{Sales value}}$

Or

$\frac{\text{Changes in profits/Contributions}}{\text{Changes in sales}}$



A comparison for P/V ratios of different products can be made to find out which product is more profitable. Higher the P/V ratio, more will be the profit and lower the P/V ratio, lesser will be the Profit. P/V ratio can be improved by:

- i Increasing the selling price per unit.
- ii Reducing direct and variable costs by effectively utilising, men, machine and materials.
- iii Switching the production to more profitable products showing a higher P/V ratio.

### **4. BREAK-EVEN ANALYSIS**

Profit planning is based upon anticipated level of activity. In order to determine expected profit at different level of activities, revenue and cost figures for varying levels have to be projected, since at different level, use of 'flexible-budget' technique is associated with profit planning. Flexible budgeting requires the compartmentalisation of cost into "variable" and "fixed" to analyse the cost for various level. This categorisation of costs into "variable" and "fixed" elements and their relationship with sales and profits, has been developed as "break-even analysis". This break-even analysis is not only helpful in various managerial decisions, but it also plays a significant role in profit planning. If all costs and expenses can be classified as 'variable' or 'fixed' and if this classification can be carried into the costs of individual products or product lines, it is possible to determine with relative ease the effect on profit of changes in total volume or shifts in the volume from one product to another, and to answer many other questions that have a direct bearing on the planning of operations for maximum profits.

Break-even is the point where total revenue equal the total costs (variable and fixed). It is that level of activity at which an enterprise makes neither a loss nor any profit. At this point of level, the sales revenues are just equal to the costs incurred. Below this level the firm will make losses, while above this level it will be making profits. This is so because while the variable costs vary according to the variations in the volume or level of activity, the fixed costs do not change. Thus, below the break even point, fixed costs will eat up all excess of sales over variable cost and yet be unsatisfied, leaving a

loss. Above the BEP, excess of sales over variable costs (this excess is known as contribution) is much more than the fixed costs of the activities and, it, thus leads to profits. Thus, it is possible to analyse the effect of change in volume, prices and variable costs on the profits of an organisation, while taking fixed costs as unchangeable. This technique is also known as cost-volume-profit analysis or contribution approach and is remarkably significant in planning and analysing of profits.

### **5. METHODS FOR DETERMINING BREAK-EVEN POINTS**

The sales volume which equates total revenue with related costs and results in neither profit nor loss is called break-even point (BEP). Break-even point can be determined by the following methods:

#### **A. Algebraic methods:**

- (i) Contribution Margin Approach
- (ii) Equation Techniques

#### **B. Graphic Presentation:**

- (i) Break-even chart
- (ii) Profit Volume chart

#### **A. Algebraic methods:**

##### **(i) Contribution Margin Approach**

Break-even points (BEP) units = 
$$\frac{\text{Total fixed costs}}{(\text{Selling price per unit} - \text{Marginal cost per unit})}$$

OR

$$\frac{\text{Total fixed costs}}{\text{Contribution per unit}}$$

OR

Break-even point (Rs.) (BEP value) = 
$$\frac{\text{Fixed costs} \times \text{sales}}{\text{Sales} - \text{Marginal cost}}$$

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

OR

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}}$$

OR

Break-even points (units) x selling price per unit.

Sales - Fixed costs - Variable cost = Net Profit

Sales = Fixed costs + Variable cost + Net Profit

i.e.

$$\text{SP (S)} = \text{FC} + \text{VC (S)} + \text{P}$$

Where

SP = Selling Price per unit

S = Number of units required to be sold to break-even

FC = Total Fixed Costs

VC = Variable Cost per unit

P = Net Profit (Zero)

$$\text{SP (S)} = \text{FC} + \text{VC (S)} + \text{Zero}$$

$$\text{SP (S)} = \text{FC} + \text{VC (S)} + 0$$

$$\text{SP (S)} - \text{VC (S)} = \text{FC}$$

Or

$$S (\text{SP} - \text{VC}) = \text{FC}$$

$$S = \frac{\text{FC}}{\text{SP} - \text{VC}}$$

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

To calculate the level of sales required to earn a particular level of profit, the formula is:

$$\text{Required Sales} = \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P/V ratio}}$$

### Illustration-1

A product is sold at a price of Rs. 120 per unit and its variable cost is Rs. 80 per unit. The fixed expenses of the business are Rs. 8,000 per year. Find (i) BEP in Rs. and units.

(ii) Profits made when sales are 240 units, (iii) sales to be made to earn a net profit of Rs. 5,000 for the year.

### Solution:

	Selling prices per unit	Rs.
Less:	Variable cost	120
	Contribution per unit	<u>80</u>
		40

$$\text{P/V ratio} = \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P/V ratio}} = 33 \frac{1}{3}\%$$

(i) BEP in Rs. = $\frac{\text{FC}}{\text{P/V Ratio}}$	BEP in unit = $\frac{\text{FC}}{\text{Contribution per unit}}$
$= \frac{8,000 \times 3}{1}$	$= \frac{8,000}{40} = 200 \text{ unit}$
$= \text{Rs. } 24,000$	

(ii) Contribution per unit Rs. 40

Total contribution of 240 unit =  $40 \times 240 = \text{Rs. } 9,600$

Less: Fixed Cost per year 8,000

Profit Rs. 1,600

$$\text{(iii) Required Sales} = \frac{\text{FC} + \text{desired profit}}{\text{P/V ratio}}$$

$$= \frac{8,000 + 5,000}{1/3}$$

### (i) Break-even chart

According to the Chartered Institute of Management Accountants, London, the chart which shows profit or loss at various levels of activity, is known as breakeven chart. The level at which neither Profit nor loss is shown is termed as the break-even point. It is a graphic relationship between costs, volume and profit. It shows not only the BEP but also the effects of costs and revenue at Varying levels of sales. The break-even chart can therefore, be more appropriately called the Cost-volume-profit graph.

### Assumptions regarding Break-Even Charts

- (i) Costs are bifurcated into variable and fixed components.
- (ii) Fixed costs will remain constant and will not change with change in level of output.
- (iii) Variable cost per unit will remain constant during the relevant volume range of graph.
- (iv) Selling price will remain constant even though there may be competition or change in Volume of production.
- (v) The number of units produced and sold will be the same so that there is no opening or closing stock.
- (vi) There will be no change in operating efficiency.
- (vii) In case of multi-product companies, it is assumed that the sales mix remains constant.

A break-even chart can be presented in different forms.

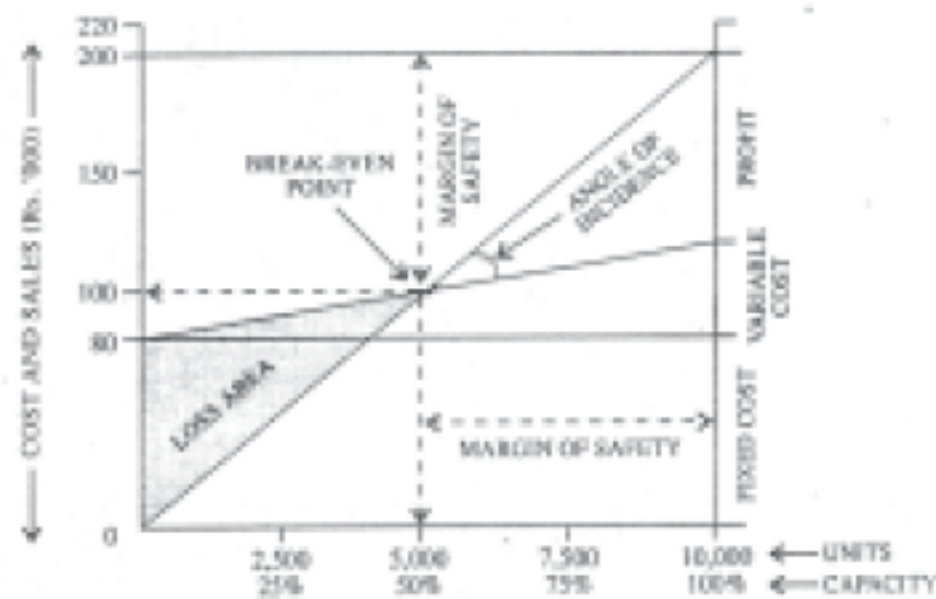
### First Method

On the X-axis of the graph is plotted the volume of productions or the quantities of sales and on the Y-axis (vertical line) costs and sales revenues are represented. The fixed costs line is drawn parallel to X-axis. The variable costs for different levels of activity are plotted over the fixed cost line, which shows that the cost is increasing with the increase in the volume of output. The variable cost line is joined to fixed cost line at zero Volume of production. This line regarded as the total cost line. Sales value at various Levels of output are plotted from the origin and joined is called the sales line.



## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

The sales of two lines is known as break-even point or line will cut the total cost line at a point where the total costs equals to total revenues and this point of intersection is the point of no profit no loss. The line produced from the inter-section to Y-axis and X- axis may give Sales value the number of units produced at break-even point respectively. Loss and Profit are as have been shown in the chart which shows that if production is less than the break-even point, business shall be running at a loss and if the production is more than the break-even level, there will be profit. The angle which the sales line makes with the total cost line while intersecting it at BEP is called angle of incidence. A large angle of incidence denotes a good profit position of a company.



### Illustration-2

From the following data, calculate the break-even point by means of a break-even chart.

Selling price per unit = Rs. 15

Variable cost per unit = Rs. 10

Total fixed cost = Rs. 1,50,000

### Solution:

For plotting the data, we need at least two points- one for plotting the total cost line and other for plotting the total sales line. Therefore, it will be necessary to presume different levels of output sales as below:

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

Output Units	Fixed costs (Rs.)	Variable cost (Rs.)	Total cost (Rs.)	Sales (Rs.)
0	1,50,000	-----	1,50,000	-----
10,000	1,50,000	1,00,000	2,50,000	1,50,000
20,000	1,50,000	2,00,000	3,50,000	3,00,000
30,000	1,50,000	3,00,000	4,50,000	4,50,000
40,000	1,50,000	4,00,000	5,50,000	6,00,000
50,000	1,50,000	5,00,000	6,50,000	7,50,000
60,000	1,50,000	6,00,000	7,50,000	9,00,000

### Second Method

This is a variation of the first method in which variable cost line is drawn first and thereafter drawing the fixed cost line above the variable cost line. The later line will be the total cost line. The sales line is drawn as usual. The added advantage of this method is that contributions at various levels of output are automatically depicted in the chart.

#### (I) Contribution break-even chart

The chart helps in ascertaining the amount of contribution at different levels of activity besides the break-even point. In this method, the fixed cost line is drawn parallel to the X-axis. The contribution line is then drawn from the origin which goes up with the increase in output. The sales line is plotted as usual, but the question of intersection of sales line with cost line does not arise. The contribution line crosses the fixed cost line and the point of intersection is treated as breakeven point. At this point, contribution is equal to fixed expenses, profit will arise and if the contribution is less than the fixed expenses, loss will arise.

#### (II) Profit-volume Graph

Profit volume graph is the graphical representation of the relationship between profit and volume, separate lines for costs and revenue are eliminated from the P/V graph as only profit points are plotted. It is based on the same information as is required for the traditional break-even chart and is characterised by the same limitation. The steps in the construction of profit volume graph are as follow:

- (I) Profit and fixed costs are represented on the vertical axis.

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

- (II) Sales are shown on the horizontal axis.
- (III) The sale line divided the graph into two parts both horizontally and vertically. The area at which fixed costs are represented on the vertical axis below the sale line and profits on the same axis above the sale line.
- (IV) Profits and fixed costs are plotted for corresponding sales volume and the points
- (V) are joined by a line which is the profit line.

### Illustration-3

**Y Ltd. Represents the following data**

	Rs.
Sales	4,00,000
Variable costs	2,40,000
Fixed costs	1,00,000
Net profit	60,000

From the above information, the following data can be calculated:

$$\text{P/V Ratio} = \frac{\text{Sales} - \text{Variable expenses}}{\text{Sales}} \times 100$$

$$= \frac{\text{Rs.}4,00,000 - 2,40,000}{4,00,000} \times 100$$

$$= \frac{1,00,000}{40} \times 100 = 40\%$$

$$\text{BEP} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}}$$

$$= \frac{1,00,000}{40} \times 100 = \text{Rs.}2,50,000$$

$$\begin{aligned}\text{Margin of safety} &= \frac{\text{Profit}}{\text{P/V ratio}} = \frac{60,000}{40\%} \\ &= \frac{60,000 \times 100}{40} = \text{Rs.1,50,000}\end{aligned}$$

## **6. MARGIN OF SAFETY**

Margin of safety is the difference between the actual sales and sales at break-even point. Sales beyond break-even volume brings in profits. Such sales represent a margin of safety. Margin of safety is calculated as follows:

Margin of safety = Total sales - Breakeven sales

Margin of safety can also be calculated with the help of P/V ratio i.e

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

Margin of safety can also be expressed as percentage of sales

$$\text{i.e.} \quad \frac{\text{Margin of safety} \times 100}{\text{Total sales}}$$

It is important that there should be reasonable margin of safety, otherwise, a reduced level of activity may prove disastrous. The soundness of business is gauged by the size of the margin of safety. A low margin of safety usually indicates high fixed overheads so that profits are not made until there is a high level of activity to absorb fixed costs.

A high margin of safety shows that break-even point is much below the actual sales, so that even if there is a fall in sales, there will still be a point. A low margin of safety is accompanied by high fixed costs, so action is called for reducing the fixed costs or increasing sales volume.

The margin of safety may be improved by taking the following steps:

- (i) Lowering fixed costs.
- (ii) Lowering variable costs so as to improve marginal contribution.
- (iii) Increasing volume of sales, if there is unused capacity.

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

- (iv) Increasing the selling price, if market conditions permit, and
- (v) Changing the product mix as to improve contribution.

### Illustration - 4

From the following figures ascertain the break-even sales and also show the computation by means of a graph.

Sales	20,00,000
Fixed costs	5,00,000
Variable costs	12,00,000

Solution:

		Rs.
Total Contribution:	Sales	20,00,000
	Variable Costs	<u>12,00,000</u>
	Contribution	<u>8,00,000</u>

As percent of sales or P/V ratio  $\frac{\text{Rs. 8,00,000}}{\text{Rs. 20,00,000}} \times 100 = 40\%$

Alternatively:  $\frac{\text{Fixed Costs} + \text{Profits}}{\text{Sales}} \times 100$

$$\frac{\text{Rs. 5,00,000} + \text{Rs. 3,00,000}}{\text{Rs. 20,00,000}} \times 100 = 40\%$$

Break-even Sales.

$$\frac{\text{Fixed Costs i.e. Rs. 5,00,000}}{\text{P/V Ratio 40}} \times 100 = \text{Rs. 12,50,000}$$

Proof: Variable Costs	60% of Rs. 12,50,000	7,50,000
	Fixed costs	<u>5,00,000</u>
	Total costs	<u>12,50,000</u>

Total costs equal sales; hence there is neither profit nor loss.

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

### BREAK-EVEN CHART

Points plotted:

Sales	Variable costs	Fixed costs	Total cost
Rs.	Rs.(60% of Sales)	Rs.	Rs.
0	0	5,00,000	5,00,000(C2)
15,00,000	9,00,000	5,00,000	14,00,000(C2)

### Illustration - 5

	Rs.
The sales of a company are @ Rs.200 per units	20,00,000
Variable cost	12,00,000
Fixed cost	6,00,000
The capacity of the factory	15,000 units

Determine the BEP. How much profit is the company making?

Solution: Contribution per unit:	Rs.
Selling price per unit	200
Variable cost per unit	120*
Contribution per unit	80
Fixed expense:	Rs. 6,00,000
Break-even point	<u>Rs. 6,00,000</u> = 7,500 units

Rs. 80

(\*total number of units is 10,000 since sale at Rs.200 per unit is Rs. 20,00,000; Rs. 12,00,000 + 10,000 = Rs. 120)

Profit being earned:	
Annual sales (units)	10,000
BEP(units)	<u>7,500</u>
Sales above BEP(Margin of Safety)	<u>2,500</u>
Contribution at Rs. 80 per unit (Profit)	<u>2,00,000</u>
Proof: variable cost	12,00,000
Fixed cost	<u>6,00,000</u>
Total	18,00,000
Profit (balancing figure)	<u>2,00,000</u>
Sales	<u>20,00,000</u>



## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

At break-even point, the contribution is just equal to fixed costs. Any sales above the BEP also provide the contribution. But as fixed costs are all met already such contribution become completely profit. The sales above BEP are known as margin of safety. The contribution from margin of safety sales is profit. As PV ratio is Contribution ÷ 100 and as Contribution ÷ 100 and as profit is the contribution from these sales above BEP (i.e., Sales Margin of safety), the following formula also is true:

$$\frac{\text{Profit}}{\text{Margin of safety}} \times 100 = \text{P/V ratio}$$

Thus, in the above illustration margin of safety sales = 2,500 units x Rs.200 = 5,00,000

Profit = Rs.2,00,000

$$\text{P/V Ratio} = \frac{\text{Profit}}{\text{Margin of safety}} \times 100 = \frac{\text{Rs.2,00,000}}{\text{Rs.5,00,000}} \times 100 = 40\%$$

This is true otherwise also i.e.  $\frac{\text{Total contribution}}{\text{Total sales}} \times 100$

$$= \frac{\text{Rs.8,00,000}}{\text{Rs.20,00,000}} \times 100 = 40\%$$

### Illustration - 6

Sales are Rs. 1,50,000, producing a profit of Rs. 4,000 in period I. Sales are 1,90,000, producing a profit of Rs. 12,000 in period II. Determine the BEP.

#### Solution:

Difference in profit = Rs. 8,000

Difference in sales = Rs. 40,000

Since the change in the sale must have led to the changes in the profit,

$$\text{P/V ratio} = \frac{\text{Rs. 8,000}}{\text{Rs. 40,000}} \times 100 = 20\%$$

At BEP. Profit = Nil.

If Rs. 20 is to be reduced from profit, sales must be reduced by Rs. 100

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

To reduce profit by Rs. 4,000 reduction in sale:

$$\frac{100 \times \text{Rs. } 4,000}{20} \text{ Rs. } 20,000$$

BEP = Rs. 1,30,000 (i.e., sales producing profit of Rs. 4,000 less reduction in sales of Rs. 20,000 to wipe out the profit).

Alternatively:

Total contribution on Rs. 1,50,000 @ 20%	Rs. 30,000
Profit	<u>Rs. 4,000</u>
Fixed expenses	<u>Rs. 26,000</u>

$$\text{BEP} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}}$$

$$\text{BEP} = \frac{26,000 \times 100}{20} = \text{Rs. } 1,30,000$$

### Composite Break-Even Point:

A business undertaking may have different manufacturing establishments each having its own production capacity, and fixed costs but producing the same product. At the same time, the concern as a whole is a units having different establishments under the same management. Hence the combined fixed costs have to be met by the combined BEP sales. In this analysis, there are two approaches namely:

Constant product mix approach.

Variable product mix approach

Under the first approach, the ratio in which the products of the various establishments are mixed is constant. This mix will be maintained at BEP sales also. Under the second approach the product of that establishment would be preferred where the contribution ratio is higher. The above two approaches are explained by the following illustration.

**Illustration - 7**

'A Limited' has two factories X and Y producing the same article whose selling price is Rs. 150 per unit. The following are the other particulars:

	Factory X	Factory Y
Capacity (unit)	10,000	15,000
Variable cost per unit	Rs. 100	Rs. 120
Fixed expenses	Rs. 3,00,000	Rs. 2,10,000

Determine the BEP for the two factories and for the company as a whole assuming Constant Sales Mix, (ii) Variable Sales Mix.

Solution: BEP for the two factories separately

	Factory X	Factory Y
Contribution per unit	Rs. 50	Rs. 30
Fixed expenses	Rs. 3,00,000	Rs. 2,10,000
break-even point	6,000 units	7,000 units
	50	30

Composite BEP:

Constant sales mix:

$$\text{Combined P/V Ratio} = (2/5 \times \text{Rs. } 50) + (3/5 \times \text{Rs. } 30) = \frac{\text{Rs. } 38}{\text{Rs. } 150} \times 100 = \frac{76}{3}$$

Combined fixed expenses = Rs. 5,10,000

$$\text{BEP} = \frac{\text{Rs. } 5,10,000 \times 3 \times 100}{76} = \text{Rs. } 20,13,158$$

As sales price is uniform the mix ratio is the capacity ratio itself, i.e. 2:3

$$X = \text{Rs. } 8,05,263 \text{ or } 5,369 \text{ units}$$

$$Y = \text{Rs. } 12,07,895 \text{ or } 8,052 \text{ units}$$

Workings:

Ratio of Sales Mix:

$$\text{Total units} = 10,000 + 15,000 = 25,000$$

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

$$X = \frac{10,000}{25,000} = \frac{2}{5}$$

$$Y = \frac{15,000}{25,000} = \frac{3}{5}$$

### Variable Sales mix

As factory X is giving a higher contribution, it shall be used in full, i.e., 10,000 units should be produced here before production is commenced at Y. This will give a contribution of Rs. 5,00,000.

Total fixed expenses for the two factories Rs. 5,10,000

Additional contribution requirement to meet the fixed expenses fully Rs. 10,000

Number of units to be produced at Y to produce this contribution 334

Total number of units:	X 10,000	
	Y <u>334</u>	10,334

The above discussion could also be applied to an undertaking selling different products each having its own contribution and sales potential. The composite BEP for the business could be worked out keeping the product mix constant. This would involve working out a composite P/V ratio as in the above case.

### Illustration - 8.

The budget of N Ltd includes the following data for the forthcoming financial year:

(a) fixed expenses	Rs. 3,00,000
(b) Contribution per unit	Product A - Rs.6; Product B = Rs.2.5 Product C - Rs.4
(c) Sales forecast	Product A - 24,000 units @ Rs.12.50 Product B - 1,00,000 units @ Rs.7.00 Product C - 50,000 units @ Rs.10.00

Calculate the combined P/V Ratio and the combined BEP

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

Solution:

Sales mix forecast	$A = 24,000 \times \text{Rs.}12.50 = \text{Rs.}3,00,000$
	$B = 1,00,000 \times \text{Rs.}7.00 = \text{Rs.}7,00,000$
	$C = 50,000 \times \text{Rs.}10.00 = \underline{\text{Rs.}5,00,000}$
	<u><math>\text{Rs.}15,00,000</math></u>

Sales mix forecast = 3:7:5

$$\text{Combined P/V Ratio} = \frac{(3/15 \times 6) + (7/15 \times 2.50) + (5/15 \times 4)}{(3/15 \times 12.50) + (7/15 \times 7) + (5/15 \times 10)}$$

OR

$$\frac{(1,44,000 + 2,50,000 + 2,00,000)}{15,00,000}$$

$$= \underline{594}$$

$$1500$$

$$\text{Composite BEP} = \frac{\text{Total fixed expenses}}{\text{Composite P/V ratio}}$$

$$= \frac{3,00,000 \times 1,500}{594}$$

$$= \text{Rs. } 7,57,575$$

BEP Sales for the 3 products	= A Rs. 1,51,515 or 12,121 units
	= B Rs. 3,53,535 or 50,505 units
	= C Rs. 2,52,525 or 25,253 units

if we solve this problem on the basis of second alternative, i.e. to change the sales mix so that priority is given to that product which gives the highest per unit contribution then product A will have to be produced in full, i.e., 24,000 units and secondly product C. The BEP in that case will be:

$$\text{Total fixed cost} = \text{Rs. } 3,00,000$$

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

Upto BEP		Sales Rs.	Contribution Rs.
I Priority:	Product A 24,000 @ Rs.12,50	3,00,000	@ 6 1,44,000
II Priority	Product C 39,000 @ Rs. 10.00	<u>3,90,000</u>	@ 4 <u>1,56,000</u>
		<u>6,90,000</u>	<u>3,00,000</u>

### Above BEP

Product C 11,000 @ Rs. 10.00	1,10,000	@ 4	44,000
Product B 1,00,000 @ Rs. 7	<u>7,00,000</u>	@ 2.50	<u>2,50,000</u>
	8,10,000		2,94,000

Hence the sales at BEP will be Rs. 6,90,000. This is lower than the BEP already worked out by keeping the sales mix constant.

### Illustration - 9

The undermentioned information is given below:

The P/V Ratio of a firm is 40%.

The firm want to increase its selling price by 10%.

The firm's variable cost is higher now by 5%.

The fixed expenses of the firm have gone up from Rs. 2,00,000 to Rs, 2,58,500.

Work out the revised BEP sales.



Solution:

Original BEP sales

P/V ratio = 40%

Fixed expenses = Rs. 2,00,000

Present BEP =  $\frac{\text{Rs. } 2,00,000 \times 100}{40} = \text{Rs. } 5,00,000$

New sales = 110 (i.e., 10% increase)

Variable cost = 63 (i.e., 5% increase)

Revised P/V ratio =  $\frac{47}{100} \times 100$  or 42.73%

Revised fixed expenses = Rs. 2,58,500

Revised BEP =  $\frac{\text{Rs. } 2,58,500 \times 100}{42.73\%} = \text{Rs. } 6,04,961$

### **7. PRACTICAL APPLICATION OF PROFIT-VOLUME RATIO**

Management may expect an accountant to furnish it with information regarding a wide range of problems which call for the use of profit- volume ratio in a wide scale.

A few of such problems are as thus:

Ascertainment of profit on a particular level of sales volume.

Determination of break-even point.

Calculation of sales required to earn a particular level of profit.

Comparison to be made in respect of product line, sales area, method of sale: separate companies and individual business.

Estimation of the volume of sales required to maintain the present level of profit in case selling prices are to be reduced by a stipulated margin.

The profit-volume ratio, together with profit-graphs, can be used to give clues to answer on such problems. Though the answer may not be very precise they do at least provide some basis for decision-making.

**Illustration - 10**

With a view to increase the volume of sales, Ambitions Enterprise has in mind a proposal to reduce the price of its product by 20%. No change in total fixed costs or variable costs per unit is estimated. The directors, however, desire the present level of profit to be maintained.

The following information has been provided:

Sales - 50,000 units	Rs. 5,00,000
Variable costs Rs. 5 per unit	
Fixed Costs	Rs. 50,000

Advice management on the basis of various calculation made from the data given.

**Solution:****Marginal Cost Statement**

	Rs.
Sales	5,00,000
Less: Variable Costs	<u>2,50,000</u>
Contribution	2,50,000
Less: Fixed Costs	<u>50,000</u>
Profit	<u>2,00,000</u>

$$\begin{aligned}
 \text{Profit / Volume Ratio} &= \frac{\text{Sales} - \text{Variable Costs} \times 100}{\text{Sales}} \\
 &= \frac{\text{Rs. } 5,00,000 - \text{Rs. } 2,50,000 \times 100}{\text{Rs. } 5,00,000} \\
 &= \frac{\text{Rs. } 2,50,000}{\text{Rs. } 5,00,000} \times 100 \\
 &= 50\%
 \end{aligned}$$

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

In the event of reduction in selling price without any corresponding increase in sales volume.

$$\begin{aligned}\text{P/V Ratio} &= \frac{\text{Rs. 4,00,000} - \text{Rs. 2,50,000}}{\text{Rs. 4,00,000}} \times 100 \\ &= \frac{\text{Rs. 1,50,000}}{\text{Rs. 4,00,000}} \times 100 = 37.5\%\end{aligned}$$

In view of the fact the directors wish to maintain the same level of profit after reduction of selling price as before reduction and it is expected that fixed costs will not change, sales volume required to meet such a situation would be -

$$\begin{aligned}\text{or } & \frac{\text{Fixed Costs} + \text{Profit}}{\text{P/V Ratio}} \\ & \frac{\text{Rs. 50,000} + \text{Rs. 2,00,000}}{37.5\%} \\ \text{or } & \text{Rs. 2,50,000} \times \frac{100}{1} \times \frac{2}{75} \text{ or Rs. 6,66,667}\end{aligned}$$

or 83,333 units approximately.

Thus, a reduction of 20% in the selling price requires an increase of about 66% in the sales volume.

Armed with this information, the management has to decide between two alternatives of to reduced or not to reduce the selling price, taking into consideration whether it would be able to measure up to the task of increasing the sales volume by 66%.

**Verification:** The conclusion that, with a view to get an approximate sales revenue of Rs. 6,66,667, sale of additional 33,333 units approximately would be required, can be verified as thus:

	Rs.	
Sales	6,66,667 (approx.)	
Less: Variable Cost (83,333 units @ Rs. 5 each	<u>4,16,665</u>	"
Contribution	2,50,002	"
Less: Fixed Costs	<u>50,000</u>	"
Profit	<u>2,00,002</u>	"

**Illustration - 11**

A factory produces 300 units of a product per month. The Selling price is Rs. 120 and variable cost Rs. 80 per unit. The fixed expenses of the factory amount to Rs. 8,000 per month. Calculate : (i) the estimated profit in a month where in 240 units are produced, (ii) the sales to be made to earn a profit of Rs. 7,000 per month.

**Solution:**

	Rs.
Selling price per unit	120.00
Less: variable cost per unit	<u>80.00</u>
Contribution per unit	<u>40.00</u>

$$\text{P/V Ratio} = \frac{(\text{Contribution} \times 100)}{(\text{Selling Price})} = \frac{40}{120} \times 100 = 33 - 1/3 \%$$

Profit on sale of 240 units:

Sales of 240 units at Rs. 120 each	Rs.28,800
Contribution from above at 33 - 1/3%	Rs. 9,600
Less: Fixed costs of 1 month	Rs. 8,000
Profit	Rs. 1,600

This result can also be arrived at as follows:

No. of units to be sold	=	240
Contribution per unit	=	Rs. 40
Contribution from 240 units	=	240 x Rs. 40
	=	Rs. 9,600
Less: Fixed cost per month	=	Rs. 8,000
Profit	=	Rs. 1,600

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

Sales Required to earn a profit of Rs. 7,000:

$$\begin{aligned}\text{Profit required to be earned} &= \text{Rs. } 7,000 \\ \text{Add: Fixed cost per month} &= \text{Rs. } 8,000 \\ \text{Total contribution to be earned} &= \text{Rs. } 15,000 \\ \text{P/V Ratio} &= 33 - 1/3\% \\ \text{i.e. sales required to earn Rs. 15,000} &= \frac{\text{Rs. } 15,000 \times 100}{33 \frac{1}{3}} \\ &= \text{Rs. } 45,000\end{aligned}$$

This result can also be arrived at through contribution per unit:

$$\begin{aligned}\text{Contribution required to cover fixed expenses and profit} &= \text{Rs. } 15,000 \\ \text{Contribution per unit} &= \text{Rs. } 40 \\ \text{No of units to be sold to earn Rs. 15,000} &= \frac{15,000}{40} \\ &= 375 \text{ units} \\ \text{Selling price per unit} &= \text{Rs. } 120 \\ \text{Total Sales} &= 375 \times \text{Rs. } 120 \\ &= \text{Rs. } 45,000\end{aligned}$$

### Illustration - 12

There are two plants manufacturing the same products under one corporate management which decides to merge them.

Following particulars are available regarding the two plants:

	Plant I	Plant II
Capacity Operation	100%	60%
Sales	Rs. 6,00,00,000	Rs. 2,40,00,000
Variable Costs	Rs. 4,40,00,000	Rs. 1,80,00,000
Fixed Costs	Rs. 80,00,000	Rs. 40,00,000

You are required to calculate for the consideration of the Board of Directors -  
What would be the capacity of merged plant to be operated for purpose of break-even?

What would be the profitability on working 75 percent of the merged capacity?

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

Solution:

Calculation of the Capacity of merged Plant to Breal-even at 100% Capacity.

$$\text{P/V Ratio} = \frac{\text{Contribution} \times 100}{\text{Sales}} = \text{P/V Ratio} = \frac{2,60,00,000}{10,00,00,000} \times 100$$

Therefore = 26 percent.

$$\begin{aligned} \text{Sales at break-even point} &= \frac{\text{Fixed Costs}}{\text{P/V Ratio}} \\ &= \frac{\text{Rs. } 1,20,00,000}{26\%} \\ &= \text{Rs. } 4,61,53,846 \text{ (Approx.)} \end{aligned}$$

In terms of percentage capacity, sales at break-even point work out to 46.15 per cent approximately.

$$\left( \frac{\text{Rs. } 4,61,53,846}{\text{Rs. } 10,00,00,000} \times 100 \right)$$

Workings

$$\begin{aligned} \text{Sales at 100\% capacity} &= \text{Rs. } 6,00,00,000 + \left( \frac{100}{60} \times \text{Rs. } 2,40,00,000 \right) \\ &= \text{Rs. } 10,00,00,000 \end{aligned}$$

$$\begin{aligned} \text{Contribution at 100\% capacity} &= (\text{Rs. } 6,00,00,000 - \text{Rs. } 4,40,00,000) \\ &\quad + \left( \frac{100}{60} \times \text{Rs. } 2,40,00,000 \right) \end{aligned}$$

$$\left( \frac{100}{60} \times \text{Rs. } 1,80,00,000 \right)$$

$$\begin{aligned} &= (\text{Rs. } 1,60,00,000) + (\text{Rs. } 1,00,00,000) \\ &= \text{Rs. } 2,60,00,000 \end{aligned}$$

Calculation of profit on working at 75% of the merged capacity.



## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

### Marginal Cost Statement.

	Rs.
Sales (75% of Rs. 1,00,00,000	7,50,00,000
Less Variable Costs -	
75% of (Rs. 4,40,00,000) + $\frac{100}{60}$ x Rs. 1,80,00,000	5,55,00,000
Contribution	1,95,00,000
Less Fixed Costs	<u>1,20,00,000</u>
Profit	<u>75,00,000</u>

### Illustration - 13

The budgeted results of Ltd., include the following:

Sales	Amount (in Lakhs)	Variable Cost as % of Sales Value
A	5.00	60%
B	4.00	50%
C	8.00	65%
D	3.00	80%
E	6.00	75%

Fixed costs for the period are Rs. 9 lakhs. You are required to:

Produce a statement showing the amount of loss expected, and

Recommend a change in Sales volume of each product which will eliminate the expected loss assuming that sale of only one product can be increased at a time.

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

### Solution:

Statement showing the loss expected:

Product	Sales	Variable cost as % sales value	Variable Cost	Contribution	P/V Ratio
A	5,00,000	60%	3,00,000	2,00,000	40%
B	4,00,000	50%	2,00,000	2,00,000	50%
C	8,00,000	65%	5,20,000	2,80,000	35%
D	3,00,000	80%	2,40,000	60,000	20%
E	6,00,000	75%	4,50,000	1,50,000	25%
	26,00,000	65.77%	17,10,000	8,90,000	34.23%

Contribution	Rs. 8,90,000
Less: Fixed Cost	<u>Rs. 9,00,000</u>
Loss / under recovery of fixed cost	<u>Rs. 10,000</u>

(b) additional Volume of Sales Required:

$$\text{Additional Sales} = \frac{\text{Under-recover of fixed Costs}}{\text{P/V Ratio}}$$

Thus

$$\text{Product A: Rs. } \frac{10,000}{40\%} \text{ or Rs. } 10,000 \times \frac{100}{40} \text{ or Rs. 25,000}$$

$$\text{Product B: Rs. } \frac{10,000}{50\%} \text{ or Rs. } 10,000 \times \frac{100}{50} \text{ or Rs. 20,000}$$

$$\text{Product C: Rs. } \frac{10,000}{35\%} \text{ or Rs. } 10,000 \times \frac{100}{35} \text{ or Rs. 28,571 (approx.)}$$

$$\text{Product D: Rs. } \frac{10,000}{20\%} \text{ or Rs. } 10,000 \times \frac{100}{20} \text{ or Rs. 50,000}$$

$$\text{Product E: Rs. } \frac{10,000}{25\%} \text{ or Rs. } 10,000 \times \frac{100}{25} \text{ or Rs. 40,000}$$

$$\text{Total: Rs. 10,000 or Rs. } 10,000 \times 100 \text{ or Rs. 29,214 approx.}$$

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

The calculation given above clearly shown that, if X Co. Ltd. , can increase sales of product A by Rs. 25,000 or that of product E by Rs. 40,000 its business operations would touch the break-even point.

Note: P/V Ratio in respect of different product has been calculated as thus:

Using the formula - 
$$\frac{\text{Sales} - \text{Variable Cost}}{\text{Sales}}$$

Therefore-

Product A: =  $\frac{\text{Rs. } 5,00,000 - \text{Rs. } 3,00,000}{\text{Rs. } 5,00,000} \times \text{Rs. } 100$  or  $\frac{\text{Rs. } 2,00,000}{\text{Rs. } 5,00,000} \times 100$  or 40%

Product B: =  $\frac{\text{Rs. } 4,00,000 - \text{Rs. } 2,00,000}{\text{Rs. } 4,00,000} \times \text{Rs. } 100$  or  $\frac{\text{Rs. } 2,00,000}{\text{Rs. } 4,00,000} \times 100$  or 50%

Product C: =  $\frac{\text{Rs. } 8,00,000 - \text{Rs. } 5,20,000}{\text{Rs. } 8,00,000} \times \text{Rs. } 100$  or  $\frac{\text{Rs. } 2,80,000}{\text{Rs. } 8,00,000} \times 100$  or 35%

Product D: =  $\frac{\text{Rs. } 3,00,000 - \text{Rs. } 2,40,000}{\text{Rs. } 3,00,000} \times \text{Rs. } 100$  or  $\frac{\text{Rs. } 60,000}{\text{Rs. } 3,00,000} \times 100$  or 20%

Product E: =  $\frac{\text{Rs. } 6,00,000 - \text{Rs. } 4,50,000}{\text{Rs. } 6,00,000} \times \text{Rs. } 100$  or  $\frac{\text{Rs. } 1,50,000}{\text{Rs. } 6,00,000} \times 100$  or 25%

### **8. OTHER USES OF C.V.P ANALYSIS**

C.V.P. analysis helps in forecasting cost and profits as a result of change in volume.

It helps fixing a sales volume level to earn or cover a given revenue, return on capital employed, or rate of dividend.

It assist determination of effect of change in volume due to plant expansion or acceptance of an order, with or without increase in costs or in other words a quantum of profit to be obtained can be determined with change in volume of sales.

C.V.P. analysis helps in determining relative profitability of each product, line, project or profit plan.

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

Through cost volume-profit analysis inter-firm comparison of profitability can be done intelligently.

It helps in determining cash requirements at a desired volume of output, with the help of cash break-even charts.

Break-even analysis emphasises the importance of capacity utilisation for achieving economy.

From break-even analysis during severe recession, the comparative effects of a shut down or continued operation at a loss is indicated.

The effect on total cost of a change in the fixed over-head is more clearly demonstrated through break-even analysis and cost-volume-profit charts.

The conditions of a business such as profit potentialities, requirements of capital, financial stability and incidence of fixed and variable costs can be gauged from a study of the position of the break-even point and the angle of incidence in the break-even chart.

### **9. ADVANTAGES OF BREAK-EVEN CHARTS**

It provides detailed and clearly understandable information. The chart visualises the information very clearly and a glance at the chart gives a vivid picture of the whole affair.

The information is presented in a simple form and therefore, is clearly understandable even to a layman.

The profitability of different products can be known with the help of break-even charts, besides the level of no-profit no-loss. The problem of managerial decision regarding temporary or permanent shutdown of business or continuation at a loss can be solved by break-even analysis.

The effect of changes in fixed and variable costs at different levels of production or profits can be demonstrated by the graph legibly.

The break-even chart shows the relative importance of fixed cost in the total cost of production. If the costs are high, it induces management to take measures to control such costs.

The economies of scale, capacity utilisation, comparative plant efficiencies can be analysed through the break-even chart. The operational efficiency of a plant is

indicated by the angle of incidence formed at the intersection of the total cost line and sales line.

Break-even analysis is very helpful for forecasting, long-term planning, growth and stability.

### **10. LIMITATIONS OF BREAK-EVEN ANALYSIS CHARTS**

Though break-even analysis has gradually become a frequently used service tool for modern financial management, there are certain objections raised against the utility of break-even analysis:

Fixed costs do not always remain constant.

Variable costs do not always vary proportionately.

Sales revenue does not always change proportionately,

The horizontal axis cannot measure the units sold in as much as many unlike type of products are sold by the same enterprise.

Break-even analysis is of doubtful validity when the business is selling many products with different profit margins.

Break-even analysis is based on the assumption that income is influenced by changes in sales so that changes in inventory would not directly affect income. If marginal costing is used, this assumption would hold good but in other cases, changes in inventory will effect income because the absorption of fixed costs will depend on production rather than sales.

Condition of growth or expansion in an organisation, the operation undergo a continuous process of growth and expansion.

Only a limited amount of information can be presented in a single break-even chart. If we have to study the changes of fixed costs, variable costs and selling prices, a number of charts will have to be drawn up.

Even simple tabulation of the results of costs and sales can serve the purpose which is served by a break-even chart, hence there is no need of presenting the data through a break-even chart.

The chart becomes very complicated and difficult to understand for a layman, if the number of lines or curves depicted on the graph are large.

## COST VOLUME RELATIONS AND BREAK EVEN ANALYSIS

The chart does not provide any basis for comparative efficiency between different units or organisations.



**REFERENCE MATERIAL**

Click on the links below to view additional reference material for this chapter

**[Summary](#)**

**[PPT](#)**

**[MCQ](#)**

**[Video1](#)**

**[Video2](#)**

# 6

## METHODS OF COSTING

---

### 1. JOB COSTING

#### **Nature and Purpose**

Job costing may be defined as a system of costing in which the elements of cost are accumulated separately for each job or works order undertaken by an organisation. Industries which manufacture products or renders service against specific orders use job costing or job order method of cost accounting. In the job costing system, an order or a unit, lot or batch of product may be taken as a cost unit, i.e., a job. Job costing is a method of costing in which cost units can be separately identified and need to be separately costed. The primary purpose of job costing is to bring together all the costs incurred for completing a job.

The system of job costing can be sub-divided into two categories viz. (a) factory job costing and (b) Contract costing. A variant of job costing system is batch costing in which costs are accumulated for specific batches of products of a similar type ordered for manufacture.

Job costing is applicable to an engineering concern, construction companies, ship-building, furniture making, machine manufacture industries, repair shops, automobile garages and such other factories where jobs or orders can be kept separately.

As production in a job order system is not continuous process, careful planning and strict control is essential to avoid wastage of materials, man power, machinery, and other resources. On receipts of an order, the production and planning department prepares a suitable design for the products or job. It also prepares a bill of materials and an operation

schedule. A production order is issued giving instruction to the shops to proceed with the manufacture of the product. This production order (also known as work order or job order record) constitutes the authority of the work. The production order or job order usually lays down the quantity of material required, time allowed for the operations, sales prices, customer's name, shipping instruction, etc. Sometimes the values of materials and labour are also indicated and then it serves the combined purpose of an order for manufacture as well as the cost sheet on which the cost of the order is compiled.

Every production order is assigned a number called the job number, job-order number, works order number.

The basis principles, procedures in the accounting of material, labours and overhead costs and other special features of the job costing systems are mentioned below:

### **Material Costs**

An essential requirement of job order cost accounting is that direct materials and their cost must be traced to and identified with specific jobs or works orders. On receipt of a production order, the shop draws the requisite materials from stores. The withdrawals are made on material requisitions on basis of the bill of materials. The particular job order number for which material is drawn is indicated in each requisition. Surplus, excess or incorrect material are returned from the shops to the stores with materials return note.

A daily or weekly analysis of materials requisitions, materials return notes and bills of materials is made and posted in the materials requisition journal. For cost accounting purposes, a materials issue analysis sheet is prepared showing the cost of materials issued against the various job orders numbers. Direct material cost is posted on the cost sheet relating to the particular production order while, indirect materials cost is treated as overhead costs.

### **Labour Costs**

All direct labour costs must be analysed according to individual jobs or work orders. On the authority of operation schedule, time is booked on time sheets, job cards, time ticket or piece-work cards. The job cards are valued by the costing department; the wages paid are classified into direct and indirect labour and booked to production orders and standing order numbers

respectively. Labour summaries or wage analysis sheets are prepared for each accounting period; say a week. Amounts on account of overtime, idle time, shift differential and fringe benefits may also be included in the wage analysis sheet. Direct labour costs are posted on the respective cost-sheets and indirect labour is treated as overhead costs.

### **Manufacturing Overheads**

Overhead costs are accumulated against standing order numbers and against cost centres. Overhead rates, predetermined or actuals as the case may be, are worked out for each center. The amount of overhead cost recoverable on each job order is summarised in an Overhead Absorption or Applied Overhead Analysis-sheet and is posted on the relevant cost-sheets. Usually, overheads are added only when the job is completed but, at the end of the accounting period, the amount of overheads which could be applied to incomplete jobs is ascertained for the purpose of establishing the extent of over or under absorption of overheads.

### **Completion of jobs**

Posting of direct material, direct labour and manufacturing overhead costs to the costsheet for a job or production order are made throughout the run of the job or order. On the completion of a job, a job completion report is sent by the production shop to the Production and Planning Department, with a copy to the Cost Office. Sometimes, information regarding completion is noted on the production order which is routed through Cost office.

The expenditure booked under each element of cost is totalled up and the grand total of cost is arrived at.

**Job Account:** An account is kept for each job so that its cost and the various components of cost can be readily ascertained. There can be various forms in which the account may be maintained. The following, therefore, may be treated as illustrative (as figures are assumed)

## METHODS OF COSTING

Job Account

No.....  
Brief Particulars.....  
.....

Date Commenced.....  
Date Completed.....  
Remarks.....

Date	Particulars	Materials	Wages	Total	Total cost	Rs.
1997						
May 7	Materials analysis	340		340	Material consumed	560
"	Wages analysis		410	410	wages	<u>970</u>
"14	Material analysis	220		220	Prime cost	1530
					Factory overheads (60%) of wages)	<u>582</u>
					Work cost	2,112
"14	Wages Analysis		560	560	Office and administrative overhead 10% of works cost	211
		560	970	1,530	Total cost	<u>2,323</u>

### Work-in-progress

The cost of an incomplete job, i.e., a job on which some manufacturing operation is till due is termed a works-in-progress. If a production order has been only completed by the end of an accounting period, it is essential that the closing stock of the work-in-progress be determined. Unless this is correctly done, the profits for the period will be distorted. Determination of work-in-progress is frequently essential where periodic profit and loss account is required to be prepared for control purposes without reference to the closure of the accounting period.

**Job-ticket:** Sometimes the progress of different jobs may be ascertained with the help of the job ticket issued for each job order by the Production Control Department. The ticket consists of detachable portions relating to different operations.

An illustration showing the method of calculation of the value of work-in-progress is given below:

**Illustration - 1**

The quantity specified on a production order was 2,000 units of an article in the manufacture of which four operations were involved. The piece-rates for these four operations were in sequence, Rs. 0.20, 0.25, 0.20, and 0.30 per unit. The company recovered factory overhead expenses on the basis of direct labour cost and the current overhead rate is 80%. The entire quantity of material authorised for the order, viz. 1000 kgs. @ Rs. 2 per kg. was issued to the shop. Of this 50 kgs were returned as scrap arising in course of manufacture, valued at Rs. 8.

At the year end, the order was incomplete; only 200 units were fully completed and transferred to finished stock-taking of the work-in-progress revealed the following position:

Materials in progress	650 kgs.
Material in hand, in shop (unprocessed)	200 kgs.
Production in partly completed stage	1,300 units

Extent of works performed

Upto the first operation	600 units
Upto the second operation stage	400 units
Upto the third operation stage	300 units
Upto the fourth operation stage	Nil
Calculate the cost of the work-in-progress at the year end	



**Solution:**

	Rs. P	Rs. P
Cost sheet showing cost of work-in-progress		
Material Cost		
Material in hand 200 kgs @ Rs 2 per kg.*		400.00
Material in process 650m kgs @ Rs 2 per kg	1,300.00	
Less: Proportionate cost of scrap	<u>6.50</u>	<u>1,293.50</u>
		1,693.50
Labour cost		
Operation I - 600 units @ Rs.0.20	120.00	
Operation II - 400 units @ Rs. 0.45	180.00	
Operation III - 300 units @ Rs. 0.65	<u>195.00</u>	495.00
Factory overhead 80% on direct labour		<u>396.00</u>
Total cost of works-in-progress		2,584.50

**Illustration - 2**

The alpha Manufacturing Company processed production through two department (i) Machinery and (ii) Finishing.

Overhead rates are predetermined on the basis of machine hours in the machine department and the direct labour wages in the finishing department.

The figure for 1996-97 based on which the overhead rates were arrived at as furnished below:

	Machining Dept. Rs.	Finishing Dept. Rs.
Direct labour wages	36,00,000	40,00,000
Factory overheads	80,00,000	60,00,000
Direct labour hours	24,00,000	50,00,000
Machine hours	20,00,000	5,00,000

The cost sheet for Job order no. 1748 indicated the following:

	Machining Dept. Rs.	Finishing Dept. Rs.
Material consumed	Rs. 50	Rs. 7
Direct labour wages	Rs. 45	Rs. 40
Direct labour hours	24	35
Machine hours	15	5

## METHODS OF COSTING

Assuming that the production order no. 1,748 consisted of 10 numbers of part No. P- 1865, prepare a cost sheet showing the unit cost of the part.

### Solution

Job Cost sheet

Started on.....	Job No. - 1748 Part No. - p -1865 No. of parts produced - 10
-----------------	--

		Parts of p-1865	Units
		Amount	
Direct Material	Rs.	Rs.	Rs.
Machine Department	50		
Finishing department	<u>7</u>	57	5.7
Direct labour wages			
Machinery department	45		
Finishing department	<u>40</u>	<u>85</u>	<u>8.5</u>
Prime Cost		142	14.2
Factory overheads			
Machinery Department			
15 hrs x <u>Rs. 80,00,000</u>	60		
	20,000		
Finishing department			
Based on direct wages i.e.			
40 hrs. x <u>Rs. 40,00,000</u>			
	Rs. 60,00,000 <u>60</u>	<u>120</u>	<u>12.0</u>
Total Cost		<u>262</u>	<u>26.2</u>

### Cost Control in Job Order System

Control in job costs may be exercised by comparison of the actual costs with estimated as basis for fixing job prices. Comparison may also be made with the cost of previous periods or of earlier batches of production. If there are several units under the management of the concern, comparison of costs of identical products manufactured in more than one factory may be useful.

Standard costs may be used in job types of plants, particularly where the product or the particular operations of the job are of a standardised nature. Standard costs provides a firm basis for preparation of cost estimates of specific jobs and thus serve as a powerful tools for cost control.

### Advantages

Job costing offers the following specific advantages:

- (i) It helps management to detect which jobs are profitable and which are not. Estimates of cost for similar works in the future may be conveniently made on the basis of accurate record of job costs, this assists in the prompt furnishing of prices quotations for specific jobs.
- (ii) The cost of material, labours and overhead for every job or product in a department is available regularly and periodically, enabling the management to know the trend of cost and thus by suitable comparison, to control the efficiency of operations, material and machines;
- (iii) The adoption of predetermined overhead rates in job costing necessitates the application of a system of budgetary control of overhead with all the advantages.
- (iv) Spoilage and defective work can be easily identified with specific jobs or products so that responsibility may be fixed on department or individuals.
- (v) Job costing is particularly suitable for cost plus and such other contracts where selling prices is determined directly on the basis of costs.

**N.B.** Job cost information can be used for estimation of future costs only after careful adjustment for variations likely to arise over time as well as for any difference in the size of the order. If major economic changes take place, comparison of cost of a job for one period with that of another becomes meaningless. Distortion of cost also occurs when the batch quantities are different.

### Report in job costing system

- (i) **Report on Profit on Completed jobs:** A statement may be prepared monthly to indicate the gross profit earned on all jobs completed during the period.

This statement is useful for the management for evaluating past performance. Net profit analysis may also be made in similar manner by including the administration, selling and distribution overhead in the statement.

(i) **Report on Cost Variances:** If cost estimates are developed, a cost variance report showing the deviations of actual costs from the estimated costs may be prepared so that significant differences may be brought to light and investigated. The report may be prepared separately for a job, or for a department showing the variances in respect of all jobs undertaken by the department during a period.

If standard costs are in use, instead of making a comparison from estimated costs may be used for comparison purpose. The variances may be analysed into material prices and quantity variances, labour rate and efficiency variances, and overhead volume and expenditure variances.

## 2. CONTRACT COSTING

Contract or terminal costing, as it is termed, is one form of application of the principles of job order costing. Contract costing is, usually, suitable for business concerned with building or engineering projects or structural or construction contracts.

Contract jobs, while they resemble jobs, have a few distinctive features:

- (i) Under job costing, cost is first allocated to cost centers and then to individual jobs. In contract costing, most of the expenses are of direct nature, overhead forms only a small percentage of total expenditure and it represents expenses like share of head office expenses, share of center storage cost etc.
- (ii) Under job costing pricing is influenced by individual conditions and general policy of the organisation. Under contract costing, pricing is influenced by specific causes of the contract.
- (iii) Unlike the job costing, each contract is a cost unit in contract costing.

- (iv) Under contract costing, the work is usually carried out at a site other than contractee's own premises. Job costing is often applied where jobs are carried out at the contractee's own premises.

Usually, there is a separate account for each contract. Also the number of contracts undertaken at a time, generally, not being very large, the Contract Ledger can very well be operated as part of the financial books. The contract account is debited with all the direct and indirect expenditure incurred in relation to the contract. It is credited with the amount of contract price on completion of the contract. The balance represents profit and loss made on the contract and is transferred to the profit and loss account. In case, the contract is not completed at the end of the accounting period, a reasonable amount of profit, out of the total profit made so far on the incomplete contract, may be transferred to profit and loss account.

### 3. SPECIFIC ASPECTS OF CONTRACT COSTING

The recording procedure of the following items may be noted carefully:

- 1) **Material:** Material may be purchased in bulk and kept in store for supply to the contract, as and when required, or these may be purchased and directly supplied to the contract. In the latter case, the cost of material would be debited directly to the contract. If any materials are transferred from one contract to another, their costs would be adjusted on the basis of Material Transfer Note signed by the transferor plus transferee foreman. In case, certain materials charges to contract are returned to stores, the same will be credited to the contract account. Materials stolen or destroyed by fire will be transferred to profit and loss account. Material in hand at the end of the year will appear on the credit side of the contract account.
- 2) **Labour:** All labour actually employed on the site is regarded as direct labour irrespective of the nature of the task performed by the labour concerned. If it is desired to ascertain the labour costs for a particular job or work, each person would be provided with a job card upon which he must record the nature of the works performed by him. On the basis of the analysis of the job cards, labour analysis sheets are prepared for ascertaining the actual cost of labour on different operations.



If concurrently number of contracts are carried on and workmen are made to divide their time between two or more contracts, it would be necessary to prepare analysis sheets of labour, for charging to each contract, wages appropriate thereto.

- 3) **Direct expenses:** The expenses which can be directly charged to different contracts will be posted directly to the respective contracts. These included cost of special tools, costs of design, electric charge, insurance etc.
- 4) **Plant:** The value of plant used on a contract may be either debited to the contract and the written down value there of the end of the year entered on the credit side for costing the contract account, or only a charge for use of the plant (depreciation) may be debited to the account.
- 5) **Indirect Expenses:** In contract, indirect expenses are few and related only to general office expenses or works which cannot be directly apportioned to individual contracts. These indirect expenses may be distributed on several contracts as a percentage of cost of materials or wages paid or the prime cost. If, however, the contracts are big, the labour hour method is often adopted for distribution of expenses since it is more efficacious. In making the distribution, the location of the site of the contract is another important factor, for contracts situated at a distance are not likely to receive the same supervision as compared to those which are close. Where such factors are prominent, some sort of quota basis for distribution of expenses may be followed.
- 6) **Extras:** Where some additional works not stipulated in the contract is carried out, the expenditure on this additional work should be separately analysed from that charged to the main contract price.
- 7) **Sub-contracts:** Generally work of a specialised character e.g. the installation of lifts, special flooring etc. is entrusted to other contractors by the main contractors. The cost of such sub-contracts is a direct charge against the contracts for which the work has been done.
- 8) **Escalation clause:** Escalation clause is usually provided in the contract as a safeguard against any likely changes, in the change in the prices or utilisation of material and/ labour. This clause provides that in case prices of items of raw materials, labour etc. specified in the contract change during the execution of the contract, beyond a specified limit over the



prices prevailing at the time of signing the agreement, the contract price will be suitable adjustment in order to avoid all future disputes. Thus this clause safeguard the interest of both the contractor and the contractee in case of fluctuation in the prices of material, labour etc.

- 9) **Cost plus contract:** Cost plus contract is a contract in which the value of the contract is ascertained by adding a certain percentage of profit over the total cost of the work. This is used in case of these contracts whose exact cost cannot be correctly estimated at the time of undertaking work. The profit to be paid to the contractor may be a fixed amount or it may be a particular percentage of a cost or capital employed. These type of contracts are undertaken for production of special articles not usually manufactured and is generally employed, when Government happen to be a contractee. Generally, in such contract, contractor and contractee have clear agreement about the items of cost to be included, type of material to be used, labour rates for different grades, normal wastages to be permitted and the rate or amount of profit.

### **Advantages of cost plus contract**

- I. Cost plus contract ensured that a reasonable profit accrues to the contractors even in risky projects.
- II. It simplifies the works offering tenders and quotations.
- III. It provides escalation clauses and thus covers the contractor from fluctuations in price and utilisation of elements of production.
- IV. The customer is assured of paying only reasonable amount of profit.
- V. The customer has the right to conduct cost audit so that he can ensure that he is not being cheated by the contractor.

In spite of the advantages mentioned above cost plus contract system has the following disadvantages:

- (i) Since the contractor is assured of profit margin, he may not take initiative for cost reduction by affecting economies of production and reducing wastages.
- (ii) The ultimate price to be paid by the customer cannot be exactly

ascertained until the work is completed and this creates delay in preparing purchase budget by the customer.

(iii) The customer has to pay not only the resultant high cost but also the resultant high profit. Thus, customer has to pay substantially for lack of proper attitude (towards cost and efficiency) on the part of contractor.

10) **Surveyor's or architect's certificate:** When a contractor is engaged on a contract for several years, he cannot afford to block a large amount of funds.

### **4. BATCH COSTING**

This is another form of job costing which is adopted in case of a manufacturing of a large number of components of machines or of other articles. Since a large number of them are manufactured together and pass through the same process of manufacture, it is convenient to collect their cost of manufacture together. Cost of each component in the batch is then determined by dividing the total cost by the number of articles manufactured.

### **5. PROCESS COSTING**

It is the method according to which cost data of production are collected according to the departments or processes and thereafter the total cost is divided by the quantity of production, to arrive at the cost per unit. It is suitable for those industries in which production flows from the beginning to the end continuously and through various stages in a textile mill through carding, warping, spinning, drawing, sizing, winding, weaving, painting, folding etc.

This is suitable for manufacturing industries such as cotton, paper, sugar, chemicals, rubber, paints and food where the final product is a large mass of a uniform quality. It can also be made applicable to mining of coal, clay, stone, etc. Usually, however, in such industries the process involved is only one, and therefore, the method of costing is simpler than the usual process costing methods; the method is called single or output costing.

### **General Principles of process Costing**

## METHODS OF COSTING

- 1) The majority of items of costs can ordinarily be identified with specific processes and collected and accumulated separately for each period.
- 2) Production records of each process are so designed as would show the quantum of production for each period.
- 3) The total cost of each process is divided by the total production be the process for arriving at the unit cost of the article processed.

### **Comparison between job costing and process costing**

The types of cost accumulation to be used is determined by the types of manufacturing operations. The difference between the two methods center mainly around how costing is accomplished. The product cost under both method is ascertained by averaging process, size of determinators being difference in both method is ascertained by averaging process, size of denominator being different in both the cases. In job costing costs are applied to specific jobs consisting of a single or joints units, while process costing is applied to large number of units.

The main points of distinction between job costing and process costing may be summarised as shown on the next page.

## METHODS OF COSTING

Job Costing	Process
(a) Goods are manufactured only against specific orders	Production is of like units in continuous flow.
(b) Costs are accumulated and applied to specific jobs	Costs are accumulated and applied process-wise or department-wise
(c) Costs are computed after every job is completed	Costs are computed after the expiry of a particular cost period
(d) Different jobs are independent of each other	Production being in a continuous flow, production are intermingled in such a manner that lots are not distinguishable
(e) Products are normally not transferred from one job to another except in the case of surplus work or excess production	Costs are normally transferred from one process to another. Generally the finished product of the process becomes the raw material of the next process until the goods are completely manufactured.
(f) From the point of view of managerial control, more attention is needed because production is not in continuous flow and each job is different.	Because of the standard, mass and continuous production, managerial control is easier.
(g) Different job may or may not have opening or closing work-in-progress.	As the production is in continuous flow there is always an opening and closing balance of work-in-progress.

## 6. PROCESS LOSSES AND WASTAGES

In many process industries some loss or wastage is inevitable. Such a loss may be the result of an evaporation, shrinkage, chemical changes, changes in moisture content or spoilage. The process loss may be normal or abnormal.

**Normal process loss:** This is the loss which is unavoidable because of the nature of raw material for the production technique and is inherent in the normal course of production such loss can be estimated in advance on the basis of past experience or chemical data.

The normal process loss is recorded only in terms of quantity and the cost per unit of usable production is increased accordingly. Where the scrap possesses some value as a waste product or as raw material for an earlier process, the value thereof is credited to the process account. This reduces the cost of normal output and process loss is shared by usable unit.

**Abnormal process loss:** Any loss caused by unexpected or abnormal conditions such as sub-standard material carelessness, accident etc. Or loss on the excess of the margin anticipated for normal process loss is regarded as abnormal process loss abnormal loss is not expected to arise, when operation are carried on efficiently according to norms relating to manufacturing operations cost of normal loss is shared by good units of production in the process, but the same cannot be given to abnormal loss.

Units representing abnormal loss are valued like good units produced and the value of units representing abnormal loss is debited to a separate account, which is known as abnormal loss account. The value of abnormal loss is calculated with the help of the following formula:

$$\frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Units of abnormal loss}$$

If the abnormal loss has got any scrap value, it should be credited to abnormal loss account and the balance is ultimately written off to costing profit and loss accounting.

Abnormal loss presents good units, which could have been produced, if operations had been carried out according to accepted norms relating to manufacturing operations. Because of this reason, units representing abnormal loss are treated at par with good units representing abnormal loss for the purpose of valuation. All cost relating to abnormal loss is debited to abnormal loss account and credited to process account so that the cost, which could have been avoided according to the norms of operations is kept separately to facilitate control action to be taken.

**Abnormal gain:** if the quantum of loss is less than the determined percentage of normal loss, the difference is called abnormal gain of effectives. The presence of abnormal effectives should not effect the cost of good units in the normal circumstances. The value of abnormal effective is debited to the concerned process account and credited to abnormal effective account. This value is calculated at the rate at which the effective output



## METHODS OF COSTING

would have been valued if normal wastage had taken place according to exception. The value of abnormal effective is calculated as follows:

$$\frac{\text{Normal cost of normal output}}{\text{Units of normal output}} \times \text{Units of abnormal effective}$$

### Illustration - 3

A product passes through three processes. The output of each product is credited as the raw material of the next process to which it is transferred and output of the third process is transferred to the finished stock.

	1st process	2nd process	3rd process
	Rs.	Rs.	Rs.
Material issued	40,000	20,000	10,000
Labour	6,000	4,000	1,000
Manufacturing overhead	10,000	10,000	15,000

10,000 units have been issued to the first process and, after processing, the output of each process is as under:

	Output	Normal wastage
Process No. 1	9,750 units	2%
Process No. 2	9,400 units	5%
Process No. 3	8,000 units	10%

No stock of material of work-in-progress was left at the end. Calculate the cost of the finished articles.

### Solution

#### Process Account No.1

	Units	Rs.		Units	Rs.
To materials	10,000	40,000	By normal wastage	200	-
To labour		6,000	By abnormal wastage	50	286
To overhead		10,000	(cost per unit Rs.5.714)		
			By Process No. 2	9,750	55,714
			(transfer of completed units)		
	10,000	56,000		10,000	56,000



## METHODS OF COSTING

Note: The cost of abnormal wastage is computed this:

Normal output = 10,000 units - 200 units = 9,800 units

Cost per unit of normal unit = Rs. 56,000 / 9,800 = Rs. 5,714

Cost of 50 units = Rs. 5,714 x 50 = Rs. 286

### Process Account No. 2

	Units	Rs.		Units	Rs.
To process no. 1	9,750	55,714	By normal wastage	48	-
				8	
To materials		20,000	(5% of 9,750)		
To labour		4,000	(cost per unit Rs. 9.686)		
To overhead		10,000			
To abnormal gain (@ Rs. 9.686)	138	1,337	By process no. 3	9,400	91,051
	9,888	91,051		9,888	91,051

Note: The cost per units is obtained by dividing Rs.89,714 by 9,262 units (i.e., 9,750 units less 488 units).

### Process Account No. 3

	Units	Rs.		Units	Rs.
To process	9,400	91,051	By normal wastage	940	-
To material		10,000	By abnormal wastage (cost per units Rs. 13.677)	460	6,364
To labour		1,000			
To overhead		15,000			
			By finished stock	8,000	1,10,687
Total	9,400	1,17,051		9,400	1,17,051

Note: The calculation of the cost of the abnormal wastage as follows:

Normal output = 8,000 Units + 460 Units = 8,460 units

Cost per unit of normal unit = Rs. 1,17,051 / 8,460 = Rs. 13.856

Cost of 460 units = Rs. 13.836 x 460 = Rs. 6,364

### **7. EQUIVALENT PRODUCTION**

Equivalent production represents the production of a process in terms of completed units. In other words, it means converting the completed production into its equivalent of complete units. According to CIMA, London the term equivalent units means "notional whole units representing uncompleted work. Used to apportion costs between work-in-progress and completed output" the principal applies when operation costs are being apportioned between work-in-progress and completed output. The formula for equivalent production is:

Equivalent units of work-in-progress = Actual No. of units in process of manufacture x percentage of work completed.

Total equivalent production will be equal to the sum of equivalent completed units of work-in-progress in the beginning plus units started and finished during the year plus equivalent completed units of work-in-progress at the end. The cost per unit of equivalent production will be equal to the total cost divided by effective production and the cost work-in-progress will be equal to the equivalent units of work-in-progress multiplied by the cost per unit of effective production.

### **8. BY-PRODUCTS AND JOINT PRODUCTS**

By-products are defined as " any saleable or usable value incidentally produced in addition to the main product". By products means secondary or subsidiary products arising in the course of manufacturing the main products (s). In the process of producing the main product it frequently occurs that materials or other products emerge which are of smaller value. These are the products and even if subsequent processing enhance their value, the resulting profit will be less than that from the main product; otherwise of

course the by-product would become the main product and vice-versa. For example, in oil refinery crude oil is processed but by-products, i.e. sulfur, bitumen, chemical, fertilizer are obtained with the main product-refined oil. Similarly in coke ovens, gas and tar are incidentally produced in addition to the main product coke. Gas and tar are therefore treated as byproducts.

There are certain industries where two or more products of equal importance are simultaneously produced such products are regarded as joint products. Joint-products thus represent two or more products separated in the course of some processing operations, usually requiring further processing, each product being in such proportion that no single product can be designate as a major product. CIMA has defined it as "Two or more products separated in processing, each having a sufficiently high saleable value to merit recognition as a main product."

So joint product imply the following:

- (i) They are produced from the same basic raw materials.
- (ii) They are comparatively of equal importance.
- (iii) They are produced simultaneously by a common process.
- (iv) They may require further processing after the point of separation.

Examples of joint products are gasoline, diesel, kerosene, lubricants, tar paraffin and asphalt obtained from crude oil. Different grades of lumber resulting from a lumbering operation is another example.

The classification of various products form the same process into joint products and byproducts depends upon the relative importance of the products and their value of the various end-products are almost equal in importance and their value is also more or less the same, they may be identified as joint products. But, if one end-product has greater importance and higher value and the other products are of less importance and rather of low value, the latter may be classified as by- products. It may be noted that the value of some end-products may be so insignificant as that they may be classified as waste or scrap only in respects of degree of importance and value. Joint products are produced simultaneously but the by-products are produced incidentally in addition to the main product.

### **Co-products**

Co-products are particular type of products but produced in different varieties.

These products may not necessarily arise from the same operation or raw materials and maybe produced in different quantities without any co-relation to the others according to the needs of the market. For example, in different quantities, such as, ceiling fan, table fan, pedestal fan, cabin fan. Etc. Similarly, in automobile industry co-products are, cars, jeeps, trucks, buses etc. Co-products are distinguished from joint products in as much as the quantities of joint products remain in linear relationship between them whereas co-products are independent ones and may be produced in different quantities without any co-relationship with others.

### **Objectives of joint cost Analysis**

Analysis of joint costs and Accounting of joint products and by- products serve the following purposes:

- (i) Correct collection and compilation of process costs.
- (ii) Determination of profit and loss on each line
- (iii) Data for price fixation
- (iv) Determination of the pattern of production and the most profitable product mix.
- (v) Marginal contribution analysis.
- (vi) Study of the effect on costs and profit due to increase or decrease in production of joint products.
- (vii) Determining the profitability of selling products and by-products as they come out at the split-off-point and selling only after further processing.

### **Limitations and Problems of Joint Cost Analysis**

- (a) Apportionment of joint costs are mainly arbitrary and no two methods will produce the same result. As such, joint costs can only be inaccurately determined.
- (b) This makes inter-firm comparison difficult.

- (c) If the by-product has negligible sale value, analysis is not economic.
- (d) Several assumptions are made and these have to be consistently adhered to, in order to have complete information.

### **9. OPERATING COSTING**

Operating costing also known as services costing is used where services are rendered and articles are not produced. It refers to the cost procedure used for determining the cost per unit of services rendered. Service costing is just a variant of units or output costing. The principle is to accumulate costs under suitable headings and to express them in terms of the units of service rendered. Because of the diverse nature of activities carried out in services undertakings, the cost system used is obviously different from that of manufacturing concerns. The main differences arise in:

- (i) The adoption of a multiple cost unit
- (ii) The adoption of a suitable cost unit which is not a job or process but is related to the services rendered e.g. unit of electricity, tonne km. Of transport services.
- (iii) The manner of collection and allocation of costs to the cost unit.

Operating costs are usually collected under following headings:

- 1) Fixed or standard charges
- 2) Semi-fixed or maintenance charges
- 3) Variable or running charges

An important feature of operating costing is that mostly such costs are fixed in nature. The operating costs may be collected for different cost units so that the relevance, and utility of cost data could be understood e.g. in hospital cost accounting; fixed charge may be apportioned in accordance with the number of available bed days but variable costs in hospitals may be ascertained in terms of occupied bed days.



## **10. OPERATION COSTING**

Sometimes, a process may consist of several operations. Each operation in each process or stage of production is separately costed. Operation costing refers to the determination of unit operation cost by each operation forming part of a production process. The procedure of costing for operation is the same as for process costing. Material, labour and expenses are recorded separately for each operation and cost of one operation is transferred from one operation to another in the case of process costing.

When a series of operations is carried out to convert raw material into the finished production, rejections may occur at the end of such operation. To find out the ultimate conversion cost of specified quantity of output, consideration is to be given to the cumulative effect on conversion cost of the rejection at each operation.

### **Illustration - 4**

An article undergoes three successive operations from raw materials to the finished product stage. The following information is available from the production records of a particular month.

Operation No.	No. of pieces (input)	No. of pieces (rejected)	No. of pieces (output)
1	12,000	4,000	8,000
2	13,200	1,200	12,000
3	9,600	1,000	8,000

Find out what should be the input in the first operation in number of pieces to obtain a finished product of 100 pieces after the last operation.

Calculate the cost of raw material required to produce one piece of finished product from the following particulars:

Weight of the finished pieces .....100 gm. per piece

Price of raw material .....Rs. 10 per kg.



**Solution:**

Operation No.	No. of pieces		No. of pieces	
	Input	Output	Rejected	% of output
1	12,000	8,000	4,000	50%
2	13,200	12,000	1,200	10%
3	9,600	8,000	1,600	20%

If 100 good units should be the output of the third operation, the input should be 100 plus 20%, i.e., 120 units. This input of 120 units of the third operation should be the output of the second operation. The percentage of rejection in the second operation should be the output of the second operation. The percentage of rejection in the second operation being 10%, the input should be 120 plus 10% i.e., 132 units. Similarly, 132 units should be the output in the first operation. The rejection being 50%, the input in the first operation should be 132 plus 50% i.e., 198 units. This can be tabulated as follows:

Operation	Input	Rejection	% of rejection	Output
1	198	66	50	132
2	132	12	10	120
3	120	20	20	100

Thus if the input in the first operation is 198 units, 100 good units will be the output in the third operation.

It is given in the problems that the weight of a finished piece is 100 gm. Since for every finished piece of output, 100 gm. of materials are required, assuming that no other loss of material occurs, for 198 units of input in the first operation,  $198 \times 100 = 19,800$  gm. of raw materials are required. The prices of raw material being Rs. 10 per k.g., the price of the raw material required should be  $\frac{10 \times 19,800}{1,000} = \text{Rs } 198$ .

1,000

## **11. SINGLE/ OUTPUT/ UNIT COSTING**

Unit costing refers to the costing procedure, which is ideally used in case of concerns producing a single article on large scale by continuous manufacture. The cost units are identical with costs. The products to be costed are homogenous. Concern using single or output costing produces basically one product to two or more grades of one product.

It is not necessary to maintain separate cost accounts under this system, for, only by organising the financial accounts in a manner permitting the expenditure to be properly analysed. All the information required can be obtained. On dividing the total expenditure incurred by the number of units produced, the cost per units is ascertained.

This system of costing is suitable for breweries, collieries, cement works, etc. In all these cases the unit cost of the article produced requires to be ascertained.

The collection of expenditure on material, labour and direct expenses does not involve any special difficulty. The works and office expenses actually incurred also are included in the total cost. Items of indirect expenses which are only paid at periodical intervals, however, are included in accounts on the basis of estimates. Selling and distributing expenses, since these have no connection with the quantity produced, are not included in cost sheets. If however, it is decided to include them the same also are estimated on the basis of past experience.

For showing the computations of cost according to this method, it is customary to draw up a memorandum statement known as cost sheet. The various items of expenditure relative to production, for the given period, are included therein from financial books and stores records. When such a statement also includes amounts of sales and figure of profits, it is described as production or output statement. The cost sheet is prepared at weekly, monthly or any other convenient, intervals and usually contain information on the undermentioned groups:

- (a) Cost of Material consumed: Details as regards quantities and value of important materials are given.
- (b) Total wages paid for various types of labour employed.

- (c) Works indirect Expenses for the Product: Details thereof are shown under appropriate heads.
- (d) Office and administrative expenses state in lump sum.
- (e) The proportion or the amounts of different types of expenditure comprised in the unit cost of the article produced, is stated as a percentage in the first case and in rupees in the second.
- (f) For purpose of comparison, the corresponding figures of the preceding week or month as well as those for the preceding year are also included.
- (g) Abnormal losses or gains should be separated and not mixed with costs, for example, cost of material consumed should not include cost of material damaged due to carelessness.

### **Treatment of stock:**

Stock requires special treatment while preparing a cost sheet. Stock may be of raw materials, work-in-progress and finished goods.

### **Stock of Raw Materials:**

If opening stock of raw material, purchase of raw materials and closing stock of raw materials, are given, then, raw material consumed can be calculated as follows:

Opening stock of raw materials	-
Add: Purchase of raw materials	-
Less: Closing stock of raw materials	-
Value of raw material consumed	-

### **Stock of work-in-progress:**

Work-in-progress is valued at prime cost or works cost basis, but latter is preferred. If it is valued at works or factory cost then opening and closing stock will be adjusted as follows:

Price cost	-
Add: factory overheads	-

## METHODS OF COSTING

Work-in-progress (beginning)	-
Less: works-in-progress (closing)	-
Works cost	-

### **Stock of Finished Goods**

If opening and closing stock of finished goods are given, then these must be adjusted before calculating cost of goods sold:

Cost of production	-
Add: Opening stock of finished goods	-
Less: closing stock of finished goods	-
Cost of goods sold	-

### **Production Account**

If the details of cost sheet or production statement are shown in the form of a ledger account, it is known as production account. Besides cost of production it also includes selling and distribution expenses. It is prepared in three parts-the first part gives the cost of production, the second part gives the cost of goods sold and the third part shows profit or loss for the period. A specimen of a Production Account is as follows:

## PRODUCTION ACCOUNT

Particulars	Amount	Particulars	Amount
To Direct materials	.....	By Cost of Production c/d	.....
‘ direct labour	.....		
Prime Cost	.....		
‘ works overheads	.....		
‘ works in progress (opening)	.....		
Less: work-in-progress (closing)	.....		
Less: sale of by-products Or scrap	.....		
Works cost	.....		
‘ Administration overhead	.....		
To cost of production b/d	.....	By closing stock of Finished goods	.....
‘ Opening stock of finished Goods	.....	By cost of goods sold c/d	.....
To cost of goods sold b/d	.....	By sale	.....
‘ Selling and distribution Overheads	.....		
‘ Profit	.....		

Uses of cost sheet:

- (i) It gives total cost and cost per units for a particular period.
- (ii) It gives information to management for cost control.
- (iii) It provided comparative study of actual current costs with the cost of corresponding periods, thus causes of inefficiencies and wastage can be known and suitably corrected by management.
- (iv) It acts as a guide to manufacture in information of suitable and definite polices and in fixing up the selling price.

**REFERENCE MATERIAL**

Click on the links below to view additional reference material for this chapter

**[Summary](#)**

**[PPT](#)**

**[MCQ](#)**

**[Video1](#)**

**[Video2](#)**



# 7

## STANDARD COSTING AND VARIANCE ANALYSIS

---

### 1. CONCEPT OF STANDARD COSTING

Cost control, leading to cost reduction, should always be the objective of any firm or institution where scarce resources are used. Even if the firm can sell its goods or services at a very remunerative price, it should still try to reduce the use of factors of production, without jeopardising the quality of the product or the service. The best way of doing this is to constantly think as to where the cost can be further reduced; but the first step is to try to see that these do not go beyond a level determined beforehand. If this approach is adopted, i.e., if an attempt is made to see that actual costs do not go beyond this level, the approach will be that of Standard Costing. In fact, it is the philosophy of standards which will bring the best results and not merely the mechanism of adopting the Standard Costing techniques. The philosophy of standards, in a nutshell, means scrupulously separating all types of wastage and losses and not allowing them to cloud the cost of production, at least for purposes of internal consumption, suppose, a worker normally working 8 hours should produce 20 unit for a wage of Rs. 20; the proper labour cost of production is Re. 1 per unit. Suppose for any reason the worker produces only 12 units. Normally, the payment of Rs. 20 will be spread over 12 units and one would say that the labour cost per unit is Rs. 1.67. but if the philosophy of standards is practised, one would say that the proper labour cost of 12 unit will still remain Re.1. per unit or Rs. 12 in all ; 8 unit have not been produced and, therefore, at the rate of Re. 1 a per unit, there is loss of Rs.8. This amount should be charged to separate account. This account should be shown as a separate item in the revenue account of the firm so that management would know, at the each period, the extent of losses that have unnecessarily taken place. Of course, if extra efficiency has been

obtained, the effect of that efficiency should be credited to a separate account and shown as a separate item in the revenue accounts.

This really is the essence of standard costing-to set targets of cost, to try to achieve those targets, to compare the actual cost with the targets, to ascertain the reasons and to record the reasons in the books of account. Or if a regular record is not maintained, at least to bring the monetary effects of various factors that have operated in the organisation, to the notice of the management. Thus standard costing is an excellent system of control of costs and of measuring efficiency, and of improving upon it.

It may be noted in passing that usually standard costs are also given the same of predetermined costs. This mean that before work is actually started an extremely careful estimate of cost is prepared to serve as the standard against which the actual is to be measured. This term should not be confused with pre production costs since that would mean the costs to be incurred actually before.

Production commences, such as on trial runs, further, standards should not be confused with estimates. Estimates cannot rather loose forecasts of anything and in fact one thinks of actuals being correct and tends to judge the accuracy of estimates on the basis of actuals. In case of standard costs, the emphasis is that the figures of standard costs are correct and that one must explain why the actuals differ from the standards. Standards are far more exact and exacting than forecasts or estimates.

## **2. DEFINITION AND MEANING**

Standard costs are the scientifically pre-determined costs of manufacturing a single unit or a number of units of product or of rendering a service during a specified future period.

The Chartered Institute of Management Accountants. London, defines standard cost as "a standard expressed in money. It is built up from an assessment of the value of cost elements. Its main uses are providing bases for performance measurement, control by exception reporting, valuing stock and establishing selling prices."

What is evident from the above definition is that standard costs are planned costs of a product under current or anticipated operating conditions. The dictionary meaning of the word 'standard' is that it is a "thing serving as a basis for comparison", thing recognised as model for limitation". But it should be noted 'standard' is a relative term. Admittedly, what is standard for one may be substandard for another and vice versa. However, what is significant is that within an organisation, it serves as a desirable target.

The term 'standard cost' consist of two parts, viz., 'standard' and 'cost' standards can be established in respect of quantities and qualities like materials and labour. Cost involves the expression of the standard so established in values.

CIMA defines standard costing as "a control technique which compares standard costs and revenues with actual results to obtain variances which are used to stimulate improve performance". The technique of standard costing may be summarised as follows:

- (i) Pre-determination of technical data related to production, i.e. details of material and labour operation required for each product, the quantum of losses, level of activity, etc.
- (ii) Pre-determination of standard costs, in full details for each element of cost viz. material, labour and overhead.
- (iii) Comparison of the actual performance and costs with the standards and working out the variances i.e., the difference between the actuals and the standards.
- (iv) Analysis of the variances in order to determine the reasons for deviations of actual from the standard, and
- (v) Presentation of information to the appropriate level of management for suitable action.

### **3. STANDARD COSTING AND BUDGETARY CONTROL**

The systems of standard costing and budgetary control have the common objectives of controlling business operations by establishment of pre-determined targets, measuring the actual performance and comparing it with

the targets for the purpose of having better efficiency and of reducing costs. The two systems are said to be inter-related but they are not inter-dependent. Standard Costing is introduced primarily to ascertain efficiency and effectiveness of cost performance. Budgetary control is introduced to state in figures an approved plan of action relating to a particular period. Both Standard Costing and budgetary control have the following common features.

- (i) Both have common object of improving managerial control.
- (ii) Both techniques are based on the presumption that cost is controllable.
- (iii) In both the techniques result of comparison are analysed and reported to management.

Despite these common features, there are two different techniques. The points of difference may be summarised as follows:

## STANDARD COSTING AND VARIANCE ANALYSIS

	Standard Costing	Budgetary Control
(i)	It is related with the control of expenses and hence it is more intensive	It is concerned with the operation of the business as a whole and hence it is more extensive.
(ii)	Standard Costs are based on technical assessments	Budgets are based on past actuals, adjusted to future trends.
(iii)	To establish standard Costs, some forms of budgeting is essential as there is the need to forecast the level of output and prescribed set of working conditions in the periods in which the standard Costs are to be used.	Budgetary control can be applied even without the help of standard costing.
(iv)	Standards are set mainly for production and production expenses.	Budgets are compiled for all items of income and expenditure.
(v)	Standard cost is the projection of cost accounts.	Budget is a projection of financial accounts.
(vi)	Standards set up targets which are to be attained by actual performance.	Budgets set up maximum limits of expenses above which the actual expenditure should not normally exceed.
(vii)	In standard costing, variance are analysed in detail according to their originating causes. It reveals variances through different accounts such as, material price, variance, etc.,.	In budgetary control variances are related through the related accounts are revealed in total.
(viii)	Standard costs do not tell what the costs are expected to be, but rather what the costs should be under specific conditions of production performance and as such cannot be used for the purpose of forecasting.	Budgets are anticipated or expected costs meant to be used for forecasting requirements of material, labour, cash etc.
(ix)	Standard costs are used in various management decision, price fixing, value analysis, valuation of closing stock, etc.	It aims in policy determination, co-ordination of activities in different divisions and delegation of authority.



One must remember, however, that the two control systems are never treated as exclusive. Standard Costing is a specialised system in respect of costs; budgets are also concerned with cost among other things; therefore, it would add strength to budgetary control system, if it adopts standard costs in respect of cost data. The two are complimentary to each other.

### Standard Costs and Estimated Costs

Both Standard Costs and estimated costs are predetermined costs, but their objectives are different. Important points of difference between the two are as follows:

	Standard Cost	Estimated Cost
i.	Standard cost can be applied in a business operating under standard costing system.	Estimated costs can be used in any business which is running under historical costing system.
ii.	Standards are meant for controlling future performances.	Estimates are prepared mainly for price fixing purposes.
iii.	Standard Costs are determined on a scientific basis keeping in view certain factors and conditions of efficiency.	Estimated costs are calculated on the basis of past performance adjusted in the light of anticipated changes in the future.
iv.	Standard Costs are determined on a scientific basis keeping in view certain factors and conditions of efficiency.	The use of estimated cost is a statistical data only.
v.	Standard Costs are to be fixed in respect of every element of cost and therefore, it incorporate whole of the manufacturing process.	Estimated costs can be ascertained for a part of the business and also for a particular purpose.

## 4. ADVANTAGES OF STANDARD COSTING

Though the advantages will be fully comprehended when one has gone through the whole study paper and has studies the various implications of Standard Costing we give below the important advantages:



- 1) To determine standards which are at once practicable and represent efficient performance, the management will have to be fully aware of all the facilities that are available, the best way in which work can be done (for example, time and motor study is essential if labour standards are to be fixed properly) and will have to gather continuous and up-to-date information about all the happenings; this exercise will enable the firm to locate many sources of wastages and losses and to block them.
- 2) Human beings often work hard to achieve standards which are within their reach; therefore, setting up of such standards will almost automatically mean greater efficiency in operations. Further, almost everyone will think in terms of setting the target and of achieving them. This will be specially so if the system of rewards and punishment is also geared to the results.
- 3) If standards are themselves challenged periodically on a systematic basis, it will mean a constant increase in efficiency.
- 4) Standard Costing involves not only pre-determined quantity standards but also standards in respect of prices and rates. This may mean that all materials issued and labour applied will be evaluated on the basis of standard price and rates. This will itself reduce clerical labour. One can say that in general Standard Costing is more economical than the ordinary system of costing where quantities and prices vary day by day or week by week.
- 5) Standard Costing will enable objective judgement of the people and to that extent the systems of promotions, etc. will be more acceptable in the firm.
- 6) The management's own time can be saved to a large extent because the attention of management will be invited only to those matters which really require their attention. This will be done through the analysis of the deviation between the Standard Costs and actual costs. Management need pay attention only to those factors which have meant efficiency or inefficiency. (Management by Exception)
- 7) For the purpose of fixing prices, Standard Costs play a useful role; they exclude the day-to-day fluctuations in cost resulting from inefficient use of resources and movement in price, therefore, can be fixed on a long-term basis.

- 8) Even for valuation of inventory, Standard Cost should be the proper basis. If actual costs are high only because there has been a wastage of resources, it is not proper to capitalise those losses by including them in the value of inventory. Nothing becomes more valuable simply because of wastage and, therefore, inventory values should better be determined on the basis of Standard Costs.
- 9) In short, one can say that if a firm practises Standard Costing on proper lines, i.e. standards are themselves determined in a way which will not impose too great a burden on the workers or other employed of the firm, it may infuse in the minds of the staff a desire to achieve the standards and thus show greater efficiency.
- 10) At every stage of setting the standards, simplification and standardisation of products, method and operations are effected and waste of time and material is eliminated. This assists in managerial planning for efficient operation and benefits all the division of the concern.
- 11) Costing procedure is simplified. There is a reduction in paper work in accounting and less number of forms and records are required. There is considerable saving in clerical time and expenditure leading to reduction in the cost of the costing system.
- 12) This system facilitates delegation of authority and fixation of responsibility for each department or individual.
- 13) Where constantly reviewed, the standard provides means for achieving cost reduction. This is attained through, improved method, improved quality of products, better materials and men, effective selection and use of capital resources etc.
- 14) Standard costs assist in performance analysis by providing ready means for preparation and interpretation of information.
- 15) This facilitates the integration of accounts so that reconciliation between cost accounts and financial account may be eliminated.

## **5. LIMITATION OF STANDARD COSTING**

Standard costing has certain limitations. These are the following:

- (i) Establishment of Standard Costs is difficult in practice. Even if the particular type of standard to be used has been properly defined, there is no guarantee that the standard established will have the same tightness or looseness as envisaged throughout the organisation.
- (ii) In course of time, the standards become rigid. It is not always possible to change standard to keep pace with frequent changes in the manufacturing conditions, frequent revision of standards is costly and creates problems.
- (iii) Inaccurate, unreliable and out-of-date standards do more harm than any good.
- (iv) Sometimes, standards create adverse psychological effects, if the standard is set at high level, its non-achievement results in frustration and a build-up of resistance. This acts as a discouragement rather than an incentive for better efficiency.
- (v) Due to the play of random factors, variances cannot sometimes be properly explained, and it becomes difficult to segregate controllable and un-controllable variances.
- (vi) Standard Costing may be suitable for small concerns. Where production concerns. Where production cannot be carefully scheduled, frequent changes in production conditions result in variances, detailed analysis of all which would be meaningless, superfluous, and costing.
- (vii) Standard Costing with non-standardised products and for repairs jobs which keep on changing in accordance with customers' specifications. Also, where products take more than one accounting period for completion, standards may not be very effective.

## **6. TYPES OF STANDARDS**

As 'standard' is a relative expression, one has to determine for oneself what one deems appropriate as a 'standard'. However, one should not lose sight of the objective which the normally should be avoidance of all losses and wastages as far as possible. Management may certainly fix standards on the

basis of maximum possible efficiency, possibly with an assumption of no wastage, no idle time, etc. However, this is not realistic; the standard will be.

The 'Ideal standard' but impracticable- no one will given make an attempt to achieve it.

Alternatively an average of past few years costs could be taken as basis but this will mean perpetuating past inefficiencies, by making them the target. This will defeat the very purpose of Standard Costing. A target should be such that it will induce the worker to give out his best. In order to make people believe in standards and to induce them towards achieving them, standards should better be such as can be achieved but with an effort; in order words, they should be somewhat idealistic.

**Basic standard:** This is a "standard", which is established for use, unaltered over a long period of time. Standards are fixed scientifically and hence it is more of a technical job. These standards are supposed to remain unchanged so long as quality requirements are constant. Moreover, if forwards contract are entered into regarding materials and labour pact signed for a certain period, the costs can be planned accordingly. Such costs, i.e., basic standards may, have to be adjusted for changes in circumstances in a period.

**Current standard:** In practice, standards are fixed on the basis of scientific studies but adjusted for current subjective factors. A standard, therefore, is made realistic. To reflect the anticipated conditions affecting operations; it is not too idealistic. Such a standard would bring to sharp focus the avoidable causes for variance, leading to control action. A current standard is a standard for a certain period, for certain condition and for certain circumstances. Basis standards are more idealistic whereas current standards are more realistic. Most companies use current and not basic standards.

**Expected or attainable standard:** A standard though idealistic should also be realistic. If targets are fixed for a certain budgeted period, taking into account the expected conditions, it can be know as " expected standard" or " attainable standard" it is defined by **CIMA, London** as " a standard which can be attained if a standard unit of work is carried out efficiently, a machine properly operated or a material properly used. Allowances are made for normal losses, waste and machine downtime".



**Normal standard:** Yet another target is one which is intended to cover a longer period of time- a period long enough to cover one trade cycle, i.e., roughly 7 to 10 years. This is defined as " the average standard which it is anticipated can be attained over a future period of time, preferably, long enough to cover one trade cycle.

**Ideal standard:** This standard refers to the target which can be attained under most ideal conditions. Hence, it is more idealistic and less realistic. It is defined by the terminology as: "The standard which can be attained under the most favourable condition, with no allowance for normal losses waste and machine down time".

### **7. CONCEPT OF STANDARD HOUR**

A standard hour is the expression of the actual output in terms of standard time instead of units. This would facilitate expression of dissimilar output in the terms of a common factor and thus measure total activity. According to the Chartered Institute of Management Accountants, London, standard hour means the quantity of the work achievable at standard performance in an hour. When the term standard hour is used, it is assumed that it represents the amount of work to be done in sixty minutes. For example, if a welder welds one piece in 20 minutes according to the standard, the standard output in one clock hour will be 3 units. If the number of units actually produced in one day (of 8 hour) is 30, then the output can be expressed as to 20 standard hours though the welders has actually worked for 8 hours only. The concept of standard hour enables measurement of activity of a factory for producing dissimilar units and expressing them in a single measure. According comparison of levels of activity between two period can be done by converting the different outputs into standards hours.

#### **Illustration - 1**

In a factory three products, A, B and C are produced. The standard time allowed respectively is 10 hours, 15 hours, and 12 hours. The actual production in May 1991 and June 1991 was as stated below:

## STANDARD COSTING AND VARIANCE ANALYSIS

	May units	June units
Product A	20,000	12,000
Product B	10,000	12,000
Product C	15,000	18,000

By what percentage has production changed in June over May? If the actual hours paid for each in May and June were 6,00,000, what is the rate of labour efficiency?

### **Solution:**

Statement of Production in May and June 1991.

May	June			
	Units	Std. Hours	Units	Std. Hours
Product A	20,000	2,00,000	12,000	1,20,000
Product B	10,000	1,50,000	12,000	1,80,000
Product C	15,000	1,80,000	18,000	2,16,000
<b>TOTAL</b>	<u>45,000</u>	<u>5,30,000</u>	<u>42,000</u>	<u>5,16,000</u>

Output in June declined by 14,000 hours, i.e., by 2.6% over May 1991

Labour efficiency: May	$\frac{5,30,000}{6,00,000} \times 100$ or 88.33%
June	$\frac{5,16,000}{6,00,000} \times 100$ or 86.00%

## **8. SETTING OF STANDARD COSTS**

It should be noted that though standards must be set for materials, labours and overheads, only an integrated approach will bring the best results. There can be saving in labour, for example, if materials of certain quality or size are purchased or if more automatic machines are introduced. When standards are to be laid down, the exact process of production and the facilities that are to be used for the purpose should be decided and taken into account. Then only the standards can be fixed properly.

The first step in the development of a Standard Costing system is to set standard costs, i.e., to predetermine the standards in respect of each



element of cost-direct material, direct labour and overheads. Extreme care is essential in the fixation of standards as the success of a standard costs used. While setting production cost standards, the following factors should be considered:

- (i) Technical and operational aspects of the concern.
- (ii) Industrial engineering criteria for materials, labour, etc.
- (iii) The types of standard to be used.
- (iv) Proper classification of the accounts so that variance may be determined properly.
- (v) Responsibility for setting standards. As definite responsibility for variances from standards is ultimately to be laid on individuals or departments, it is obvious that all those individuals or department should be associated with setting of standards.

### **9. DIRECT MATERIAL STANDARDS**

The Standard Cost of direct materials is closely related to the quantities and prices of material to be used in production. Hence, two related standards are set:

- (i) **Material Usage Standard:** The object of setting the materials usage standard is to achieve maximum efficiency in material usage. The first step in this connection lies in specifying the size and quality of materials. This is followed by an analysis of the materials requirements. A list is prepared showing the details of materials size, grade, quantity etc.- for setting the standard. This is known as a "Standard Materials Specification." The standard quantities of material to be used per unit of production can be laid down by one of the following means:
  - (a) By reference to the weight of material in the final product.
  - (b) On the basis of past performance with due allowance for changes in conditions.
  - (c) By means of test runs conducted under different conditions and taking as average of quantities used.

Due allowance must be made for normal wastage. This is generally based on an estimate wastage which is unavoidable, e.g., normal loss through evaporation, off-cuts, broken parts, etc.

(ii) **Materials Price Standard:** Standards are set for material prices after due consideration of the efficiency of purchasing and store-keeping functions. The aim of setting materials price standard is to achieve maximum efficiency in these functions, and thus minimise direct materials costs. The price standard should provide for discount on purchases, economy of bulk purchasing and anticipated changes in market price.

### 10. STANDARD COST FOR DIRECT LABOUR

Direct labour cost depends upon labour time and wage rates and therefore, setting standard cost for direct labour involves setting two related standard:

- (i) **Standard Labour Time:** This indicates the precise time (hours) that labour of a particular grade should take to perform a given operation. The main object of setting standard labour time is to derive maximum efficiency in the use of labour time. The standard time may be set on the basis of past performance with adjustments for change of conditions. Time and motion studies are a great help in setting standard time.
- (ii) **Labour Rate Standard:** This refers to the wage rates expected to be paid of different grades of labour employed in the organisation. The object is to plan for the actual wages to be paid. A variety of factors should be considered and allowance made for them while setting standard wages rates, principal of them are future trend of wages which can be anticipated; collective agreement between labour and management; guaranteed minimum wages; and overtime wages, if the level of activity makes overtime inevitable.

Both these standards must be set after a detailed study of labour work involved. Besides, the workers employed must be graded on standard basis.

## **11. STANDARD OVERHEAD RATES**

The principal object of setting standard overhead rates is to minimise the overhead costs chargeable to production. Following steps are necessary for setting standards rates:

- (i) The level of activity of production departments and the work to be done by the service departments should be determined.
- (ii) Overhead costs should be classified into fixed, variable and semi-variable overheads. The costs expected to be incurred under each head for each of the production and services departments should be calculated for a given period. The expected costs may be laid down in details in the form of cost-budget based on past experience, present conditions and future trends.
- (iii) The standard overhead rates for each of the service departments should be calculated, and applied to the producing departments.
- (iv) The standard overhead rates for the producing department may be determined as a direct labour hour rate, or machine hour rate, or as a percentage of direct wages. The rates may be computed using the following ratios:

### **Direct Labour Rate**

$$\frac{\text{Total Standard Overhead Cost of Production Department}}{\text{Standard Direct Labour Hours for Production Department}}$$

### **Machine Hour Rate**

$$\frac{\text{Total Standard Overhead Cost for Production Department}}{\text{Standard Machine Hours}}$$

### **Percentages of Direct Wages**

$$\frac{\text{Total Standard Overhead Cost for Production Department} \times 100}{\text{Standard Direct Wages for Production Department}}$$

## **12. STANDARD ADMINISTRATION COSTS**

The object of setting a standard administration cost is to secure the maximum quantity and quality of administrative services at minimum cost. For this purpose, all administrative functions should be studied in detail. O and M division by examining the office operation and suggesting simplification and standardisation of methods and procedures may help a lot in this.

The standard quantity of work to be performed may be set by one or more of the following methods:

- (i) On the basis of past performance:
- (ii) On the advice of organisation and methods team;
- (iii) Time and motion studies; and
- (iv) Choosing appropriate 'work units' and fixing Standard Costs per work-unit.
- (v) Administrative costs should be classified into fixed, variable and semi-variable items before setting the standard rates.

## **13. STANDARD COSTS FOR SELLING AND DISTRIBUTION**

Since selling and distribution expenses are primarily related to volume of sales, a sales forecast is essential before setting standards of selling and distribution costs. The classification of these costs into fixed, variable and semi-variable items is necessary. Another pre-requisite for setting standards is a detailed examination of the functions and determining standard units of operation.

## **14. COMPUTATION AND ANALYSIS OF VARIANCES**

The primary object of standard costing is to reveal the difference between actual cost and standard cost. A 'variance' in standard costing refers to the divergence of actual cost from standard cost. Variances of different cost items provide the key to cost control. They indicate whether and to what

extent standards set have been achieved. This enables management to correct adverse tendencies.

The Chartered Institution of Management Accountants London, defines variance as "the difference between planned, budgeted, or Standard Cost and actual cost; and similarly for revenue" variance analysis can be defined as " the analysis of performance by means of variance". It is the process of computing the amount of and isolating the cause of variances between actual costs and standard costs. Variance analysis involves:

- (a) Computation of individual variances, and
- (b) Determination of the cause (s) of each variance.

Actual cost which is higher than the Standard Costs would be a sign of inefficiency and the difference would be termed as unfavourable or adverse. A variance that reduces profit is adverse or unfavourable. A variance that increases profit is favourable variance and is computed under each element of cost for which standards can exercise proper control. The cause is affixed to the variance, for example, materials price variance will show that the variance arose due to change in the price of materials. Some of the variance are controllable while others are not. The purpose of such classification is that proper emphasis can be placed on the controllable variance. This follows the principal of management by exception.

Variances occurring in a period may be compared with variances on the same account expressed as a percentage of the standard costs and compared with the percentage for the previous month. Comparison may be made between the standard and actual or between basic standard and current standard.

As already stated, the origin and causes of the variances need to be traced by analysing the total variances into their components parts in order to determine and isolate the causes giving rise to each variance.

Equal emphasis should be laid on favourable and unfavourable variances. An unfavourable variance points out the inefficiency in use or waste of materials, labour, and resources. A favourable variance may be due to improvement in efficiency or production of substandard products or an incorrect standard. An unfavourable variance may be off-set by a favourable variance; hence the need for analysis and appropriate action.



A detailed probe into the variance, particularly the controllable variance, help the management to ascertain:

- (a) The amount of variance;
- (b) Its occurrence;
- (c) The factors responsible for it;
- (d) The executive responsible for the variance'
- (e) Corrective action which should be taken to obviate or reduce the variance.

**Favourable and unfavourable variance:** If the actual cost is less than standard cost, the difference is known as a favourable variance, credit variance or positive variance denote by (F) or cr.-it increases the profit. On the other hand, if actual cost exceeds, standard costs, the divergence is know as an unfavourable variance, debit variance, negative variance of adverse variance denoted by (A) or dr.- it reduces the profit.

**Controllable and Uncontrollable Variances:** When the variance with respect to any item reflects the degree of efficiency of an individual or department, i.e., a particular individual department head is responsible for the variance, the variance is known as a controllable variance. Obviously, such a variance is amenable to control by suitable action. An uncontrollable variance is one which is not amenable to control by individual or department action. Such a variance is caused by external factors like change in market conditions. Fluctuations in demand and supply, etc,. No particular individual within the organisation can be held responsible for it.

When variances are reported, attention of the management is particularly drawn towards controllable variances. If a variance has been caused by multiple factors the part of cost variance relevant to each factor should be determined.

There are certain variance which may arise under material, labour or overhead due to change in the basic condition on which the standards are established.

**Revision Variance:** This is an amount by which a budget is revised but which is not incorporated in the Standard Cost rate as a matter of policy. The



## STANDARD COSTING AND VARIANCE ANALYSIS

Standard Costs may be affected by wage rate change after wage records, fiscal policy etc. The Standard Costs are not disturbed to account for these uncontrollable factors and to avoid the amount of labour and cost involved in revisions, the basic Standard Costs are allowed to stand. It is essential to isolate the variance arising out of non-revision in order to analyse the other variances correctly.

**Method Variance:** It is the difference between the Standard Cost of the product manufactured or operation performed by the normal methods and the cost of operation by alternative method. Standards usually take into account the best. Method applicable, and any deviation will result in an unfavourable variance. Hence such deviations should be as few as possible.

Variance analysis usually proceeds after amending the standards according to the revision variance and the method variance.

### Illustration - 2

Standard cost of a product in a factory is determined as follows:

	Rs.
Material (5 units @ Rs. 4 each)	20
Labour (20 hours @. 1.50 per hour)	30
Overhead expenses	<u>10</u>
Total	<u>60</u>

During a period, 8,000 units were produced whose actual cost was as follows :-

	Rs.
Material (40,500 units @ Rs. 5 each)	2,02,500
Labour (1,50,000 hours @ Rs. 1.60 each)	2,40,000
Overhead expenses	<u>90,000</u>
Total	<u>5,32,500</u>

Prepare a statement showing standard cost, actual cost and variance.

**Solution:****Statement of Standard Cost, actual cost and variances**

The above statement shows the variance in respect of each element of cost. Each such variance can be further analysed. Before making such analysis it is necessary to recognise the two broad process in cost accumulation. The cost is first incurred and then charge to production. For example, materials are purchased first (normally) and then issued for production and wages are incurred first and then charged to production on the basis of time spent on production. Thus, there are two stages. In cost accumulation, namely, (i) the incurring stage, (ii) the recovery stage. The recognition of these two stages. Analysis involves identifying and quantifying the variance at both these stages.

Particulars	Standard Cost Rs.	Actual Cost Rs.	Variance Rs.
Material	1,60,000	2,02,500	42,500 (A)
Labour	2,40,000	2,40,000	-
Overhead expenses	80,000	90,000	10,000 (A)
Total	4,80,000	5,32,500	52,500 (A)

Before we proceed to analyse the variance, the following essential points should be noted regard to the utility of the variance analysis:

- (i) Variances should not be automatically applied for control purposes. They are just indicators of where the reason for higher cost exists. It is up to the controlling authority to judge whether the higher costs are well justified. The actual cost may be higher due to factors absolutely out of the control of the responsible authority and perhaps the responsible authority had contributed in preventing the actual cost from escalating too high. In such a situation applying controls implicit on the basis of variances disclosed will lead to demoralisation of staff.
- (ii) While comparing the actual costs with the standards, the level of activity should be checked up for comparability. If standards have been evolved for a budgeted level of activity and if the actual level is different, a simple comparison of actuals with budget would be erroneous. The standards should be revised in accordance with the actual level of activity attained.

But, in doing so care should be taken to distinguish between fixed costs and variable costs. The difference between the original standard and revised standard is known as "revision variance."

(iii) While working out the variance in respect of fixed costs (particularly fixed overhead), it should be kept in mind that what is charged to cost is not the actual cost but an amount based on pre-determined recovery rates multiplied by the output which may be expressed in standard hours.

**Two-way Analysis of variance:** A study of the illustration already referred to would show that a simple comparative statement would bring about the variances in respect of each element of cost. Now, each variance has to be analysed as (i) incurring variance, and (ii) recovery variance. Also, broadly, the causes leading to a variance may be either efficiency or inefficiency in the use of resources or change in the price paid for the resources.

Accordingly, we have the following analysis:

(i) Material cost variance	Material price variance Material usage variance
(ii) Labour cost variance	Labour rate variance Labour time variance
(iii) Overheads cost variance	Overhead expenditure variance Overhead volume variance

As each element of cost is analysed into two broad groups. It is known as "Two-way Analysis".

### **15. MATERIAL COST VARIANCES**

Material cost variance is the difference between the Standard Cost of materials specified and the actual cost of material used.

Material cost variance = Standard Cost of Material - Actual cost of material used.

Material cost variance arise due to variation in the price of the material or in its usage. In accordance with this, materials cost variance may be analysed under two heads. viz. materials price variance and materials usage variance.

(a) **Material Price Variance:** This is that portion of the materials cost variance which is due to the difference between the standard price specified and the actual price paid. Material price variance is that portion of the direct material cost variance which is the difference between the standard prices specified and actual prices paid for the direct material used. This is an "incurring " variance. This reflects the extra price paid on the units purchased. While making this calculation standard consumption of units should not be given any consideration. It is computed by multiplying the actual quantity by the difference between the standard price and the actual price. The formula is:

Material price variance = Actual Qty (standard units price - Actual unit Price)

Or  $AQ(SP - AP)$

In other words, material price variance is the difference between 'what it actually cost and what it would have cost if the actual usage had been paid for at the standard price'.

In the illustration given earlier Re. 1 has been paid extra on 40,500 units (actually used). Hence, material price variance in Rs. 40,500 (A).

The reasons for material price variance may be one or more of the following:

- (i) Changes in market price of materials used;
- (ii) Changes in quantity of purchase or uneconomical size of purchase order resulting in a different price;
- (iii) Failure to obtain cash and/or trade discount which were provided while setting standards;
- (iv) Rush order to meet shortage of supply;
- (v) Failure to take advantage of off-season price, or failure to purchase when price is cheaper;
- (vi) Emergency purchases on the request to production/sales manage;

- (vii) Changes in issue price due to differences in changes related to store-keeping, material handling, carriage inward expenses etc.
- (viii) Changes in the amount of taxes and duties;
- (ix) Changes in quality or specification of material purchased;
- (x) Use of substitute material having a higher or lower unit price;
- (xi) Changes in the pattern or amount of taxes and duties.

The materials price variance is generally the responsibility of the purchase manager.

However, the variance may be ultimately traceable to factors beyond his control like changes in the market price.

(b) **Material Usage Variance:** This is that portion of material cost variance which is due to the difference between the standard quantity of materials specified and the actual quantity used. Material usage variance is that portion of the direct material cost variance which is the difference between the standard quantity specified for the production achieved and the actual quantity used both valued at standard prices. The divergence of actual quantity of material used from the standard quantity set, multiplied by the standard price is known as the material usage variance. The formula for the calculation of this variance is:

Material Usage Variance = Standard Price (Actual Quantity - Standard Quantity)

i.e.  $SP (AQ - SQ)$

In the illustration given above, 40,000 units of materials should have been used for producing 8,000 units of finished goods: actual consumption is 40,500 units or for 500 units, the amount comes to Rs. 2000. Thus material usage variance is Rs. 2,000 (a).

The usage variance may have been caused by one or more of the undernoted factors:

- (i) Lack of due care in the use of materials;
- (ii) Defective production necessitating additional material for correction;



- (iii) Abnormal wastage through pilferage or other losses in the use of materials;
- (iv) Inefficiency in production due to improper method or lack of necessary skill in workmen;
- (v) Use of a material-mix other than the standard mix; and
- (vi) Yield from materials in case excess of or less than that provided as the standard yield;
- (vii) Purchase of inferior material or change in quality of material;
- (viii) Rigid technical specifications and strict inspection leading to more rejections which require more materials for rectification.
- (ix) Use of substitute material leading to poor quality.
- (x) Improper maintenance of machine leading to breakdowns and more use of material ; and
- (xi) Poor inspection of raw materials.

A favourable variance may not always be advantageous for the concern. For instance, a saving in material usage may perhaps be effected by a reduction in wastage by slowing down the work but the resulting increase in the labour and overhead costs may far exceed the favourable materials usage variance.

Material usage variance may further be classified into:

(i) **Material Mixture Variance:** One of the reasons for material usage variance is change in the composition of the materials mix. It results from a variation in the material mix used in production. Thus, if a large proportion of the more expensive material is used than that laid down in the standard mix, materials usage will reflect a higher cost than the standard. Contrarily the use of cheaper material in large proportions will indicate a lower cost of material usage than the standard.

It is that portion of the material usage variance which is due to the difference between the standard and actual composition of a mixture of materials. In other words, this variance arises due to a change in the ratio of actual material mix from the standard ratio of material mix. It is calculated as the



## STANDARD COSTING AND VARIANCE ANALYSIS

difference between the standard price of standard mix and the standard price of actual mix.

Suppose for producing an article the materials standard is 6 kg. of material A @ Rs. 5 per kg. and 4 kg. of material B @ Rs.6 per kg. And the actual quantities used are 5 kg. of material A and B each. The total quantity used is still 10 kg. But the material cost will increase as shown below :

Due to the change in the relative proportions of the two materials, the total cost has risen; this is the nature of the mix variance. It is calculated by comparing (revised) standard mix at standard prices and the actual mix at standard prices.

		Rs.	Rs.
Standard:	Material A 6 kg. @ Rs.5	30.00	
	Material B 4 kg. @ Rs.6	24.00	54.00
Actual:	Material A 5 kg. @ Rs.5	25.00	
	Material B 5 kg. @ Rs.6	30.00	55.00

the total cost has risen; this is the nature of the mix variance. It is calculated by comparing (revised) standard mix at standard prices and the actual mix at standard prices.

Revised standard Mix =  $\frac{\text{Total of actual quantities of all material} \times \text{Standard quantity of any one material}}{\text{Total of standard quantity of all types of material}}$

See the illustration given below:

### Illustration 3:

For producing one unit of a product, the material standard is:

Material X: 6 kg. @ Rs. 8 per kg and  
Material Y: 4 kg. @ Rs. 10 per kg

In a week, 1,000 units were produced the actual consumption of materials was:

Material X: 5,900 kg. @ Rs. 9 per kg and  
Material Y: 4,800 kg. @ Rs. 9.50 per kg

Compute the various variances.

## Solution:

Standard cost of material of 1,000 units:

	Rs.
Material X: 6,000 kg. @ Rs. 8 per kg	48,000
Material Y: 4,000 kg. @ Rs. 10 per kg	<u>40,000</u>
Total	<u>88,000</u>

Actual cost:

Material X: 5,900 kg. @ Rs. 9 per kg	53,100
Material Y: 4,800 kg. @ Rs. 9.50 per kg	<u>45,600</u>
Total	<u>98,700</u>

Total material cost variance	10,700 (A)
------------------------------	------------

## Analysis

Material Price Variance:

Actual Quantity (Standard Price - Actual Price)

X = 5900 (Rs. 8 - Rs. 9) = Rs. 5,900 (A)

Y = 4800 (Rs. 10 - Rs. 9.50) = Rs. 2,400 (F)

Rs. 3,500 (A)

Material Usage Variance:

Standard Price (Standard Quantity - Actual Quantity)

X = Rs. 8 (6,000 - 5900) = Rs. 800 (F)

Y = Rs. 10 (4000 - 4800) = Rs. 8,000 (A)

Rs. 7,200 (A)

Material Cost Variance =  
[Rs.10,700(A)]

Material price variance [Rs.3500(A)]  
Plus material usages variance (Rs. 7,200(A))

Material Mix Variance:

Revised standard mix (total actual quantity 10,700 kg.)

Material X -  $10,700 \times \frac{6}{10}$  = 6,420kg.

## STANDARD COSTING AND VARIANCE ANALYSIS

$$Y - 10,700 \times \frac{4}{10} = 4,280 \text{ kg.}$$

Standard cost of revised standard mix:

	Rs.	Rs.
X 6,420 kg. @ Rs. 8	51,360	
Y 4,280 kg. @ Rs. 10	42,800	94,160

Standard cost of actual mix:

X 5,900 kg. @ Rs. 8	48,200	
Y 4,800 kg. @ Rs. 10	48,000	<u>95,200</u>
Material mix variance (Difference)		<u>1,040(A)</u>

The net usage variance will be Rs. 7,200 less Rs. 1,040 or Rs. 6,160 as proved below:

	Rs.
X (6,420 - 6,000) x Rs. 8	3,360 (A)
Y (4,280 - 4,000) x Rs. 10	<u>2,800 (A)</u>
	<u>6,160 (A)</u>

(ii) **Material Yield Variance:** Yield variance is the difference between the standard yield specific and the actual yield obtained. In other words, the difference between actual yield of material in manufacture and the standard yield (i.e. expected yield from a given standard input) valued at standard output price is known as material yield variance. This variance is of great significance in processing industries, in which the output of one process becomes the input of the next process till the finished product is obtained at the final stage. The analysis of this variance helps effective control over usage. A low actual yield is unfavourable yield variance which indicates that consumption of materials was more than the standard. A high actual yield indicates efficiency, but a constant high yield is a pointer for the revision of the standard.

The formula for calculating the yield variance is:

Material Yield Variance = Standard Yield rate (Actual - Standard yield)

Standard yield rate =  $\frac{\text{Standard cost of Standard mix}}{\text{Net standard output i.e (Gross output - Standard loss)}}$

Or material Yield variance =

Standard output price (standard loss in terms of actual input- Actual loss on actual Output)

The yield variance may be caused by such factors as: defective methods of operation, sub-standard quality of materials purchased, lack of due care in handling. Lack of proper supervision etc.

### ILLUSTRATIONS

The method of computing, analysing and recording of material cost variance may be illustrated below with the help of following assumed data:

#### Illustration - 4

In a manufacturing process, the following standards apply:

Standard Price	Raw materials A Rs. 1 per kg.
	Raw materials B Rs. 5 per kg.

Standard Mix 75% A; 25% B (by weight)

In a period the actual costs, usage and output were as follows:

Used: 4,400 kgs. of A costing Rs. 4,650  
1,600 kgs. of B costing Rs. 7,850

Output: 5,670 kgs. of products

The budgeted output for the period was 7,200 kgs.

**Solution**

Standard yield from 6,000, i.e. (4,400 + 1,600) kgs. of output is

	Rs.
6,000 kgs. x 90% i.e. 5,400	
Material A (75%) = 4,500 kgs. @ Rs. 1	4,500
Material B (25%) = 1,500 kgs. @ Rs. 5	7,500
6,000 kgs.	12,000
Less 600 kgs. (Loss)	-
Output: 5,400 kgs.	12,000
Standard cost of actual output (5,670 kgs.)	

$$\text{Rs. } 12,600 = \frac{5,670 \times 12,000}{5,400}$$

Actual cost

Kgs.	Rs.
Material A 4,400	4,650
Material B <u>1,600</u>	<u>7,850</u>
6,000	
	12,500
Less 330 (Loss)	
	<u>5,670</u>
	12,500

Variance Analysis

$$\begin{aligned} \text{Material cost variance} &= \text{Actual cost} - \text{Standard cost} \\ &= \text{Rs. } 12,500 - \text{Rs. } 12,600 = \text{Rs. } 100 \text{ (F)} \\ \text{Price variance} &= \text{Es. AQ (SP - AP)} \\ \text{Material A: Rs. } 4,400 - \text{Rs. } 4,650 &= \text{Rs. } 250 \text{ (A)} \\ \text{Rs. } 8,000 - \text{Rs. } 7,850 &= \underline{\text{Rs. } 150 \text{ (F)}} \\ &= \underline{\text{Rs. } 100 \text{ (A)}} \end{aligned}$$

Mix Variance = SP (Standard proportion - Actual proportion)

	Rs.
Material A: Rs. 4,500 - 4,400	= 100 (F)
Material B: Rs. 7,500 - 8,000	= <u>500 (A)</u>

## STANDARD COSTING AND VARIANCE ANALYSIS

$$\begin{aligned}\text{Yield Variance} &= \text{Standard yield price (Actual yield - Standard yield)} \\ &= \frac{\text{Rs. } 12,000}{5,400} \times (5,670 - 5,400) = \text{Rs. } 600 \text{ (F)}\end{aligned}$$

Total Material Cost Variance:

	Rs.
Price Variance:	100 (A)
Mix Variance:	400 (A)
Yield Variance:	<u>600 (A)</u>
	<u>100 (F)</u>

### 16. LABOUR COST VARIANCES

Labour cost variance (also termed as direct wage variance) is the difference between the standard direct wages specified for the activity achieved and the actual direct wages paid. The formula for Labour cost variance is.

$$\text{LCV} = (\text{Standard Hours} \times \text{Standard Rate}) - (\text{Actual Hours} \times \text{Actual Rate})$$

As the cost of labour is determined by labour time and wages, the labour cost variance is composed of either or both of variances relating to labour time and labour rate. As such, labour cost variance is analysed into two separate variances, viz., wages rate variance and labour efficiency variance.

(i) **Wages Rate Variance:** This is that portion of the wages variance which is due to the difference between the actual rate and standard rate of pay specified. It is calculated like the material price variance.

$$\text{Labour Rate Variance} = \text{Actual Hours} (\text{Standard Rate} - \text{Actual Rate})$$

Wage rate variance occur due to the following causes:

- (i) Change in basic wage structure or change in piece work rate.
- (ii) Overtime work in excess of that provided in the standard rate.
- (iii) Employment of one or more workers of a different grade than the standard grade.
- (iv) Payment of guaranteed wages to worker who are unable to earn their normal wages if such guaranteed wages form part of direct labour cost.



- (v) New workers not being allowed full normal wages rates.
- (vi) Use of different method of payment i.e. payment of day rates while standards are based on piece work method of remuneration.
- (vii) Higher wages paid on account of overtime for urgent work.
- (viii) The composition of a gang as regards the skill and rate of wages being different from that laid down in the standard.

Wages rates are usually determined by factors beyond the control of the personnel department such as conditions in the labour market, wages awards by wage boards, etc. Wage rate variances are therefore, mostly uncontrollable except for the portion which arises due to department of wrong grade of labour for which the departmental executive may be held responsible.

(ii) **Labour Time or Efficiency Variance:** Also termed as labour efficiency variance, is that portion of the direct wages variance which is due to the difference between the standard labour hours specified and the actual labour hours expended. Obviously, this variance provides a key to the control of worker's efficiency and labour cost. In effect, it is a usage variance. The computation of variance is as follows:

Labour Efficiency Variance = Standard Wage Rate (Standard Hours of production - Actual Hours worked)

The causes giving rise to labour efficiency variance are as follows:

- (i) Lack of proper supervision or stricter supervision than specified;
- (ii) Poor working condition;
- (iii) Defective machinery and equipment;
- (iv) Discontentment in workers due to unsatisfactory personnel relations;
- (v) Increase in labour turnover;
- (vi) Use of non-standard material requiring more or less operation time;
- (vii) Basic inefficiency of workers due to insufficient training, faculty instructions,

(viii) Wrong selection of workers.

Calculation of wage variance is illustrated below :

Example: Assuming:

Actual hours worked	5,600
Actual wage paid	Rs. 7,840
Standard rate per hour	Rs. 2
Standard hour produced	Rs. 4,000

Answer: Wages variance = Standard cost - Actual cost

$$(4,000 \times \text{Rs. } 2) = \text{Rs. } 8,000 - \text{Rs. } 7,840 = \text{Rs. } 160 \text{ (F)}$$

$$\begin{aligned} \text{Wages rate variance} &= \text{Actual hours (Standard rate - Actual rate)} \\ 5,600 \text{ Rs. } 2 - \frac{\text{Rs. } 7,840}{5,600} &= \text{Rs. } 3,360 \text{ (F)} \end{aligned}$$

$$\begin{aligned} \text{Labour efficiency rate variance} &= \\ \text{Rs. } 2 (4,000 - 5,600) &= \frac{\text{Rs. } 3,200 \text{ (A)}}{\text{Rs. } 160 \text{ (F)}} \end{aligned}$$

Mention may be made of a few subsidiary variances related to labour costs:

**Idle time variance:** This variance which forms a portion of wages efficiency variance, is represented by the standard cost of the actual hours for which the worker remain idle due to abnormal circumstances. The formula is:

$$\begin{aligned} \text{Idle Time Variance} &= (\text{Actual hours paid for} \times \text{Standard rate}) - \\ &\quad (\text{Actual hours worked} \times \text{Standard rate}) \end{aligned}$$

or

$$\text{Idle Hours} \times \text{Standard rate.}$$

It is always adverse. Suppose in the example given above the actual time includes 1,000 idle hours. The Idle Time Variance will then be Rs. 2,000 (A); the efficiency Variance will be then Rs. 1,200 (A), making a total of Rs. 3,200 (A).

**Labour Mix Variance:** Also know as Gang Composition Variance. This is a subvariance which arises due to change in the composition of a standard gang of combination of labour force.

The formula for computing labour mix-variance is:

(Actual hours at standard rate of actual gang -  
Actual hours at standard rate of standard gang.)

or

Standard rate ( Revised standard labour hours - Actual labour hours)

Revised labour = 
$$\frac{\text{Total of actual hours} \times \text{Standard hours}}{\text{Total of standard hours}}$$

The calculation is just like that of materials. It is included in the efficiency or time variance discussed above.

**Labour Yield Variance:** This is due to the difference in the standard output specified and the actual output obtained. This is computed as follows:

Labour yield variance = Standard cost (Actual output - standard output)

or

(Standard loss of actual total input - Actual loss) × Average standard rate per unit.

If the actual output is more than standard output, it is favourable variance and vice versa.

### Illustration - 5

A factory, working for 50 hours a week, employs 100 workers on a job work.

The standard rate is Re. 1 an hour and standard output is 200 units per gang hour.

During a week in June, ten employees were paid at 80 p. an hour and five at Re. 1.20 an hour. Rest of the employees were paid at the standard rate.

Actual number of units produced was 10,200

Calculate labour cost variances.

**Solution:****(i) Cost variance**

standard Cost - Actual Cost

Rs. 5,100 - Rs. 4,950 = Rs. 150 (F)

**Workings****(ii) Rate variance:**

(a) Calculation of Actual Cost:		Rs.
15 workers for 50 hours @ Re. 1 per hour	=	4,250
10 workers for 50 hours @ 80 p. per hour	=	400
5 workers for 50 hours @ Rs. 1.20 per hour	=	<u>300</u>
Total Actual Cost		<u>4,950</u>

**(b) Calculation of Standard Rate:**

Standard cost (per gang hour)

Standard Production (per gang hour)

$\frac{100 \times \text{Re. } 1}{200 \text{ units}}$

$\frac{\text{Rs. } 100}{200 \text{ units}} = 50 \text{ per units}$

**(c) Calculation of Standard Cost:**

Actual production x Standard rate

10,200 units x 50 p. per unit = Rs. 5,100

As the actual wage rate has deviated from the standard in respect of only 15 worker from out of a total of 100 workers, wages rate variance would be calculated only in respect of these 15 workers.

**(iii) Efficiency Variance:**

Actual Hours (standard rate - Actual Rate)

Therefore,

500 Hours (Re. 1 - 80 p.) = Rs. 100(F)

250 Hours (Re.1 - Rs. 1.20) = Rs. 50(A)

thus, the total rate variance is Rs. 50 (F)

efficiency variance is indicated by the fact that, as compared with standard production of 10,000 units (200 units ´ 50 hours), the actual production is 10,200 units

Standard Rate ( Standard Hours - Actual Hours)

Re. 1 (5,100) = Rs. 100 favourable.

## Calculation of Standard Hours:

$$\frac{\text{Actual production}}{\text{Standard production per hour}} \times \text{No. of workers}$$

$$\frac{10,200 \text{ units}}{200 \text{ units}} \times 100 = 5,100 \text{ hours}$$

## (iv) Yield Variance:

Standard Labour cost per unit of output (SY-AY)

0.50 (10,000\_10,200) = Rs. 100 (F)

verification:

Cost Variance + Efficiency Variance

Rs. 150 (F) = 50 (F) + Rs. 100 (F)

## 17. OVERHEAD COST VARIANCES

The total overhead cost variance is the difference between the Standard Cost of overhead allowed for the actual output achieved and the actual overhead cost incurred. In other words, overhead cost variance is the under or over absorption of overheads. Overhead cost variance is calculated as follows:

[Actual output x Standard overhead rate per unit] - Actual overhead cost

or

[Standard hours for actual output x Standard overhead rate per hour] - Actual overhead cost

Overhead cost variances can be classified as:

(i) Variable overhead variance

(ii) Fixed overhead variance

### **Variable Overhead Variance**

It is the difference between the standard variable overhead cost allowed for the actual output achieved and the actual variable overheads. Normally this variance is represented by expenditure (cost) variance only because variable overhead cost will vary in proportion to production so that only a change in expenditure can cause such variance. It is calculated as:

Variable Overhead Variance:

$(\text{Standard variable Overhead Rate} \times \text{Actual Output}) - \text{Actual Variable Overheads}$

or

$(\text{Standard Hours for Actual Output} \times \text{Standard Variable Overhead Rate}) - \text{actual Variable overheads.}$

The variable overhead cost variance is usually calculated in total only since variable overhead vary according to output and not according to time, hence, there is only one variance. However, some accountants argue that certain variable overhead may vary according to time also, hence variable overhead efficiency variance arise just like labour efficiency variance and it can be calculated if information relating to actual time taken and allowed is given. In such case variable overhead variance can be segregated into two parts.

(i) Variance Overhead Expenditure Variance =  $(\text{Actual hours} \times \text{Standard Variable Overhead Rate per hour}) - \text{Actual Variable Overhead.}$

or

$\text{Actual hours} (\text{Standard Variable Overhead Rate per hour} - \text{Actual Variable Overhead Rate per hour}).$

(ii) Variable Overhead Efficiency Variance =  $(\text{Standard Time for Actual production} \times \text{Standard Variable Overhead Rate per hour}) - \text{Actual Hours worked} \times \text{Standard variable Overhead Rate per hour}).$

or



Standard Variable Overhead on Actual Production - Standard Variable overhead for actual time

or

Recovered Overheads - Standard Overheads.

## Illustration 7

The following data is obtained from the books of a manufacturing company regarding variable overheads:

Budgeted production for January 300 units

Budgeted variable overhead	Rs. 7,800
Standard time for one unit	20 hours
Actual production for January	250 units
Actual hours worked	4,500 hours
Actual variable overhead	Rs. 7,000

## Solution

- Variable Overhead Variance =  
Standard Cost - Actual Cost  
Rs. 6,500 - Rs. 7,000 = Rs. 500 (A)

## Workings:

### Fixed Overhead Variance

- Standard variable overhead cost of actual output is  
250 units x Rs. 26 per unit = Rs. 6,500
- Standard variable cost per unit is  

$$\frac{\text{Budgeted variable overhead}}{\text{Budgeted production}} \text{ or } \frac{\text{Rs. 7,800}}{300 \text{ units}} \text{ or Rs. 26 per unit}$$

Sometimes, a little refinement is introduced in the calculation of variable overhead variance and, therefore, the computation is as follows:

- (i) Variable Overhead Expenditure Variance =  
 Actual Cost - Standard overhead on hours worked  
 Rs. 7,000 - Rs. 5,850 = Rs. 1,150 (A)
  - (a) Standard variable overhead on hours worked is -  
 4,500 hours x Rs. 1.30 per hour = Rs. 5,850
  - (b) Standard variable overhead per hour is -  

$$\frac{\text{Standard variable overhead per unit}}{\text{No. of hours required for a unit}} = \frac{\text{Rs. 26}}{20 \text{ hours}} = \text{Rs. 1.30}$$
- (ii) Variable Overhead Efficiency Variance =  
 Standard variable overhead on hours worked - standard variable overhead on actual output  
 Rs. 5,850 - Rs. 6,500 = Rs. 650 (F)

### Fixed overhead Variance

It is the difference between the standard cost of fixed overhead allowed for the actual output achieved and the actual fixed overhead x cost incurred i.e.

(Actual output x Standard fixed overhead rate) - Actual fixed overheads

or

(Standard hours produced x Standard fixed overhead rate per hour) - Actual fixed overhead.

Standard overhead produced means hours which should have been taken for the actual output.

Fixed overhead variance may broadly be divided into:

- (i) Expenditure variance and
  - (ii) Volume variance.
- (i) Expenditure Variance

This is also known as budget variance. This is obtained by comparing the total overhead cost actually incurred against the budgeted overhead cost i.e.

Budgeted overheads Actual overheads.

If the actual overheads are more, it shall result in an adverse variance and vice versa. This variance gives a measure of efficiency of spending.

## Illustration - 6

The following information relates to the month of June, 1999

	Budgeted 20,000 units Rs.	Actual 22,000 units Rs.
Output		
Overheads - Variable	1,00,000	1,07,000
- Fixed	1,50,000	1,58,000

Compute the overheads variance.

### Solution:

(i) Variable overheads allowed or budgeted for actual output

	Rs.
= 22,000 x $\frac{1,00,000}{20,000}$	1,10,000
Actual amount spent	<u>1,07,000</u>
Variable overhead variance	<u>3,000 (F)</u>

(ii) Fixed overhead for the period (change in  
Output having no effect on expenditure)

	1,50,000
Actual fixed overhead	<u>1,58,000</u>
Fixed overhead expenditure variance	8,000 (A)
Total overheads variance	<u>5,000 (A)</u>

## (II) Volume Variance

The difference between overhead absorbed on actual output and those on budgeted output is termed as volume variance. This variance shows the over or under absorption of fixed overheads during a particular period. If the actual output is more than the standard output, there is over-recovery of fixed overheads and volume variance is favourable and vice versa if the less than the standard output.

Volume Variance = (Actual output x Standard rate) - Budgeted fixed overheads

or

Standard rate (Actual output - Standard output)

or

Standard rate per hour (Standard hours produced - Budgeted hours)

N.B. Standard hour produced means number of hours which should have been taken for the actual output as per the standard laid down.

Volume variance can be further sub-divided into the following variances:

(i) **Capacity Variance:** It is that portion of the volume variance which is due to working at higher or lower capacity than the standard capacity. It is related to the under or over utilisation of plant and equipment. It is represented as:

Standard rate (Standard units - Revised budgeted units)

or

Standard rate (Actual hours - Revised budgeted hours)

(ii) **Calendar variance:** It is that portion of the volume variance which is due to the difference between the number of working days anticipated in the budget period and the actual working days exceed in the period to which the budget is applied if the actual working days exceed standard days, the variance will be favourable and vice-versa.

It is calculated as:

Standard rate (Revised budgeted units - Budgeted units)

or

Increase or decrease in production due to more or less working days at the rate of revised capacity x Standard rate per unit.

or

Standard rate (Revised budget hours - Budget hours)

**Illustration - 7**

The budgeted capacity of a factory per month of 25 days was 2,00,000 hours and the budgeted fixed overheads were Rs. 2,40,000. The management increased the capacity by 20% in the beginning of October, 1991; the actual number of working days in that month were 23. Compute the variances that emerge.

**Solution:**

Budgeted fixed overhead recovery rate Rs. 1.20 i.e.  $2,40,000 / 2,00,000$

Actual production in terms of hours  $(2,00,000 + 20\%) \times 23/25$  or 2,20,800

**Volume Variance**

Volume variance: Fixed overheads absorbed on 2,20,800

Hours @ Rs. 1.20 per hours	Rs. 2,64,960
Budgeted fixed overheads	<u>Rs. 2,40,000</u>
Volume Variance	<u>24,960 (F)</u>
(or 20,800 hours @ Rs. 1.20)	

**Analysis**

Capacity Variance production in term of hour of new

Capacity - i.e. $2,00,000 + 20\%$	Hrs. 2,40,000
Fixed overheads absorbed @ or Rs. 1.20 per hours	Rs. 2,88,000
Fixed overhead, budgeted	<u>Rs. 2,40,000</u>
	<u>Rs. 48,000 (F)</u>

Calendar Variance: Loss of hours due to 2 extra Holidays

$2,40,000 \times \frac{2}{25}$	19,200
--------------------------------	--------

Loss of fixed overheads absorbed

because of loss of hours  $19,200 \times 1.20$

Capacity Variance	Rs. 23,040 (A)
Calendar Variance	<u>Rs. 48,000 (F)</u>
	<u>Rs. 23,040 (A)</u>

(iii) **Efficiency Variance:** It is that portion of the volume variance which is due to the budgeted efficiency to production and the actual efficiency achieved. It is calculated as follows:

Standard Rate (Actual production in units - Standard production in units)

or

Standard rate per hour (Actual hours worked - Standard hours for actual production).

N.B. Standard production or hours means budgeted production or hours adjusted to increase or decrease in production due to capacity or calendar variances.

### **18. SALES VARIANCES**

Sales variance also known as sales value or sales revenue variance is the difference between budget between budgeted value of sales and the actual value of sales achieved in a given period. Sales variance may be analysed in two ways: i.e. (i) Sales margin variance (on the basis of profit) and (ii) sales value variance (on the basis of turnover).

#### **(i) Sales Variance (Based on profit)**

Sales margin variance indicates the difference between actual profit and standard or budgeted profit. It is calculated as:

Actual profit - Budgeted profit  
(Actual quantity of sales x Actual profit per unit) -  
(Budgeted quantity of sales x Budgeted profit per unit)

This variance is further classified into:

(i) Price variance and (ii) Volume variance.

(i) **Sales Price Variance:** It is the portion of total sales margin variance which is due to the difference between the standard price of the quantity of sales effected and the actual price of those sales.

Sales price variance = Actual quantity of sales (Actual profit per unit - standard profit per unit)



or  $(\text{Actual quantity of sales} \times \text{Standard price}) - \text{Actual quantity of sales} \times \text{Actual price}$

(ii) **Sales Volume Variance:** It is that portion of total sales margin variance which due to the difference between the budgeted quantity and the actual quantity of sales.

$\text{Sales volume variance} = \text{Standard profit per unit} (\text{Actual quantity of sales} - \text{Standard quantity of sales})$

or

$\text{Standard profit on actual quantity of sales} - \text{Standard profit on standard quantity of sales}$ .

Sales margin variance due to volume can be further analysed into to subvariances:

(a) **Mix Variance:** When more than one product is manufactured and sold, the difference in profit can result because of the variation of actual mix and budgeted mix of sales. The difference in profit therefore is the mix variance.

$\text{Sales mix variance} = \text{Standard profit per unit} (\text{Actual quantity of sales} - \text{Standard proportion for actual sales})$

or

$\text{Revised standard profit} - \text{Budgeted profit}$ .

Sales Variance (Based on turnover)

**Sales Value Variance:** It is the difference between the actual value of sales and standard value of sales. i.e.  $(\text{Actual quantity} \times \text{Actual Selling Price}) - (\text{standard quantity} \times \text{Standard selling price})$ .

Sale value variance further analysed into sales price variance and sales volume variance.

(i) **Sales Price Variance:** It is the difference between the standard and actual prices of the sales effected. It is calculated as:

$\text{Actual quantity} (\text{Actual selling price} - \text{Standard Selling price})$ .

(ii) **Sales Volume Variance:** It is the difference between the actual quantity of sales and standard quantity of sales i.e. Std. Selling price (Actual quantity of sales - standard quantity of sales).

Sales volume variance is further classified into sales mix variance and sales quantity variance:

**Sales Mix Variance:** It is that part of the sales volume variance and a rise due to the difference in the proportion in which various articles are sold and the standard proportion in which various articles were to be sold i.e.

Standard value of actual Mix - Standard value of revised standards mix.

**Sales Quantity Variance:** It is that part of the sales volume variance which arises due to the difference between revised standard sales quantity and budgeted sales quantity and budgeted sales quantity. i.e.

Standard selling price per unit ( standard proportion for actual sales quantity - budgeted quantity of sales).

or

Revised Standard sales value - Budgeted sales value.

### **19. REPORTING OF VARIANCES**

The primary purpose of reporting to management is to enable them to take corrective action and arrest unfavourable variances to the extent possible. Therefore, timely and prompt reporting of the variance is of utmost importance. The individual or department responsible for adverse controllable variance should be located. For instance, a variation in the price paid for raw material would be the responsibility of the purchase manager. The board and the managing director would be concerned with the overall efficiency, with which their plans have been operated in a special manner- starting with the standard or budget profit, the various variances would be put in two columns, favourable and unfavourable, and the net results added to or deducted from the standard profit, thus arriving at the actual profit. Management can be easily see the factors that have contributed to the change in the profit picture. While reporting the analysis of variances to

management, graphs and charts might be used or analysis may be reported in the form of statement and reports giving main details.

In order that variance reporting should be effective, it is essential that the following condition are fulfilled:-

- (i) The variances arising out of each factor should be correctly segregated. If part of a variance due to one factor is wrongly attributed to or merged with that of another, the analysis report submitted to the management would be misleading and wrong inferences may be drawn from it;
- (ii) Variance, particularly the controlled variance should be reported with promptness as soon as they occur. This would enable corrective action being taken in time;
- (iii) Analysis of uncontrollable variance should be made with the same care as for controllable variances since the analysis of the off standard situation may reveal far reaching effects on the economy of the concern;
- (iv) The forms of reports for the different types of variances should be designed keeping in view the needs of the management and the size of the concern, and no standard forms can, therefore, be suggested.

It is better to present the profit figures by way of reconciliation of budgeted (or standard) and actual profit on the basis of variances. This is illustrated below:-

A statement of the type given above enables management to locate the points that need attention - a very important objective of standard costing.

# STANDARD COSTING AND VARIANCE ANALYSIS

## Profit and Loss Statement for the Month of .....

Profit as budgeted				Rs. 1,25,000
Variance		Dr.	Cr.	
Material -	Usage	4,000		
	Price		2,000	
Labour -	Idle Time	2,500		
	Efficiency	1,500		
	Rate of pay	3,000		
Overheads -				
Variable:	Expenditure		1,500	
Fixed:	Expenditure		2,000	
	Volume	2,500		
Capacity	4,500			
	Dr.			
Calendar	1,000			
	Cr.			
Efficiency	1,000			
	Cr.			
Selling price			10,000	
		13,500	15,500	2,000
				(Cr.)
Actual Profit			15,500	1,27,000

**REFERENCE MATERIAL**

Click on the links below to view additional reference material for this chapter

**[Summary](#)**

**[PPT](#)**

**[MCQ](#)**

**[Video1](#)**

**[Video2](#)**

# 8

## MARGINAL COSTING

---

### 1. CONCEPTUAL FRAMEWORK

Variable costing is a costing method in which only variable costs are accumulated and cost per unit is ascertained only on the basis of variable costs. Prime costs and variable factory overheads are used to value inventories. Fixed costs tend to vary with time, such as salaries and rent, rather than level of output and variable costs tend to change in total with increase or decrease in the level of activity, e.g., materials, power etc. Fixed costs which are by and large uncontrollable, are not taken into account under marginal costing while ascertaining per unit cost but are not ignored. It should be borne in mind that variable cost per unit are fixed and fixed costs per unit are variable with changes in level of output. Variable costing is generally known as marginal costing. The CIMA has defined marginal cost as "the cost of one unit of product or service which would be avoided if that unit were not produced or provided." Marginal costing is defined as "the accounting system in which variable costs are charged to cost unit and fixed costs of the period are written-off in full against the aggregate contribution. Its special value is in decision-making." It is a technique of applying the existing method in a particular manner in order to bring out the relationship between profit and volume of output.

Marginal Costing and Direct Costing are often treated as interchangeable terms. Profit is measured by deducting fixed costs from the total contribution. Contribution or gross margin is the difference between sales and the marginal cost of sales. Marginal costing assumes that the contribution provides a pool out of which fixed cost is met; any surplus being the profit or net margin contribution or contribution to fixed costs.

The main features of marginal costing are the following:



## MARGINAL COSTING

- a) Costs are separated into the fixed and variable elements and semi-variable costs are also differentiated likewise.
- b) Only the variable costs are taken into account for computing the value of stocks of work-in-progress and finished products.
- c) Fixed costs are charged off to revenue wholly during the period in which they are incurred and are not taken into account for valuing product costs/inventories.
- d) Prices may be based on marginal costs and contribution but in normal circumstances prices would cover costs in total.
- e) It combines the techniques of cost recording and cost reporting.
- f) Profitability of departments or products is determined in terms of marginal contribution.
- g) The unit cost of a product means the average variable cost of manufacturing the product.

## **2. CONTRIBUTION**

If a system of managerial costing is operated in an organisation with more than one product, it will not be possible to ascertain the net profit per product because fixed overheads are charged in total to the profit and loss account rather than recovered in product costing. The contribution of each product is charged to the firm's total fixed overheads and profit is ascertained. As stated earlier, contribution is the difference between selling price and variable cost of sales. It is visualised as some sort of a fund or pool, out of which all fixed costs, irrespective of their nature are to be met, and to each product has to contribute its share. The excess of contribution over fixed costs is the profit. If the total contribution does not meet the entire fixed cost, there will be loss.

In normal circumstances, selling prices contain an element of profit but there may be circumstances, when products may have to be sold at cost or even at loss. Therefore the character of contributions will have the following composition under different circumstances:

- i. Selling price containing profit:  
 $\text{Contribution} = \text{Fixed cost} + \text{Profit}$
- ii. Selling price at cost:  
 $\text{Contribution} = \text{Fixed cost}$
- iii. Selling price at loss:  
 $\text{Contribution} = \text{Fixed cost} - \text{Loss}$

### **3. INCOME DETERMINATION UNDER VARIABLE AND ABSORPTION COSTING**

Under variable costing, only factory overheads costs that tend to vary with volume are charged to product costs in addition to prime cost. While evaluating inventory only direct materials, direct labour and variable factory overhead are included and are considered as product costs. Fixed factory overhead under direct or marginal costing is not included in inventory. It is treated as a period cost and charged against revenue when incurred. Under absorption costing, sometimes called full or conventional costing, all manufacturing costs, both fixed and variable are charged to product costs; Thus Absorption costing is "a principle whereby fixed as well as variable costs are allotted to cost units." It means a system under which cost per unit includes fixed expenses, especially fixed production overheads in addition to the variable cost.

Profit emerges only after charging all costs - fixed and variable. In marginal costing also this is true; only profit is ascertained by charging the fixed expenses costs to contribution.

Contribution is the difference between selling price and marginal costs. Fixed costs written off against the profit (called contribution) during the period. Thus;

$$\begin{aligned}\text{Selling price} - \text{Variable cost} &= \text{Contribution} \\ \text{Contribution} - \text{Fixed costs} &= \text{Profit}\end{aligned}$$

If profit and fixed costs are  
Known,  $\text{Fixed costs} + \text{Profit} = \text{Contribution}$

This gives us a basic marginal equation;

$$\text{Sales} - \text{Marginal costs} = \text{Contribution} = \text{Fixed costs} + \text{Profit} \\ (\text{if there is a profit})$$

$$\text{or sales} = \text{Marginal costs} + \text{Fixed costs} + \text{Profit}$$

Since the closing stocks do not have any element of fixed costs, profit shown by marginal costing technique may be different from that shown by absorption costing. When the entire stock is sold, there is no inventory i.e., neither there is opening nor closing stock, the profit revealed by both the methods will be same. But when sales and production are out of balance, difference in net profit is reported. When absorption costing is applied, the fixed manufacturing costs are shifted from one year to another year as a part of the inventory cost i.e. stock. If a company produces more than it sells in a given period, not all of the current manufacturing overheads will be deducted from sales i.e., closing stock will include a portion of fixed overheads. In other words, in absorption costing inventory will be valued as a higher figure; therefore, profit will be more as revealed by absorption costing than marginal costing. Hence, profits will not necessarily increase with an increase in sale value. The position will be reverse, in case a company produces less than it sells in a given period. Thus, marginal costing can produce a net profit figure which is smaller than or greater than or equal to the net profit as shown under absorption costing.

#### **4. APPLICATION OF VARIABLE COSTING**

Profit planning

There are four ways in which profit performance of a business can be improved:

- a) by increasing volume;
- b) by increasing selling price;
- c) by decreasing variable costs; and
- d) by decreasing fixed costs.

## MARGINAL COSTING

Profit planning is the planning of future operations to attain maximum profit or to maintain a specified level of profit. The contribution ratio (which is the ratio of marginal contribution to sales) indicates the relative profitability of the different sectors of the business whenever there is a change in selling price, variable costs or product mix. Due to the merging together of fixed and variable costs, absorption costs fail to bring out correctly the effect of any such change on the profit of the concern.

### Illustration - 1

A toy manufacturer makes an average net profit of Rs. 2.50 per piece on a selling price of Rs.14.30 by producing and selling 60,000 pieces or 60% of the potential capacity. His cost of sales is:

Direct material	Re. 3050
Direct wages	Rs. 1.25
Works overhead	Rs. 6.25 (50% fixed)
Sales overhead	Re. 0.80 (25% variable)

During the current year, he anticipates that his fixed charges will go up by 10% while rates of direct material and direct labour will increase by 6% and 8% respectively. But he has no option of increasing the selling price. Under this situation he obtains an offer for an order equal to 20% of his capacity. The concerned customer is a special customer.

What minimum price will you recommend for acceptance to ensure the manufacture an overall of Rs.1,67,300 ?

## MARGINAL COSTING

### Solution:

	Previous Year			Budget for Current year prior to acceptance of 20% excess orders
	Per Piece Rs.	Amount Rs.	Per Piece Rs.	Amount Rs.
Sales	<u>14.30</u>	<u>8,58,000</u>	14.30	8,58,000
Variable cost:				
Direct material	3.500		3.710	
Direct labour	1.250		1.350	
Variable works Overhead	3.125		3.125	
Variable sales Overhead	<u>0.200</u>		<u>0.200</u>	
	8.075	4,84,500	8.385	5,03,100
Contribution	6.225	<u>3,73,500</u>		3,54,900
Fixed cost:				
Works overhead	1,87,500		2,06,250	
Sales overhead	<u>36,000</u>	<u>2,23,500</u>	<u>39,600</u>	<u>2,45,850</u>
Profit		1,50,000		1,09,050

Marginal cost of additional 20,000 units: Rs. 1,67,700

(Rs. 20,000 x Rs. 8.385)

Increased contribution required = Rs. 1,67,300 - Rs. 1,09,050 = Rs. 58,250

Total Sales price expected for 20,000 units: = Rs. 1,67,700 + Rs. 58,250

Sales price per unit =  $\frac{\text{Rs. 2,25,950}}{20,000}$  = Rs. 11.297

**Note:** Such concessional price is acceptable only for special markets (e.g., export market) or special customers like government and only if idle capacity exists.

## Illustration - 2

The following data relate to a manufacturing company:

Plant capacity:	4,00,000 units per annum
Present utilization:	40%
Actuals for the year 1991 were:	
Selling Price	Rs. 50 per unit
Materials cost	Rs. 20 per unit
Variable Manufacturing Costs	Rs. 15 per unit
Fixed Costs	Rs. 27 lakhs

In order to improve capacity utilization the following proposals are being considered:

Reduce selling price by 10%

Spend additional Rs. 3 lakhs on sales promotion

How many units should be made and sold in order to earn a profit of Rs. 5 lakhs per year?

### Solution:

Revised selling price (Rs. 50 less 10%)		Rs. 45 per unit
Variable Costs		
Material Cost	Rs. 20	
Variable Manufacturing Cost (per unit)	Rs. 15	
Total Variable Cost		Rs. 35 per unit
Contribution		<u>Rs. 10 per unit</u>
Total Contribution required:		
Fixed Costs		Rs. 27,00,000
Additional Promotion Expenses		Rs. 3,00,000
Profit		<u>Rs. 5,00,000</u>
		<u>Rs. 35,00,000</u>



## MARGINAL COSTING

Total number of units to be made and sold to earn Rs. 35,00,000

$$= \frac{\text{Total Contribution}}{\text{Contribution per unit}}$$

$$= \frac{\text{Rs. 35,00,000}}{\text{Rs. 10}} = 3,50,000 \text{ units.}$$

### Evaluation of Performance:

The various section of a concern such as a department, a product line, or a particular market or sales division, have different revenue earning potentialities. A company always concentrates on the departments or product lines which yield more contribution than others. The performance of each such sector can be brought out by means of cost volume -profit analysis or the contribution approach. The analysis will help the company to take decision that will maximize the profits.

### Illustration - 3

A business produces three products A, B and C for which the standard variable costs and budgeted selling prices are as follows:

	A	B	C
	Rs.	Rs.	Rs.
Direct Material	3	6	8
Direct Wages	4	4	10
Variable overhead	3	5	7
Selling price	18	25	48

In two successive periods, sales are as follows:

	A	B	C
	Units	Units	Units
Period I	10,000	10,000	10,000
Period II	20,000	13,000	5,000

The budget fixed overheads amounted to Rs. 1,35,000 for each period. In spite of increased sales the profit for the second period has fallen below that of the 1st period.

Present figures to management to show why this fall in profits should, or should not have occurred.

## MARGINAL COSTING

### Solution:

	Product A		Product B		Product C		Total	
Sales (units)	10,000	20,000	10,000	13,000	10,000	5,000	30,000	38,000
(Rs. 000)								
Sales (value)	<u>180</u>	<u>360</u>	<u>250</u>	<u>325</u>	<u>480</u>	<u>240</u>	<u>910</u>	<u>625</u>
Variable Cost	100	200	150	195	250	125	500	520
Contribution	80	160	100	130	230	115	410	405
Fixed overheads							<u>135</u>	<u>135</u>
Net Profit							<u>275</u>	<u>270</u>
Marginal Contribution								
Ration (%)	A: 44.4		B: 40.0		C: 47.9			

Comments: Sales have increased by 8,000 units but the sales value has increased by Rs. 15,000. Marginal costs have increased by Rs. 20,000 to meet cost of increased units of production, resulting in the fall of profits by Rs. 5,000.

Product C which yields the highest percentage of contribution to sales is the most profitable line. Product A comes next and product B is the least profitable of the three.

The unsatisfactory position in Period II is because of unfavourable sales mix as the production of most profitable line C has been cut down and the less profitable products A and B have been pushed up.

### Illustration - 4

A factory produces 300 units of a product per month. The selling price is Rs. 120 and variable cost Rs. 80 per unit. The fixed expenses of the factory amount to Rs. 8,000 per month. Calculate: (i) the estimated profit in a month where in 240 units are produced, (ii) the sales to be made to earn a profit of Rs. 7,000 per month.

## Solution:

Selling price per unit	Rs. 120.00 <u>80.00</u> <u>40.00</u>
Less: Variable cost per unit	
Contribution per unit	
∴ P/V ratio $\left( \frac{\text{contribution}}{\text{selling price}} \times 100 \right) = \frac{40}{120} \times 100 = 33 \frac{1}{3} \%$	
i. Profit on sale of 240 units:	
Sales of 240 units at Rs.120 each	Rs.28,800
Contribution from the above at $33 \frac{1}{3} \%$	Rs. 9,600
Less: Fixed cost of one month	Rs. 8,000
∴ Profit	Rs. 1,600
This result can also be arrived at as follows:	
No. of units to be sold	= 240
Contribution per unit	= Rs. 40
∴ Contribution from 240 units	240 X Rs.40 = Rs.9,600
Less: Fixed for the month	= Rs.8,000
∴ Profit	Rs. 1,600
ii. Sales required to earn a profit of Rs.7,000:	
Profit required to be earned	= Rs.7,000
Add: Fixed costs per month	= <u>Rs.8,000</u>
Total contribution to be earned	= <u>Rs15,000</u>
P/V ratio	= $33 \frac{1}{3} \%$
i.e. Sales required to earn Rs. $33 \frac{1}{3} \%$	= Rs. 100
∴ Sales required to earn Rs.15,000	= $\frac{\text{Rs.15,000} \times 100}{33 \frac{1}{3} \%}$ = Rs.45,000
This result can not be arrives through contribution per unit:	
Contribution required to cover fixed expenses and profit	= Rs.15,000
Contribution per unit	= Rs. 40
∴ No. of units to be sold to earn Rs.15,000	= $\frac{15,000}{\text{Rs.40}}$
∴ Selling price per unit	= Rs.120
∴ Total sales	= 375 X Rs.120 = Rs.45,000

## Make or Buy Decisions:

When the management is conformed with the problem whether it would be economical to purchase a component or a product from outside sources, or to manufacture it

internally, marginal cost analysis renders useful assistance in the matter. Under such circumstances, a misleading decision would be taken on the basis of the total cost analysis. In case the proposal is to buy from outside then, what is already being made, and the price quoted by the outsider should be lower than the marginal cost. If the proposal is to make something what is being purchased outside, the cost making should include all additional costs like depreciation on new plant, interest on capital involved and that cost should be compared with the purchase price.

## Illustration - 5

A. T.V. manufacturing company finds that while it costs to make component X, the same is available in the market at Rs. 5.75 each, will all assurance of continued supply. The breakdown of costs is:

Material	Rs. 2.75 each
Labour	Rs. 1.75 each
Variable overheads	<u>Rs. 0.50 each</u>
Depreciation and other fixed cost	<u>Rs. 1.25 each</u>
	Rs. 6.25 each

- Should the company make or buy the component ?
- What should be your decision if the supplier offered component at Rs.4.85 each ?

## Solution:

Marginal cost per unit of component X	Rs. 2.75
Materials	Rs. 1.75
Labour	<u>Re. 0.50</u>
Variable overheads	<u>Rs. 5.00</u>

- The purchase cost of the above component is Rs. 5.75 each. If the company is having spare capacity which cannot be filled with more remunerative jobs, it is recommendation that the above component be manufactured in the company since the marginal cost at Rs. 5.00 each is less than the purchase cost of Rs. 5.75.
- In the event of purchase cost of Rs.5.00 each, it is recommended that the component be bought from the supplier as this results in a saving of Re. 0.15

each. The spare capacity thus available can be utilized for other purposes, as far as possible.

### **Closure of a Department or Discontinuance of a Product:**

As discussed earlier, marginal costing technique helps in deciding the profitability of a product. It provides the information in a manner that tells us how much each product contributes towards fixed cost and profit; the product or department that gives least contribution should be discarded except for a short period. If the management is to choose some product out of the given ones, then the products giving the highest contribution should be chosen and giving the least should be discontinued.

### **Maintaining a Desired Level of profit**

A company has to cut prices of its products from time to time because of competition, Government regulation and other compelling reasons. The contribution per unit on account of such cutting is reduced while the industry is interested in maintaining a minimum level of its profits. In case the demand for the company's product is elastic, the maximum level of profits can be maintained by pushing up the sales. The volume of such sales can be found out by marginal costing techniques.

### **Illustration - 6**

S. Ltd. manufactures and markets a single product. The following information is available:

There is acute competition. Extra efforts are necessary to sell. Suggestions have been made for increasing sales:

	Rs. Per unit
Materials	8.00
Conversion costs (variable)	6.00
Dealers margin	2.00
Selling price	20.00
Fixed cost Rs. 2,50,000	
Present Sales 80,000 units	
Capacity utilization: 60 per unit	

## MARGINAL COSTING

- i. By reducing sales price by 5%
- ii. By increasing dealers margin by 25% over the existing rate.

Which of the two suggestion you would recommend if the company desires to maintain the present profit? Give reasons.

### **Solution:**

Present marginal cost per unit:

	Rs.
Materials	8.00
Conversion costs	6.00
Dealers costs	<u>2.00</u>
Total	<u>16.00</u>

$$\begin{aligned}\text{Contribution per unit} &= \text{Selling price} - \text{Marginal cost} \\ &= \text{Rs. } 20.00 - 16.00 = \text{Rs. } 4.00\end{aligned}$$

$$\text{Total Contribution} = \text{Rs. } 4. \times 90,000 = 3,60,000$$

$$\begin{aligned}\text{Profit} &= \text{Contribution} - \text{Fixed cost} \\ &= \text{Rs. } 3,60,000 - \text{Rs. } 2,50,000 = \text{Rs. } 1,10,000\end{aligned}$$

Since in both suggestion s, fixed costs remain unchanged, the present profit can be maintained by keeping the total contribution at the present level i.e. Rs.3,60,000.

- i. Reducing sales price by 5%

$$\begin{aligned}\text{New Sales price} &= (\text{Rs. } 20.00 - \text{Rs. } 1.00) = \text{Rs. } 19.00 \\ \text{New dealers margin} &= 10\% \text{ of Rs. } 19.00 \\ &= \text{Rs. } 1.90\end{aligned}$$

$$\begin{aligned}\text{Variable Costs} &= \text{Rs. } 8 + \text{Rs. } 6 + \text{Rs. } 1.90 = \text{Rs. } 15.90\end{aligned}$$

$$\text{Contribution per unit} = \text{Rs. } 19.00 - \text{Rs. } 15.90 = \text{Rs. } 3.10$$



## MARGINAL COSTING

Sales (units) required to maintain the present level of profit.

$$\begin{aligned} &= \frac{\text{Total contribution}}{\text{Contribution per unit}} = \frac{\text{Rs. 3,60,000}}{\text{Rs. 3.10}} \\ &= 1,16,111 \text{ units} \end{aligned}$$

ii. Increasing dealers margin by 25%

New dealers margin	= Rs. 2 + 25%	= Rs. 2.50
New variable cost	= Rs. 8 + Rs. 6 + Rs. 2.50	= Rs. 16.50
Contribution	= Rs. 20 - Rs. 16.50	= Rs. 3.50
Sales (units)	= $\frac{\text{Rs. 3,60,000}}{\text{Rs. 3.50}}$	= 1,02,857 units

The second proposal is recommended because the contribution per unit is higher and the sales (in units) are lower. Lower sales efforts and less finance would be required in implementing the proposal.

### Offering quotation:

One of the best ways for sales promotion is to offer quotation at low rates. A company is producing 80,00 units (80%) of capacity and making a profit of Rs. 2,40,000. Suppose the Punjab Government has given a tender notice for 20,000 units. It is expected that the units taken by the Government will not affect the sale of 80,000 units which the company is already selling and the company also wishes to submit the lowest quotation. The company may quote any amount above marginal cost, because it will give an additional marginal contribution and hence profit.

### Accepting an Offer or Exporting below Normal Price:

Sometimes the volume of output and sale may be increased by reducing the normal prices of additional sale. In this case the concern should be cautious enough to see that the sale below normal price in additional markets should not affect the normal market. To be on the safe side the product may be sold under the label of a different brand. If there is additional sale because of export orders, goods may be sold at a price below the normal.

## MARGINAL COSTING

### Illustration - 7

The cost of a manufacturing company for the products:

	Rs.
Materials	12.00
Labour	9.00
Variable expenses	6.00
Fixed expenses	<u>18.00</u>
Total	<u>45.00</u>

The unit of product is sector Rs. 51.00

The company's normal capacity is 1,00,000 units. The figures given above are for 80,000 units. The company has received an offer for additional 20,000 units @ Rs.36 per unit from a foreign customer.

Advise the manufacture on whether the order should be accepted. Also give your advice if the order is from a local merchant.

### Solution:

Marginal Cost for additional 20,000 units

	Per unit	For 20,000 units
	Rs.	Rs.
Material	12.00	2,40,000
Labour	9.00	1,80,000
Variable expenses	<u>6.00</u>	<u>1,20,000</u>
Marginal cost	<u>27.00</u>	<u>5,40,000</u>
Additional revenue to be realized = S.P. - Marginal cost (Rs. 36 x 20000) = 7,20,000 - 5,40,000		

As the fixed cost of Rs. 18 is fixed upto the normal capacity of 1,00,000 units these additional 20,000 units will generate a revenue of (Rs. 7,20,000 - 5,40,000), hence the order should be accepted.

### **Suggested Reading**

- 1) Cost Accounting - Babatosh Banerjee
- 2) Principles and Practice of Cost Accounting - N.K. Prasad
- 3) Cost Accounting - Charles T. Horngern
- 4) Cost and Management Accounting - S. N. Maheshwari
- 5) Cost Accounting - Blocker and Weltmer

**REFERENCE MATERIAL**

Click on the links below to view additional reference material for this chapter

**[Summary](#)**

**[PPT](#)**

**[MCQ](#)**

**[Video](#)**