

MANONMANIAM SUNDARANAR UNIVERSITY, Tirunelveli**Directorate of Distance and Continuing Education****COST SYSTEMS AND COST CONTROL****Syllabus****UNIT - 1**

Organisations of the costing department and its integration with other departments - Installation of costing system and modification three forms and records - records required to be maintained under the companies Act use of mechanical aids for maintenance of cost records - Management Control and Cost information system, performance reporting at various levels of management.

UNIT -2

Budget and Budgetary Control functions budgets leading to the preparation of master budget: capital expenditure budget, fixed and flexible budget: responsibility accounting - standard costing and variance analysis - material, labour and overheads reporting of variances.

UNIT -3

Marginal costing - break even Analysis, cost - volume - report analysis, break even charts, contributing margin and various decision - making problems like make or buy, own or lease, retain or replace; repair or lease, retain or replace repair or renovate; now or later changes versus status quo; lower or faster; sell or scrap or retain; export versus local sale; shut - down or continue; expend or contract.

UNIT-4

Cost determination and distinct from cost control - cost control and various techniques used for the same, control over wastage, scrap, spoilage and defectives, various techniques of cost reduction such as work study, time and motion study. Studies based on time and cost relationship, employee participation in cost reduction programmes and the significance of constituting special cost reduction cells for this purpose.

UNIT-5

Cost studies for management decisions, including product and production decisions, pricing decisions, marketing and distribution decisions, decision relating to product mix, inventory control, plant location, product development, competitive pricing, price differential and discounts and pricing - marketing strategies.

BOOK RECOMMENDED:

1. Hongrean, Charles, T: - Cost Accounting - A (Prentice Hall of India Ltd.) - Managerial Emphasis,
2. Matz adopted, carry over I and - G rank George W - Cost Accounting
3. N.K. Prasad - Principles and Practice
(Book Syndicate P.Ltd) - Accounting
4. V.K.Saxena and C.D.Vahist - Cost Accounting concepts and Application.
5. Johe Blocker and W.Keith Weltmer:
(Tate MC Graw Hill Publishing Company) Cost Accounting Principles and Practices.

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COST SYSTEMS AND COST CONTROL

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CHAPTER 1

COST SYSTEM AND ITS INSTALLATION AND ORGANISATION OF COSTING DEPARTMENT.

These days managements are facing problems of survival due to keen competition and only those firms which are in a position to keep their costs minimum survive. The Problem is how to reduce the costs to the minimum and the solution lies in tracing and eliminating all inefficiencies, thus improving efficiency. The information on the basis of which these steps may be taken cannot be easily provided by the financial accountant.

The objects of the study of financial accounting are in many ways different from those of costing. financial accounting aims at the measurement of profit, while the study of costing aims at the ascertainment of cost. The management has statistical cost data which can only be supplied by the cost accountant. the management's function is to plan business operations with a view to maximising profits. This objective is often realised through a variety of supplementary decisions, such as making a better product at a lower price, making a new product, using better techniques and many others. The management accomplishes this basic objective by organising its business activities and managerial control. One of the important phases of managerial control is planning and control of costs.

While planning, making decisions, and controlling costs the management may face a few more problems like the following.

- i) Fixation of price:
- ii) Deciding whether to continue the production of a particular product or not:
- iii) Whether to produce or to buy it from outside.
- iv) Whether to explore the possibilities of export trade or not:
- v) Whether to make capital investment or not;
- vi) Effecting reduction of cost : and
- vii) Maximisation of profits and thereby surviving in the market.

The above problems cannot be satisfactorily solved by the financial accountant because of limitations of financial accounting. A cost accountant performs such functions as:

- i) Collection of cost data, their classification and allocation:
- ii) Analysis of cost data; and
- iii) Ascertainment of costs.

Let us take the problems stated above one by one and see whether the financial accountant can help the management in taking decisions. We shall find that he fails to solve them or help the management and as a result the management looks ahead in having the services of a cost accountant whose main aim is to provide necessary cost data for taking decisions. Today, decisions are not taken arbitrarily, but accounting must ultimately contribute either directly or

ndirectly to the maintenance of or increase in the profit of the organisation. This goal is accomplished by furnishing the management with important figures which can be used while making decisions which will either reduce the costs of production or increase the volume of sales.

The cost accounting system helps the management in the determination of the costs of different components of a specific job or of a single unit or a group of units and this helps management to analyse them with a view to reducing them. Reductions in cost may be made possible by managerial decisions such as using substitute materials, changing the design of the product so that less materials may be used, changing wage system to reduce idle time, installing more sophisticated modern equipment, etc. Adoption of budgetary control and a standard costing technique will further help to control the cost.

The duty of costing is advantageous because it provides a guide for testing the adequacy of selling prices. We can ascertain the cost per unit and thereby find out the possibilities of reducing the cost.

With the help of marginal costing techniques or the contribution formula, the management takes decisions about price fixation, whether to produce or not, whether to expend or not, or how to maximise profitability. With the help of budgetary control and standard costing techniques, material accountant helps the management in keeping the production cost at the minimum possible level.

In serving the management, the cost accountant must develop practical cost procedures that produce statistics useful in controlling the operations of the business enterprises. An equally important task is the proper analysis, interpretation and reporting of the figures obtained by cost techniques with accompanying recommendation as the future policies.

As a function of management, cost accounting provided for a proper classification and subdivision of costs; control of materials and supplies; wages and overhead costs; establishment of standards for measuring efficiency; budgeting, accumulation of data as an aid to price determination; curtailment of losses due to seasonal conditions and determination of expansion and contraction policies.

As a function of management, cost accounting provided for a proper classification and sub-division of costs; control of materials and supplies; wages and overhead costs; establishment of standards for measuring efficiency; budgeting;

The quote Blocker and Weltment, "Cost accounting is so closely allied to management that it is difficult to indicate where the work of the cost accountant ends and managerial control starts". In general, it may be said the cost accounting is to serve management in the execution of policies and in the comparison of actual and estimated results in order that the value of each policy be appraised and changed to meet future conditions.

An effective cost accounting system shall provide the management with various reports for managerial decisions.

- a) Periodic comparisons of materials, labour and overhead costs by products or departments will enable management in identifying inefficiencies. The comparison will also enable the management to decide whether to make or buy and also whether to add new products or to discontinue unprofitable items.
- b) Specific reports on spoilage and scrap, defective work and idle time help to localise areas of deterioration where immediate action may be needed.
- c) Reports on the cost of plant and equipment operations will indicate whether there is a proper utilisation of available installed capacity and if there is under - utilisation of installed capacity, the management should accept an order less than the full cost (but in excess of variable costs) so that some of the fixed manufacturing overhead costs can be absorbed by additional production.

INTEGRATION OF COSTING DEPARTMENT WITH OTHER DEPARTMENTS

The function of the cost department is to ascertain and to control costs. The costs arise as a result of the activities of each one of the departments discussed above. These individuals responsible for these departments in these casts, and it is they who should be told how and where their costs can be controlled. Based upon the data available in each department and the records maintained therein the cost department ascertains the costs. The costs thus ascertained are analysed in a systematic manner, compared with the budget and presented back to departments for necessary control.

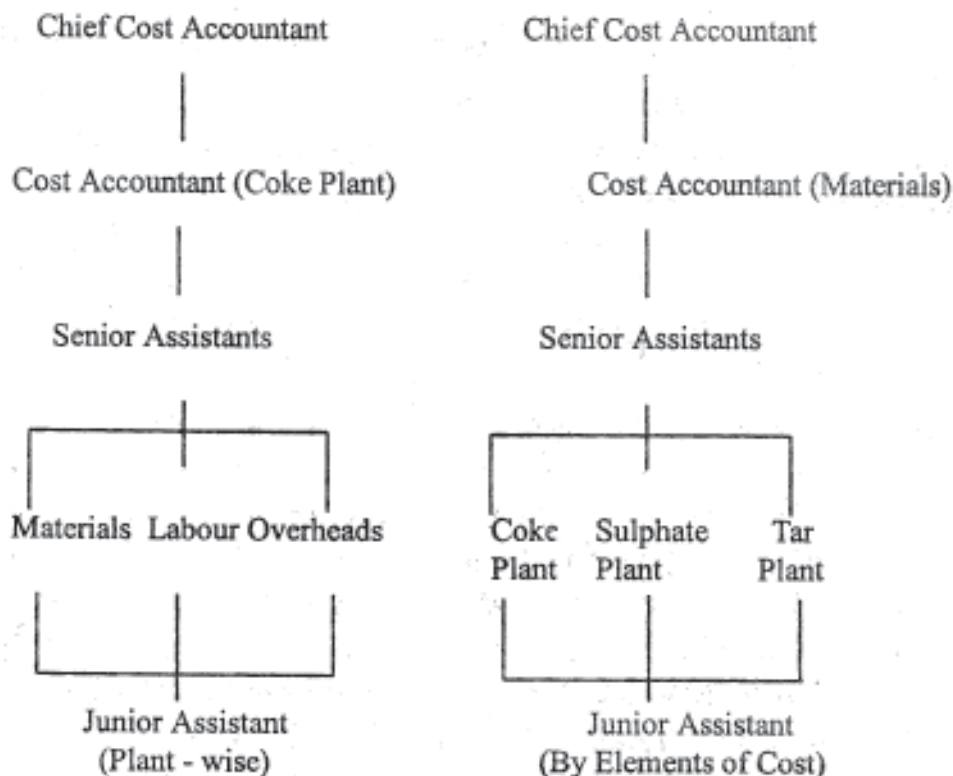
As far as the Manufacturing division is concerned, it should be noted that the records maintained by the planning department and the data available therefrom help the cost department in laying down what the costs 'should be'. Similarly, what the cost 'has been' is known through the records and information available in the production departments; the records of the progress and Inspection departments provide the reasons as to how and where the 'has been' costs differ from the 'should be' costs. To ensure a co-ordinated working right throught, the cost department should be associated with the design of forms and records to be maintained in each department so that these records can given the records to be maintained in each department so that these records can give the required information in manner easy for cost ascertainment and control. The effective functioning of the cost department in any organisation depends upon how efficiently it makes use of the records in the various departments to feed back in time, such statistics as would be directly helpful in the control of costs.

What has been said of the manufacturing division applied equally to Sales, Supplies, Finance and Administrative divisions also. The cost of manufacturing is only a part of the total costs. Non- manufacturing costs like the selling costs, inventory costs, administration costs, etc., are also equally improtant. The service which a cost department can render towards the efficient functioning of the divisions as well, should receive due consideration, in every organisation.

It is the present trend in Management, that the person in charge of the Cost department is usually the Budget Officer of the organisation. It is his responsibility to keep a watch over the expenditure of each division of the organisation and to work in close collaboration with the divisional heads to ensure that the profit and performance targets are being achieved as planned.

ORGANISATION OF COST DEPARTMENT

In large organisations this department normally function under a Chief Cost Accountant who has under him two or more cost accountants to supervise and direct specific divisions of the work of the department. The cost department's work for this purpose can be analysed either by elements of cost or by plant cum products. The organisational set up under these two methods is illustrated below:



Of these two methods, the control by plant cum products is found to be very effective particularly in large industries like steel plant, fertilizer plants etc., Where however the organisation concerned is not big, the size of the cost department will also be proportionately small and it will be functioning under a single cost accountant, assisted by sectional supervisors and a few cost clerks. In such a case, the organisation by elements of cost will be found to be more suitable. The organisation of the cost department depends very much upon the nature of the industry and the size of the cost department; for a smooth flow of the work and for the timely preparation of cost statements, the choice will be between the two alternative schemes discussed above.

Installation of Costing System

Undoubtedly no business of any size can survive in the intensely competitive conditions of today. Moreover, all business are not alike even in the same industry, so no ready made system of cost accounts can be provided to suit each and every business. The underlying principles and objects of all costing systems are the same but the applications of these principles and the methods by which the objects are to be achieved are likely to vary with circumstances. Therefore, it is necessary that before any system is installed, a preliminary investigation must be made and it should be seen to it that it fulfils certain desirable conditions for the success of the system. The system must be designed to suit the business. Steps to be taken to introduce cost accounting.

- i) **Determination of objectives.** The objectives to be achieved should be determined. The system to be introduced should be adopted to meet the objectives effectively and it should also suit the general nature of the business.
- ii) **Ascertaining significant factors.** Significant factors which are amenable to control and which affect the well-being of the concern should be ascertained. For example, if an article is to be packed in a particular manner required under the law, it is no use having an elaborate system about it except that the system must show up acquisition costs of packing material and its utilisation. The system should cover of packing materials and its utilisation. The system should cover all the functions - production, administration, distribution, etc., according to their importance of the function in the business. But it should not devote disproportionate attention to any single function. For example, in cosmetics and drugs production costs are not that important as marketing costs. The cost accounting system should, therefore, devote more attention to marketing and distribution in such businesses.
- iii) **Technical aspects.** All the technical aspects should be studied thoroughly. The system should be such as to throw light on all identifiable and material activities and processes.
- iv) **Co-ordination.** The assistance of the works staff is essential and the participation from all levels of management is a pre-requisite to successful operation of any costing system. Therefore, the system should be evolved in consultation with the staff and should be introduced after meeting their objections and viewpoints.
- v) **Maintenance of details of records.** Details of records to be maintained should be carefully worked out. This will depend, on the materiality, and controllability of the concerned elements of cost. However, complete analysis, at a reasonable cost, is generally desirable.
- vi) **Standardisation of forms.** The forms to be used by foremen, workers, etc., should be standardised as far as practicable. In designing forms it should be ensured that minimum clerical work at different stages is required.
- vii) **Arrangement for presentation of cost data to different levels.** An arrangement should be

made to ensure that costs and other data are presented to different levels of management concerned regularly and promptly.

- viii) Survey of accounting system. The cost accounting system, to operate properly, must be an integral part of the general accounting system. To ensure proper co-ordination between the cost system and the accounting department, the existing setup should be examined for both personnel and records. The organisation chart and plant of production, etc., should be studied thoroughly to make the system a success.
- ix) The timing of installation of the new cost accounting system is also an important aspect.

Supervision of Installation. Many system installations fail because of lack of supervision by the system man after the system has been installed. Johnson (in *Accounting Systems in Modern Business*) points out that the conversion period is the most hectic of all so far as the system designer is concerned. In spite of the most careful planning, something always seems to crop up which requires attention. After the system has been in operation for a certain time, some changes may be found advisable in

- a) Standards;
- b) overhead rates
- c) the number and content of cost records; and
- d) the procedure in handling forms.

The cost system is organic and must grow and adapt itself to changing conditions. Continuous revision is essential for maximum results.

The system should be such that it is adaptable to the organisation. The objective of the system should be to minimise the cost and it should prove to be a real investment. The advantages to be gained from the installation of the system must be more than the costs incurred. There should be integration of the costing system with financial accounting, so that duplicate records and work can be easily avoided. Clerical work involved in the maintenance of the costing system should be kept to a minimum as far as possible. Otherwise the usefulness of the system will disappear. The system should be feasible and capable of being adapted to changing business conditions and environment.

COST CENTRES AND COST UNITS

Cost Centres

The Institute of Cost and Management Accountants, London, has defined a cost centre as "A location, person, or item of equipment (or group of these) for which costs may be ascertained and used for the purposes of cost control".

Types of Cost Centres

The sub-classifications have been defined by the same Institute as follows:

The impersonal cost centre: It is a cost centre which consists of a location or items of equipment or a group of these.

The personal cost centre: It is a cost centre which consists of person or a group of persons.

The operation cost centre: It is a cost centre which consists of machines and / or persons carrying out similar operations.

The process cost centre. It is a cost centre which consists of a specific process or continuous sequence of operations.

Usually a big factory is divided into a number of departments in order to facilities work and supervision. Departmentalisation also helps in the estimation of indirect expenses. We may, if we like, try to estimate the expenses for the whole factory first and then apportion them among the department and then among products. But if we have departments, the better plan would be to try to estimate expensed department-wise as far as possible. Even if a factory is not officially divided into departments, the Cost Accountant may divide it into notional departments for his own purpose. For example, he may try to estimate expenses connected with every big machine or a group of machines or men who may be there.

Cost Units:

The Institute of Cost and Mangement Accountants, London defined cost unit as "a quantitative unit of product or service in relation to which costs are ascertained. In relation to job costing method, it consists of a single specific order; in relation to batch costing, it consists of a group of similar articles which maintain its identify throughtout one or more stages of production; and in relation to contract costing method, it consist of a single contract"

Cost units used are by no means uniform. While coal is measured by metric tone, petrol by barrel and lumber by board feet, products such as machines, aeroplanes, automobiles, shoes, shirts or stocking are measured either by individual unit or by multiples thereof, such as a dozen or, a gross.

In Selecting the cost unit, care must be taken to ensure that the unit is neither too large nor too small. If the units is too large, significant cost trends may pass unnoticed due to averaging of costs. If the units is too small, it may necessitate detailed and expensive clerical work.

BASIC COSTING METHODS AND TECHNIQUES

General methods and techniques of costing have been developed to meet the needs of individual business organisations. We have used the works "Methods" and "Techniques" as headings intentionally because we want the students to understand these terms clearly. The term "Methods" signifies the determination has been used to signify techniques of a ascertaining actual cost and techniques which are applied for decision making. Different methods are used by different industries according to their needs and nature of the product they manufacture of operations they perform. These techniques can be used independently irrespective of whether a particular method has been used or not.

Costing Methods:

The ICMA, London, has classified these methods into two categories, viz.,

- i) specific order costing, and
- ii) operation costing

while some cost accountants group them into two other categories, viz.

- i) job costing, and
- ii) process costing:

Really speaking there is no difference between specific order costing and job costing, and operation costing and process costing. But this sometimes leads to confusion because job costing is not the only specific order costing. Similarly, process costing is not only operation costing. Therefore, we have chosen to use the words "specific order costing" and "operation costing" as they have wider meaning and scope.

I. Specific order Costing:

- a) Job Costing, ICMA, London, has defined it as "That form of specific order costing which applies where work is undertaken to customer's special requirements". As distinct from contract costing, each job is of comparatively short duration. The work is usually carried out within a factory or workshop where each job moves through the processes or operations as a continuously identifiable unit, although the term may also be applied to such work as property repairs carried out on the customer's premises. This method is applied where the cost of a separate job is wanted. The terms "specific order", "production order" or "job cost system" are synonyms of the term 'job order costing'. Among the industries that employ the job order cost system are asphalt, paving construction, furniture, hardware, heavy machine, paper and paper products, printing, shipbuilding, textile finishing and toys.
- b) Batch Costing. Where the cost of a group of products is ascertained, it is referred to as a batch costing. Under this method, the unit of cost is a batch or group of identical products. This method is applied in general engineering industries where components are manufactured. The ICMA, London, has defined it as "that form of specific order costing which applies where similar articles are manufactured in batches either for sale or for use within the undertaking. In most cases the costing is similar to job costing".
- c) Contract Costing. Under this method, separate cost account is kept for each individual contract or job undertaken. Builders, civil engineering contractors, constructional and mechanical engineering firms use this type of cost accounting. The ICMA, London, has defined it as, "that form of specific order costing which applies where work is undertaken to customer's special requirements and each order is of long duration (compared) with those to which job costing applies. The work is usually of a constructional nature. Generally the method is similar to job costing although it has certain distinctive features".

- d) Multiple of Composite Costing. This is used when a variety components are being produced and subsequently assembled in complex production. The cost of each component and the assembly is to be determined separately.
- e) Terminal Costing. Where the cost can be properly terminated at some point and related to a particular job, it is referred to as "terminal costing".

II. Operation Costing:

The cost unit this method is the operation instead of the process are repetitive in nature. Moreover, where the final products cannot be measured in terms of single units, operation costing can suitably be applied. The ICMA, London, has defined it as "the category of basic costing methods applicable where standardized goods or services result from a sequence of repetitive and more or less continuous operations or processes to which costs are charged before being averaged over the units produced during the period". This may be classified into the following three methods.

a) Single Output or Unit Costing

This is the method of costing where cost per unit is ascertained and is used in those enterprises where identical cost units, i.e., a narrow range or only one product is produced continuously. This method is applied to such industries as marble, quarrying, steel, brick kilns, etc.

b) Operating Costing:

The cost of providing a service is termed as "operating cost". Such a service might consist of transport, steam, gas, hot water and catering. This method is applied by public utility undertakings such as waterworks, electricity and gas supplies, road transport, hospitals, etc. A special feature of this method is the unit under this method is, generally, per kilowatt, hour etc. The ICMA, London has defined it as "that form of operation costing which applies where standardized services are provided either by an undertaking or by a service cost centre within an undertaking. The method may be used where the service is not completely standardized but where it is convenient to regard it as such, and to calculate average costs per period in relation to the standardized unit of measurement, e.g., ton-mile in the case of goods transport or patient day in the case of hospitals".

c) Process Costing:

This method of costing is used to ascertain the cost of a product at each stage of the process or operation. The industries which make use of this method of costing are chemical, refineries, soap manufacturing, iron and steel and textile. The ICMA, London, has defined it as, "that form of operation costing which applies where standardized goods are produced"

PRINCIPLES AND TECHNIQUES OF COSTING:

Various principles and techniques of costing to suit the manner in which it is decided to present information to the various levels of management. Below is the list of techniques which

have been recommended by the Institute of Cost and Management Accounts, London.

1. Absorption Costing

A Principle whereby fixed as well as variable costs are allotted to cost units. The term may be applied where

- a) Production Costs only, or
- b) costs of all function are so allocated.

2. Marginal Costing

Marginal costing is not a method of costing such as job costs, process costs, operating costs, etc., but is a special technique concerned particularly with the effects which fixed overheads have on the running of a business. Marginal costing is the ascertainment, by differentiating between fixed costs and variable costs, of marginal costs and of effects on profit of changes in volume or type of output.

3. Differential Costing

This technique is used in the preparation of ad hoc information in which only cost and income differences between alternative courses of action are taken into consideration.

4. Incremental Costing:

This technique is used in the preparation ad hoc information where consideration is given to a range of graduated changes in the level or nature of activity. The additional costs and revenues, likely to result from each degree of changes, are presented.

5. Opportunity Costing

It deals with the problem of demonstrating the most profitable course of action with several alternatives. It is, therefore, concerned with comparative rather than actual costs. The opportunity cost of a product is not in any way based upon expenditure, but may be described as the alternative revenue forgone.

6. Responsibility Costing

Cost data are accumulated and reported according to areas of responsibility within a firm. The areas are commonly referred to as responsibility centres. Thus reports not only indicate what costs have been incurred but also fix responsibility. Responsibility costing greatly facilitates the practical implementation of management's cost control objective.

7. Actual Cost Ascertainment (Historical Costing)

Actual cost ascertainment is a principle whereby costs of cost centres and cost units are ascertained which, subject to certain approximations, are deemed to represent actual cost. (The term "historical costing" is often used to describe this concept but is not recommended because the word "historical" may equally be applied to other concepts, e.g., statement of variances relating to past events)

8. Variance Accounting Techniques

It is a technique whereby the planned activities of an undertaking are expressed in budgets, standard costs, standard selling prices and standard profit margins, and the differences between these and the comparable actual results are accounted for. Management is periodically presented with an analysis of differences by causes and responsibility centres, such analysis usually commencing with the operating profit variance. The technique also includes the establishment of a suitable arrangement of accounts in the principal ledger. Different variance accounting techniques are discussed below:

- a) Standard Costing consist of
- i) setting up of standards for each product;
 - ii) comparison of the actuals with standards;
 - iii) finding out reasons for variances; and
 - iv) taking remedial action.

In other words, standard costing is the preparation and use of standard costs, their comparison with actual costs and the analysis of variance to their causes and points on incidence. Standard costs are usually the planned costs of products under current and anticipated conditions.

- b) The Budgetary Control Technique relates to the establishment of budgets relating the responsibilities of executive to the requirements of a policy, and the continuous comparison of the actual with budgeted results, either to secure to individual action the objective of that policy or to provide a basis for its revision.

The term "variance accounting" is more appropriate where planned performances are expressed in standard costs per unit of product or service as well as in budgets, all being used in comparisons with actual results.

- c) The variance Analysis is that part of variance accounting which relates the analysis to constituent parts of variances between planned and actual performance. This technique has been developed to control cost and is based on the principle of management by exception.

Cost Systems:

The basic objective of cost accounting is the determination of all costs. After a cost unit has been selected, the obvious question arises as to how these costs are allocated. Costs may be allocated on the basis of the actual cost incurred or costs may be assigned on a standard cost basis. If the latter method is chosen, various accounting will set off the different between the actual cost and standard cost.

The following are the three cost systems generally in use:

1. The Historical Cost System. Under this system costs are collected as they occur. This system delays the presentation of results until manufacturing operations have been performed or services rendered.
2. The Standard Cost System. Under this system costs are determined in advance of production. Differences between actual costs and standard costs, called variances, are collected in separate accounts. The variances are analysed, and the management is expected to move quickly to check unfavourable trends and departures from predetermined standard as well as from the desired overall profit goal.
3. The Uniform Costing System. It is not a distinctive form of costing but refers to the cost system designed by a trade association or other organisations for use by its members. The term applies to uniformity of application of principles of apportionment and absorption of overheads and of determining cost and selling prices. The methods of uniform costing may be advantageously applied for inter-firm comparisons. These methods, principles and techniques can also be explained with the help of figure 1.2.

COST ACCOUNTING LANGUAGE OR TERMINOLOGY

The Concept of Cost

“Cost” is one of the most slippery words used in accounting. It is used for a number of quite different motions. “Cost” is a measurement, in monetary terms, of the amount of resources used for some purpose. In other words, cost represents a sacrifice of values. There are various ways of defining and measuring the resources sacrificed in a variety of circumstances. In financial accounting the term “Cost” is understood to mean historical cost or actual cost. This is defined by the committee on Terminology of the American Institute of Certified Public Accountants as follows:

“Cost” is the amount, measured in money, of cash expended or other property transferred, capital stock issued, services performed, or a liability incurred, in consideration of goods or services received or to be received.

W.M. Harper has defined cost as “the value of economic resources used as a result of producing or doing the thing costed”. Note the word “value”. In a majority of cases the value of the economic resources used is the amount of money spent in acquiring or producing them, but this is not always so. For instance, if the market price of an article was Rs.5 at the time of purchase and rose to Rs.7 by the time it was actually used in production, then, strictly speaking, the cost is Rs.7, since this is the value of the article used.

All historical costs may be classified as either unexpired or expired. An unexpired cost is one which has the capacity of contributing to the production of revenue in the near future. An expired cost is one which cannot contribute to the production in future.

The ICMA, London, has defined as an expense incurred. The word “cost” as it is understood in different senses, is being defined below:

Different Meanings of the term "Cost"

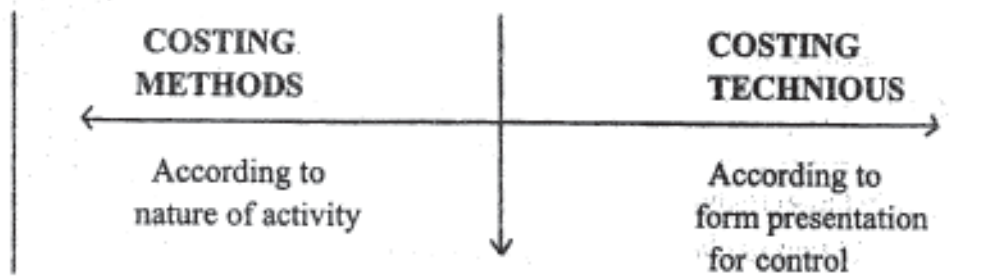
- a) In simple and sophisticated term, cost may be described as total of all expenses incurred, whether paid or outstanding, in the manufacture and sale of a product or those incurred in rendering a service.
- b) The word "cost" has been defined by the committee on cost Terminology of the American Accounting Association as "The foregoing, in monetary terms, incurred or potentially to be incurred in the realisation of the objective of management which may be manufacturing of production or rendering of a service".
- c) "Cost" represent all expenses on all goods, services and property which have been referred without having any relation what so ever with the realisation of revenue.
 "Expenses" means those costs which have been released to be set off against the revenue of a particular period.

**COST ACCOUNTING
METHODS, AND
TECHNIQUES**

- Specific order costing
- (a) Job Costing
- (b) Batch Costing
- (c) Contracting Costing
- (d) Multiple Costing
- (e) Terminal Costing

UNIFORM
COSTING
↑
SYSTEM

- I. Absorption Costing
- II. Marginal Costing
- III. Differential Costing
- IV. Incremental Costing
- V. Opportunity Costing
- VI. Responsibility Costing.



Date Bank routine information.

↓
PLANNING
CONTROL
DECISION MAKING

- II. Operation Costing
- a) Single or unit costing
- b) Operating or Service Costing
- c) Process Costing

- VII. Actual Cost ascertainment
- VIII. Variance Accounting
- a) Standard Costing
- b) Budgetary control
- c) Variance analysis.

“Loss” represents a fall on the equity of business, by means other than withdrawal of capital, for which no replacement has been obtained, lime machinery destroyed by flooding of business premises.

- d) Cost are always calculated from the point of view of management, which expects costs in perform three functions, viz., cost computation, cost control and cost analysis. Therefore, the concept of cost depends upon the purpose for which it is used, the conditions under which it is employed and the people who intend to use this concept. Thus, costs from the point of view of the management may be direct, indirect, prime, conversion, joint, product, period, controllable, opportunity, sunk, inputed, out of pocket, and an entire range of others.

All these modifications of cost have their own characteristics and the word “Cost” has to be used-very carefully under appropriate conditions. From a general point of view it is necessary for the cost of any type to be based on relevant facts competently observed and significantly measured.

Classification of Costs

The following cost classification is recommended for the development of cost data that are useful to the management for:

- a) Planning profit by means of budgets
- b) Controlling
- c) Measuring annual or periodic profit;
- d) Assisting management in establishing selling prices and pricing policy; and
- e) Furnishing relevant cost data and information for decision making.

According to Matz and Uary, costs can be classified into the following seven categories;

1. By the nature of the item (a natural classification)
2. With respect to the accounting period to which they apply;
3. By their tendency to vary with volume or activity;
4. By their relation to the product;
5. By their relation to manufacturing departments;
6. For planning and control; and
7. For analitical processes.

The Natural Classification of Costs

The process of classifying costs on the basis of the three elements of cost, namely,

- i) materials;
- ii) labour, and
- iii) factory overhead is known as the “natural classification”

In a manufacturing concern, the total operating cost is divided into two groups.

A) MANUFACTURING COST

The Manufacturing Cost is also named as “the production cost” or the “factory cost”. It is the sum of the costs of direct materials, direct labour and factory overhead.

B) COMMERCIAL EXPENSES

These fall into two categorie;

- i) The Marketing or selling or distribution cost; and
- ii) General administration cost.

i) The Marketing Cost

The marketing is the cost incurred in publicing and presenting to customers the products of the undertaking in suitable attractive forms and at acceptable prices, together with costs of relevant research work, the securing of orders, and usually, delivery of the goods to customers. The portion of marketing cost which is incurred in warehousing saleable products and in delivering products to customers is known as the selling cost. The portion of the marketing cost which is incurred in advertising and promotion as aids to eventual sale of goods or services is called the publicity cost. In certain cases after-sales service and or order processing may also be include in the marketing cost.

ii) The General Administration Cost

This is sum of those costs of general management, and of secretarial, accounting and administrative services, which cannot be directly related to the production, marketing research or development functions of the enterprise.

This operating cost can be shown with the help of the following figure.

AN ANALYSIS OF TOTAL COST

Direct Materials	+	Direct Labour	+	Other Direct Costs	= Prime Cost
Indirect Materials	+	Indirect Labour	+	Other Indirect Costs	= Factory Overhead.
Includes: Factory supplies Lubricants		Includes: Supervision Superintendence Inspection Salaries of factory Clerks Defective work Experimental Work		Includes: Rent Insurancefire and liability Taxes Depreciation maintenance and repairs power Light Heat Miscellaneous factory Overhead	=
					<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Manufacturing Cost </div> +

AN ANALYSIS OF TOTAL COST

Marketing Expenses	+	Administrative Expenses	=	Commerical Expenses.
<p>Includes:</p> <p>Sales salaries commissions to salesmen advertising Samples Entertainment Travel expenses Rent Telephone and telegraph Stationery and printing Postage frieght and cattage - outward miscellaneous marketing expenses</p>		<p>Includes</p> <p>Administrative and Office salaries Rent Auditing expenses Legal Expenses doubtful expenses Telephone and telegraph Stationery and printing Postage Miscellaneous expenses.</p>	=	Total Cost

Cost with respect to the accounting period to which they apply

This Classification is very important from the point of view of financial accounting and the principle of matching cost with revenue. According to this, cost may be classified into three broad categories.

- i) Capital expenditure
- ii) Revenue expenditure, and
- iii) Deferred revenue expenditure

i) Capital expenditure

Capital expenditure is intended to benefit future periods and and is classified as an asset. The benefit of such an expenditure is spread over a number of successive accounting period. Capital expenditure has a tendency to gradually dissolve itself into revenue expenditure by way of being charged to income, e.g. depreciation.

ii) Revenue expenditure

A revenue expenditure benefits current period and is termed as an "Expense". An expenditure classified orginally as an asset becomes and expense when the asset is either consumed or charged off. The examples of such expenses are; wages to workers, office salaries etc.,

The distinction between capital and revenue expenditure is essential in order to match with revenues and to measures periodic income. The terms "capital expenditure" and "revenue expenditure" are only relative and they can be affected only either by accounting mainpulations

or by the character of the company's operations. However, it is so necessary for the proper computation of net income that the distinction between them is scrupulously observed.

It is quite common to find that the distinction between "capital revenue" and "expenditure revenue" is ignored for extraneous considerations and, therefore, the figure of net income is distorted. In this light, the determination of expenditure is purely a matter of managerial discretion except for the purposes of taxation.

iii) Deferred revenue Expenditure

There is a class of expenditures which do not fully conform to the ingredients of either the capital or the revenue expenditure, and partaken of the characteristics of both. Such an expenditure is called "deferred revenue expenditure" It is temporarily treated as an asset to be written off over a couple of years or so by being gradually charged to profits e.g., expenses on special advertisement campaigns and renovations of fashionable places. These expenditures are written off on the basis of past experiences over a number of years at the management.

Cost in their tendency to vary with the volume of activity

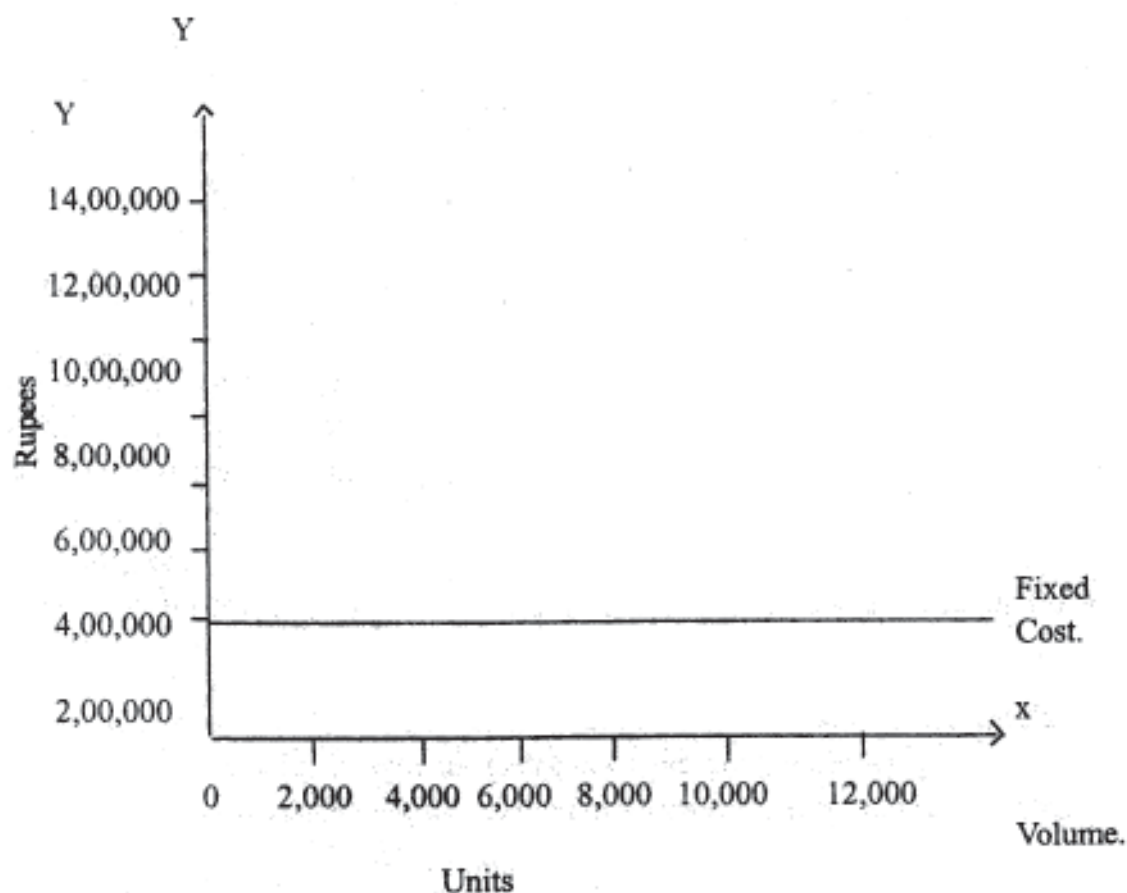
This classification of costs is of great significance for the purpose of short period managerial decision making, which requires day-to-day decision regarding either expansion of production or reduction of the same in responses to the fact changing business environment.

According to this classification, costs can be divided into three categories;

1. Fixed Costs

According to the Institute of Cost and Management Accountants, London, it has been defined as "a cost which accrues in relation to the passage of time and which, within certain output or turnover limits, tends to be unaffected by fluctuations in the volume of output or turnover". Examples are: rent, rates, insurance and executive salaries.

All costs which do not vary with the level of activity, but tend to vary with time, are referred to as "fixed costs". Fixed costs are those costs which remain constant in total regardless of changes in volume or level of activity. For example, a firm pays Rs.2,000/- per month as salary to an engineer. If the engineer can produce two thousand units, his services may be used to his full capacity, or it might not be used at all, but this would not affect the fixed amount of salary which is to be paid to the engineer. A fixed cost does not change in amount, but it may vary as far as cost per unit is concerned. This is because the same total fixed cost is spread over on the actual units produced. If production reaches the installed capacity, the same total fixed cost is spread over on the actual units produced. If production reaches the installed capacity, the cost per unit may also decrease. A fixed cost may be represented as a parallel line to the base line when drawn on graph paper. This is shown in the figure on the opposite page.



Many Characteristics of Fixed Costs are

- i) Fixed costs do not bear a direct relationship with the volume of production unless they are associated with the change in the level of output. Therefore, it is said that fixed costs have a tendency to remain unchanged for a particular output range.
- ii) The fixed cost per unit of output decreases if production increases, and vice versa.
- iii) These costs cannot easily be assigned to departments, so a mechanism of assignment, allocation, apportionment and absorption of these has to be devised.
- iv) The responsibility for the incurrence of fixed costs and their accountability is with the top management.

Three broad types of fixed costs may be distinguished.

1. Long - rim capacity costs

These are the costs of a company's facilities. They represent the existing capacity to produce and sell goods. Depreciation and amortization are fixed costs in this category.

2. Operating fixed costs

These fixed costs are needed to operate the company's facilities. Insurance, taxes, supervision (when fixed), are examples of this type of fixed costs.

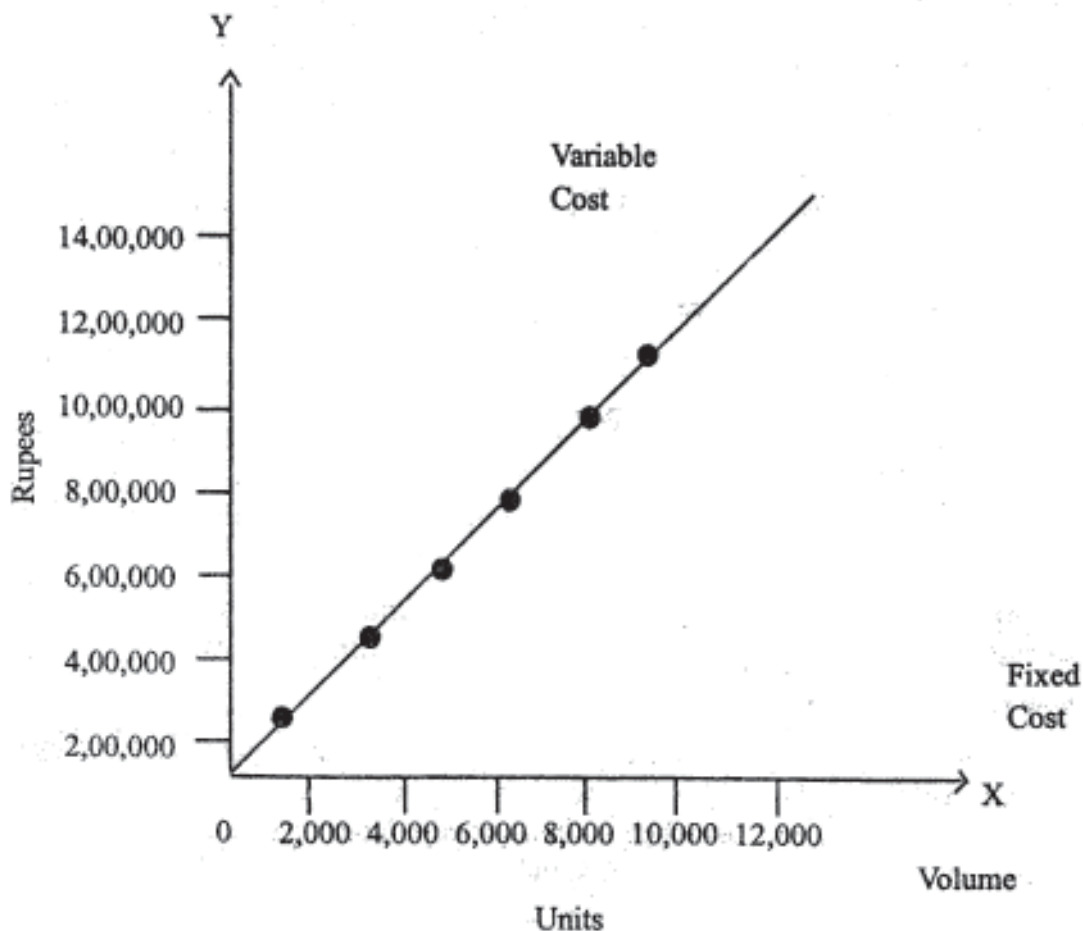
3. Programmed fixed costs

These are fixed costs, not directly related to facilities and their operation, to which management has committed the company, Research expenses and advertising are examples of costs of this type.

2. VARIABLE COSTS

They are those costs which have a tendency to change proportionately with the volume of production and the level of output. Due to this nature of the variable costs, they are represented on a graph by

means of a line which is continuously using in response to the volume of production (see figure 1.6)



The Chief Characteristics of variable costs are:

- i) They bear a direct positive correlation with the volume of production.
- ii) Variable costs per unit of output have a tendency to remain more or less the same.
- iii) Variable costs can be directly and easily assigned to the department concerned.
- iv) The responsibility for incurrence as well as accountability is with the departmental heads and some times even with the foremen on the shop floor.

3. SEMI VARIABLE COSTS

These costs are characterised by the ingredients of both fixed and variable costs. Thus, they remain constant up to a certain volume of production, but they have a tendency to change once such a volume of production is exceeded, for example, a supervisor may be competent to keep an eye on five workers, but, if the number of workers increases, another supervisor should be required for effective supervision. Examples of semi-variable costs are given below:

- a) Supervision,
- b) Inspection,
- c) Payroll department services.
- d) Personnel department services,
- e) Factory office services,
- f) Materials and inventory services,
- g) Cost department Services,
- h) Maintenance and repairs of machinery and plant equipment,
- i) Compensation insurance
- j) Health and accident insurance
- k) Special security taxes,
- l) Industrial relations and welfare expenses
- m) Heat, light, power, etc.

Thus a semi - variable cost may be described as the one which changes in response to the volume of production, but not proportionately.

For purpose of direct costing the treatment of semivariable costs is very important, because these costs have to be segregated into the fixed and the variable costs.

Cost in their related the product

The elements of manufacturing costs are direct materials, direct labour and factory overhead. The first two of these when added are known as the prime cost of the product. The prime cost is identical with total direct cost when all items except labour and materials are treated as indirect. The term "conversion cost" is used to indicate the total of direct labour plus factory indirect cost. The conversion cost is the total cost of changing materials into finished products.

Materials Cost. It can be of two types:

- (i) direct materials cost, and
- (ii) indirect materials cost,

Direct materials are those materials which can be easily identified with the individual units, while indirect materials are grouped under the heading 'overhead'. These materials are raw materials which become an integral part of the finished goods and which can be conve-

nically assigned to specific physical units. The Institute of Cost and Management Accountants, London, has defined direct materials as "the cost of materials, entering into and becoming constituent elements of a product or a saleable service". Direct materials are included directly in calculating the cost of the product, such as lumber to make furniture, steel to make automobile bodies, and crude oil to make gasoline.

As compared to direct materials, indirect materials are those which though sometimes joining part of the finished product are so small in value or of such a complex nature that no useful purpose would be served by treating them as direct expenses, e.g., screws, varnish, nails, etc., factory supplies are also considered as a part of indirect materials and they consist of cotton rags for cleaning machines, brushes for mopping the floor, disinfectants used for keeping the factory clean, and so on.

LABOUR COST

Labour Cost can again be classified into

- (i) direct labour cost
- (ii) indirect labour cost.

Direct labour is one which is expended directly upon the materials to make the finished product. All wages which are conveniently, specifically and obviously related or traceable to specific products are called "direct wages costs". The Institute of Cost and Management Accountants, London, has defined it as "the cost of remuneration for employee's efforts and skills applied directly to a product or saleable service". Examples are; wages paid to machine operators and wages paid to workers, etc.,

Indirect labour may be defined as 'that labour which does not affect the construction or the composition of finished product'. The Institute of Cost and Management Accountants, London, defined it as the "wages cost other than direct wages cost". The definition given by the Institute is not an elaborate one and needs further explanation. Indirect labour is that labour which is not directly associated with the production activities. The term includes the labour cost of foremen, general helpers, cleaners and those employees who are engaged in maintenance work, or other service workers not directly related to physical production. All indirect labour costs are included under the heading "overhead".

Expenses:

Expenses are also classified into two categories namely, direct expenses and indirect expenses. Direct expenses are those expenses which can be conveniently and easily traceable to individual units. The Institute of Cost and Management Accountants, London, defines expenses as "costs other than materials or wages, which are incurred for a specific product or saleable service". The cost of hiring a special plant for a particular job or contract is a direct expense with job or contract. In a similar way the cost of lighting and rates is direct in relation to the cost centre.

Indirect expenses are those expenses which cannot be conveniently and easily associated with a traceable to individual units produced. The Institute of Cost and Management Accountants, London, defines indirect expenses as "expenses other than direct expenses". All manufacturing overhead, administrative costs or marketing and selling costs are treated as indirect expenses. The word "overhead" also includes indirect materials and indirect labour. This classification is also known as the "general cost classification".

A cost may be either direct or indirect. The which is direct for one segment may be indirect for another. Indirect costs may be allocated costs since they must always be assigned, allocated or applied to processes, products, jobs or other business segments. Direct costs are usually variable costs, while a major part of indirect costs consists of fixed costs.

Costs in their relation to manufacturing departments.

A factory is generally divided into a number of departments from the organisational point of view. Costs are accumulated on the basis of departments for the purpose of achieving control. Departments are sometimes further subdivided into cost centres. As a product passes through a department or a cost centre, it is charged with direct materials, direct labour and a share of factory overhead on the basis of a departmental factory overhead rate.

Cost classification according to planning, control and decision making

Classifications given under heading sixth and seventh on Page 23 are discussed here.

The word "cost" has different meaning in different settings and the kind of cost concept to be used in a particular situation depends upon the decisions to be made. In management decisions involving a selection between alternative courses of action cost plays a prominent role. Cost are also used for planning and control purposes. The concept of planning and Control.

Planning refers to the determining of objects and formulation of plans to meet the objectives laid down. Planning is achieved generally through a set of budgets forming part of a comprehensive budgetary programmed.

Control is the direction of activities to achieve the desired objectives.

Different Cost Concepts

In financial accounting the term 'cost is defined as "the sacrifice made in order to obtain some goods or services; the sacrifice may be measured in cash expended, property transferred, service performed, and so on".

In managerial accounting the term "cost" is used in a slightly different way. The real reason is that there are different types of costs and cost classification is done according to the needs of the management. Here different cost concepts for different purposes are used. We have grouped the different concepts under the following three categories.

- I. Concepts relating to income determination and inventory valuation
- II. Concepts relating to control
- III. Concept relating to decision making.

I. Concepts relating to Income Determination and Inventory Valuation**PRODUCT AND PERIOD COSTS**

Product costs. Product costs are manufacturing costs which are included for inventory purposes. These costs are also known as inventory valuation costs. They are admitted into the flow of costs through work in process inventory. When product costs expire, they appear as expenses in Profit and Loss Account.

Period Costs. A period cost is the general description of all expenses reported in the income statement. If an expenditure on research and development is to be treated as a period cost, it will be recorded as an expense account. All expenses are period costs and are shown in the income statement as charges against revenues of a particular accounting period.

II. Cost Concept relating to planning and Control**DIRECT AND INDIRECT COSTS i.e.,****VARIABLE COSTS, FIXED COSTS AND SEMI VARIABLE COSTS**

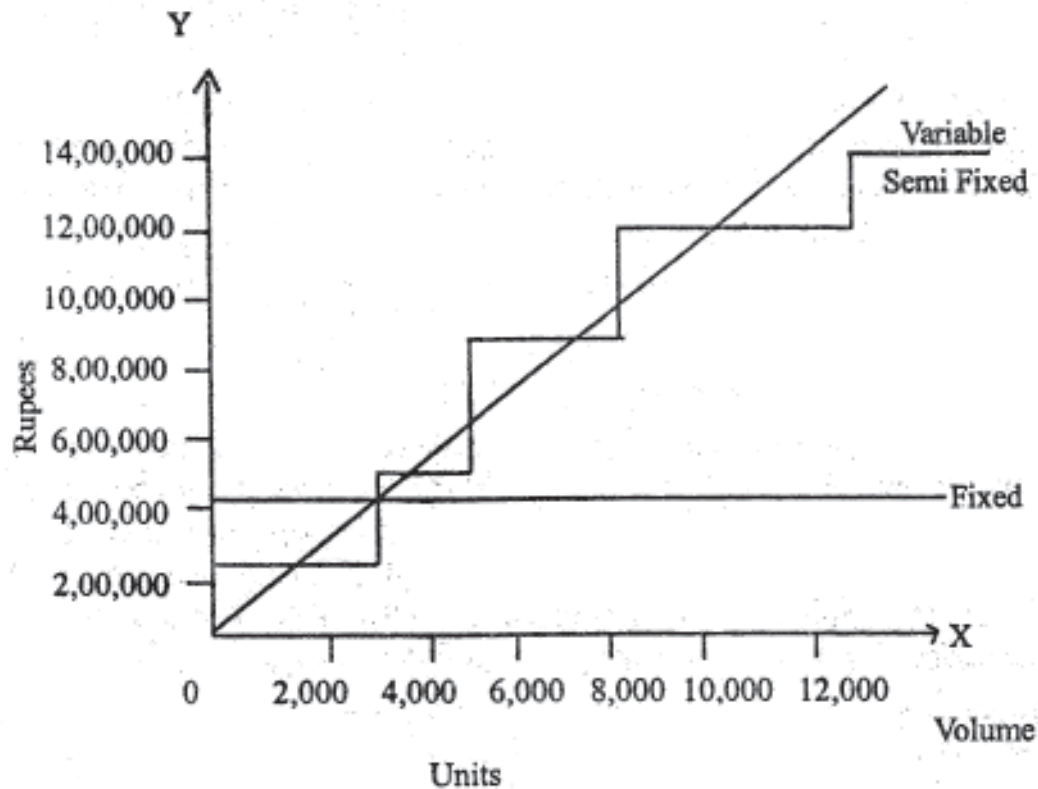
Variable Costs. Costs which vary in direct proportion to changes in the level or volume of the activities, are referred to as variable costs. Variable costs consist of prime cost plus variable overhead. Generally speaking variable costs vary in direct proportion or in 1:1 proportion relationship to changes in productive output or activity. For example, the direct materials cost is usually a variable cost, i.e., each manufactured unit requiring a certain quantity of materials. Thus, the materials cost will change in direct proportion to the number of units produced.

Fixed costs. Fixed costs are those costs which remain constant, i.e., they do not vary in total with the change in the volume of output, however, in some cases fluctuates with the changes in the volume of production. Examples of such costs are managerial remuneration, insurance, taxes and rates, etc.,. Fixed expenses will remain the same regardless of whether the factory reaches installed capacity or is below its normal capacity level. Fixed costs are sometimes classified as committed costs or programmed costs. The management in making long range decisions may commit a company to a cost pattern that will extend to several years in the future. For example, when a building is purchased, property, taxes, insurance, repairs etc., will have to be incurred. These fixed cost will be known as committed costs. Other Costs which may referred to as "Programmed costs", "Manged Costs" or "Behaviour Costs" are determined as part of management policy.

Semi - Variable Costs. Many costs are, however, of semi - variable or semi -fixed nature, i.e., they may change but not in direct proportion to the output or the activities. These costs do not change within a small range of activities but may change when the output reaches a particular level in the same proportion in which the output changes. For example, the semi - variable expenses may remain constant at 60 to 70 per cent capacity or activity level, but may increase in total from 70 to 80 percent level of activity. Semi-variable cost can be segregated into fixed and variable costs. For example, depreciation of a plant and machinery depends upon two factors, viz.,

- (i) Variable affix of time, and
 (ii) partly wear and tear.

The former cost is referred to as fixed, while the latter is referred to as variable. a figure showing fixed, variable and semi variable functions is given below.



The Methods of Segregation have been discussed in detail in Chapter V.

Fixed costs are often responsible for difficulties in accounting for costs. By definition, the total fixed costs remain constant over a specified range of activity or output. This means that a fixed cost per unit will vary; when a greater number of units is produced, the fixed cost per unit will decrease, and vice versa. This variability with respect to the unit cost creates, and vice versa. This variability with respect to the unit cost creates problems in product costing. For example, a factory's fixed costs are Rs.6,00,000 and let us presume that the factory produces only one unit and the variable cost for that unit is Rs.10. The total cost of the one unit produced will be Rs.6,00,010. But if we presume that the production rises to 1,00,000 units and the variable cost per unit remains to be Rs.10 per unit, then the total cost of one unit at this stage of production will be Rs.16 per unit. It means that fixed cost per unit goes on changing with the change in the actual production.

Controllable and Non- controllable Costs.

The distinction between controllable and non - controllable costs must be clearly understood to get a proper understanding of the control process. A controllable cost has been defined by Anthony and Welsch as an item of cost which is controllable if the amount of cost

incurred in (or assigned to) a responsibility centre is significantly influenced by the actions of the manager of the responsibility centre. Otherwise it is non-controllable. There are two important implications of this definition; and firstly, it refers to a specific responsibility centre, and secondly it suggests that controllability results from a significant influence rather than from a complete influence.

“Controllable” always refers to a specific responsibility centre because elements or cost are controllable somewhere within the organisation; and a few elements of cost are completely controllable by any one person.

Characteristic of Controllable and non-controllable Costs:

- i) An allocated cost is not controllable by the responsibility centre to which the allocation is made;
- ii) All controllable costs are direct costs; however, all direct costs are not controllable.
- iii) Controllable costs are not necessarily the same as variable costs, i.e., they vary with the volume of output. Some costs such as indirect labour, heat and light, may be unaffected by the volume; they are nevertheless controllable. Direct labour which is usually the obvious example of controllable cost may be non-controllable in certain type of responsibility centres.
- iv) A non-controllable element of cost can be converted into a controllable element of cost by the following two methods.
 - a) by changing the basis of cost assignment, and / or
 - b) by changing responsibility for cost incurrence.
- v) A controllable cost must be separated from a non-controllable cost, because a non-controllable cost need not even be reported in some cases.
- vi) Engineered and Discretionary. Costs are controllable, engineered Costs have been defined by Anthony and Welsch as “items of cost for which the right or proper amount, or costs that should be incurred, can be estimated. “Discretionary costs” are “items of cost whose amount can be varied at the discretion of the manager of the responsibility centre. These costs are also Programmed or Managed Costs”.
- vii) Committed Costs are not controllable in the short run, but they are controllable in the long run committed Costs are those that are the inevitable consequences of commitments previously made. Depreciation is an example”.

This cost classification depends upon the point of reference. All costs are controllable at some level or the other in a company. Only at lower levels of management some costs may be considered to be non-controllable. The top level management has the power to expand or contract or to exercise levels, the authority to control does not exist and, therefore, that level of management is concerned. Sometimes, it is assumed that direct costs and controllable costs are the same thing. A cost can be direct to a department but not yet controllable. For example, the

salary of the departmental supervisor is a direct cost of the department but is controlled at a higher level of the management rather than at the supervisory level.

There is also a tendency to assume that fixed costs are non - controllable and that all variable costs are controllable and that all variable costs are controllable. Costs behaviour should not be confused with controllability. For example, advertising is a fixed cost but the amount is entirely controllable by the top level management policies.

Time also plays a part in the controllability. There may be certain costs which are controllable in the long run, but they are not controllable in a short period. For example, an advertising programme may have been set and contract signed, the management has no power to change the amount of spending after the expiry of the long run.

Budgeted and Standard Costs

Budget Costs. Budget represents plan of business operations for the future expressed in monetary terms. Therefore, budgets are based on estimates and the costs included in the budget are also estimates. Generally, budgetd costs are estimated for a group of business operations. Subsequently, business operations are tracked to find out how far they have corresponded to the budgetary targets and budgeted costs. This is done by means of what is called "Budgetary Control"

Standard Costs

They represent predetermined costs of every aspect of business operation ranging from direct materials and direct labour to seeling and distribution overhead. This costs are based on past experience of business operation and are fixed under certain assumed conditions. In view of the fact that these assumed conditions may or may not turn out to be correct, business operations have the inherent tendency to be deviate from these standards either way. These deviations, which are technically valled variances, are monitioned throughly and the responsibility for them is fixed. The entire exercise involved in monitoring business operations with reference to the standards set for them, analysis of the variations from the standard and the fixing of the responsibility therefore is called variance Analysis.

Budgeted costs and standard costs superficially appear to be one and the same thing, but there are subtle distinctions between them. Firstly, budgeted costs are genrerlaly estimated on the basis of departments, while standard costs are predetermined for every single business opeeration involved, not only in the manufacture of a product, but in almost all activities of a business.

Secondly, the relative emphasis of budgeted costs is on planning of business operations while that of standard costs is on control of business operations, though in modern times planning and control cannot be segregated in wetertight compartments.

Thirdly, budget costs are generally expressed in monetary terms while standard costs are invariable expressed in physical quantities, though it is not unusual to express them in terms of money. Thus, budgeted costs represent the financial management approach to the planning and

control of business operations, while standard costs are the operation management's approach toward the same.

Fourthly, standards are fixed after considerable detailed study of the entire business and by conducting empirical investigations of business conditions, while budgetary targets are roughly estimated without much attempt to bring precision and refinement among them.

III. COST CONCEPTS RELATED TO DECISION MAKING

From the point of view of decision making, there are two cost concepts. One is the relevant costs and the other is the irrelevant costs. Relevant costs are those which are considered while making a decision; but the irrelevant costs are those which are ignored while market- ing a decision. In decision making, future costs are relevant rather than historical costs.

Relevant Costs:

Under relevant costs the following cost concepts should be understood which are commonly used for decision making:

- (a) The differential costs;
- (b) The Opportunity Costs;
- (c) The Imputed Costs;
- (d) The Future Costs;
- (e) The Out - of - pocket costs; and
- (f) The Replacement Costs.

(a) The differential costs

The differential cost is the difference between the cost of one alternative and that of another alternative. "Differential costs are also known as "incremental costs", although, technically, an incremental cost should refer only to an increase in cost from one alternative to another. The differential cost is a broader term including both increases and decreases in costs between alternatives.

The differential cost involves the estimation of the impact of decision alternatives and costs and revenues, due change in prices, product, processes, investment to be made in distribu- tion channels, addition to new products or machinery, etc., The two basic concepts which go together with this type of cost analysis are incremental cost and incremental revenue. Incre- mental revenue is the change in the total income resulting from a decision. Therefore, incre- mental costs represent a change in the cost resulting from a decision. They are, therefore, not necessarily variable, traceable or cash costs. This concepts is used for the making of the follow- ing managerial decisions.

1. Whether to process a product, further or not;
2. Whether to continue or discontinue a line of business;
3. Optimising investment plan etc.,

(b) The opportunity cost concept

An opportunity cost can be defined as the potential benefit, i.e., the benefit forgone in rejecting the same course of action. In other words, the sacrifices that are made when income benefits or returns are refused are known as opportunity costs. Charles T. Horngren has defined "Opportunity costs" as "the maximum alternative earning that might have been obtained after the alternative use". It may also be explained as the cost of opportunity lost by the diversion of an input factor from one use to another. It is a measure of the opportunity forgone. The introduction of this concept is useful to the management control in those situations where the management has already one course of action and wants to find out as to whether the other alternative should be taken or ignored.

An opportunity cost does not involve cash outlays is not usually entered in the books of the organisation. But, it is a cost that must explicitly be considered in every decision making. Virtually every alternative has some opportunity cost attached to it. In rejecting one course of action, the rejected alternative becomes the opportunity cost for the alternative accepted. Let us assume that a company has space available in a fully depreciated building which it owns. The space can be rented for Rs.5,000 per annum. The company is considering the utilisation of this space in connection with the expansion of one of its product lines. In evaluating the desirability of the product a change for space should be included as Rs.5,000(Opportunity cost) despite the fact that the building is fully depreciated.

(c) Imputed Costs

Imputed costs are hypothetical costs at least in the sense that they are alien but are not recognised by the accounting system. However, from the theoretical costs. Such costs are also known as notional costs, i.e., the costs are not actually incurred but are to be considered while making a decision. For example, in accounting, interest and rent are recognised only as expenditure when they are actually paid or incurred. But in costing they are charged on a notional basis while ascertaining the cost of a product.

(d) Future costs

All decisions are related to the future. Historical costs generally provide a basis for the cost of production, but the costs which are not likely to be incurred during the anticipated life of the proposal are not relevant for decision making. Therefore, a consideration must be given to the future costs. One may, however, base future costs on the past cost trends.

(e) Out - of Pocket costs

Out - of - pocket costs are those which require current or future outlay of cash i.e., cash outflow are to be well managed. These costs, however, do not involve current cash expenditure. This concept is particularly useful where future cash outflows relating to the proposed investments are involved.

(f) Replacement costs

The replacement cost of an asset is what a firm would have to spend currently to obtain

the services provided by that asset. In general, this amount is the current market value of the asset.

IRRELEVANT COSTS

Cost which do not affect decisions are known as irrelevant costs. The following costs are included under value of the asset.

(a) The historical costs

It is defined by the Committee on Terminology of the American Institute of Certified Public Accountants as "the amount, measured in money, of cash expended or other property transferred, capital stock issued, services performed or a liability incurred, in consideration of goods or services received or to be received". In other words, a historical cost is the cost which is reported in a conventional financial statement.

(b) The actual cost ascertainment

It is a principle whereby costs of cost centres and cost units are ascertained which, subject to certain approximation, are deemed to represent actual costs. (The term "historical costing" is often used to describe this concept but is not recommended because the word 'historical' may equally be applied to other concepts, e.g., statements of variances related to past events).

(c) Sunk costs

"A sunk cost is one for which expenditure has taken place in the past and which will not be affected by a particular decision under consideration. In other words, a sunk cost is cost that will not be changed by decisions, it may be a variable cost or a fixed cost. The changed by the decisions that will be made. Therefore, sunk costs are treated as irrelevant from the point of view of decision making. Horngren has defined it as "a cost which has already been incurred and which is, therefore, irrelevant to the decision making process. It is also known as a historical cost. For example, a firm has acquired a machine for Rs.50,000. The cash spent on the machine is a sunk cost. What has happened in the past is done, i.e., investment in this cost has been made. The investment may have been unwise but the associated costs are "out of window" so far as the decision making is concerned. For this reason such costs are said to be sunk.

GENERAL PRINCIPLES AND LIMITATIONS GENERAL

PRINCIPLES OF COST ACCOUNTING.

1. A cost should be related to its causes. The relating of cost to its causes is done primarily to recover costs or to divide the burden of costs properly on units which are produced. Costs should be related as closely as possible to their causes so that costs can be shared only among the cost units passing through that department of which expenses are being considered. For example, a foreman's salary cannot usually be identified to a single unit since several other units are also supervised by him.
2. A cost should be charged only after it has been incurred. While determining the cost of individual units only those costs which have actually been incurred should be consid-

ered. For instance, a cost unit should not be charged the selling costs, while it is still in the Factory. Selling costs can be charged with the products which are sold.

3. The prudence convention should be ignored. All accountants are usually conservative in their approach. They believe in historical cost and, while determining cost, they always attach importance to the historical cost. This convention must be ignored in cost accounting, otherwise there is a danger that management appraisal of the profitability of projects may be vitiated. "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 cost accounts. All costs which are not related to normal economic performance are known as abnormal costs. The costs which are incurred due to accident and negligence and are uncontrollable are known as abnormal costs. If these costs are not ignored while computing the cost it will distort cost figures and mislead management as to the working results of their undertaking under normal conditions. It is therefore advisable that abnormal costs should be excluded from cost accounts.
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 and likely to be distorted.
6. Principles of double entry should be applied wherever necessary. Costing requires a greater use of cost sheets and cost statements for the cost ledger and cost control accounts should be kept on the double entry principle should be applied because it helps to produce accurate and reliable cost data.

LIMITATIONS OF COST ACCOUNTING

Cost accounting is not, and can never be, an exact science because of the inherent element of judgement. Since cost accounting is not an exact science, but an art, and has developed through theories over a period of time, the various theories can never be shown as disproved but they keep on changing with the passage of time. Some of the limitations of cost accounting are given below.

1. Lack of uniformity

The greatest limitation of cost accounting is its failure to conform to any uniform procedure. Limitations of historical cost accounting procedure as generally recognised. Despite the prescription of uniform and detailed cost accounting procedures, two equally competent cost accountants are likely to arrive at different results from the same data. For this reason all cost accounting and cost analysis results should be accepted as a reasonable approach to accuracy and not as precise measurements.

2. Extent of joint costs

All costs are more or less interwoven. Many costs are joint at the point of their incurrence and there is no exact formula by which they can be apportioned. Usually the joint costs are arbitrarily apportioned.

3. Division of overhead into fixed and variable

All location of direct labour and material costs in the absence of current and complete information is difficult.

Cost are mere estimates and a check- up should be made to ensure that the estimates are near to exactness. Accuracy in cost accounting is a relative consideration. Despite the fact that there are certain limitations, cost accounting, if properly used, outweighs its limitations and is a tool for solving many managerial problems.

COST ACCOUNTING LEDGERS

The cost department is mainly concerned with the income and expenditure of the business and all nominal accounts like wages, salaries, rent etc., and to some extent the real account such as plant and machinery and buildings are to be maintained by the cost department. The cost department has nothing to do with personal accounts. The following are the ledgers which are usually maintained by the cost department.

a) Cost Ledger

ICMA has defined it as "the principle ledger in the cost accounting book - keeping system where this is distinct from but interlocked with the financial accounts. It contains, inter alia, a number of control accounts which control subsidiary ledgers, and a contra account by means of which the double entry principle is maintained. This principal ledger is similar to the general ledger of the financial accounts. Separate accounts for each element of cost are opened such as Stores Control Account, Wages Control, Factory Overheads Control Accounts etc., In order to make Cost Ledger self - balanced the General Ledger Adjustment Account is opened in the General Ledger. All nominal accounts are transferred from the financial books. All the transfers from the cost books to financial books are also posted. In short, General Ledger Adjustment Account represents the personal account shown in the financial books. This account is opened with the main object of completing the double entry in the Cost Ledger. All receipts on account of sales and other credit items given in the financial books are debited to the General Ledger Adjustment Account and Transactions related to material purchases, miscellaneous expenses and wages and salaries are credited to General ledger Adjustment Account. The General Ledger adjustment Account is also referred to as cost Ledger Adjustment Account is also referred to as Cost Ledger Control Account.

b) Subsidiary Ledger

ICMA has defined this book of accounts as " a supporting ledger consisting of a group of accounts of similar nature, the total of which is in agreement with a control account in the principal ledger. Its main purpose are to limit the accounts in the principal ledger to manage-

able number, to simplify the location of errors by making each group self - balancing and to facilitate the delegation of clerical responsibilities. Example are subsidiary ledgers maintained for creditors, stores, working progress and finished stocks.

c) Stores Ledger

Accounting to IMCA, this ledger is “a subsidiary ledger containing an account for each separately identifiable class of material handled by the stores organisations. It is controlled by the stores control account in the principal ledger. It is sometimes referred to as the raw materials ledger. In this ledger all the accounts relating to different stores are maintained. In order to make this ledger as self - balanced, Stores Ledger Control Account is opened. Receipts of goods are posted from the goods Received Notes and issues are posted from material Requisition Slips. If some of the materials are purchased for a specific job, they are debited to the Work-in-Progress Control Account directly and not to the Stores Ledger Control Account. The balance of this account must agree with the total of the balance of individual items of stores as per stores ledger.

d) Work - in - Progress Ledger

ICMA has defined it as “a subsidiary ledger containing detailed accounts of work in progress. It is controlled by the Work-in-Progress Control Account in the principal ledger. The Work-in-Progress accounts may take the form of printed cards or sheets on which costs are computed”. The main object of this ledger is to record production and the cost incurred thereon. Each job, batch or process is assigned a number and a separate account for each job is maintained. Expenses relating to the respective jobs are posted to each respective job account. This account is debited with the opening balance of Work-in-Progress, material, labour and works overhead, costs recovered, costs recovered and is credited with the cost of finished goods.

e) Finished Goods Ledger

ICMA has defined it as “a subsidiary ledger containing an account for each separately identifiable class of saleable products. It is controlled by the Finished Goods stock Control Account in the Principal Ledger. The products which have been completed are recorded in this ledger, special account for each job is opened in the ledger.

f) Overhead Ledger

ICMA has defined it as a subsidiary ledger, containing detailed accounts of overhead. It is controlled by the Overhead Control Account in the principal ledger. The accounts in this ledger are arranged analytically, having regard to the main functions of the business, to the cost centres and to the different types of overhead cost.

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Chapter 2

MECHANICAL AIDS FOR COST RECORDS

Need for Mechanisation

The cost incurring aspect and the 'revenue earning aspect' of a business are dealt with by persons who constitute themselves into the cost accounting organisation. In other words, the cost accounting organisation is mainly concerned with the work of cost accounting i.e., recording incomes and expenses, preparation of statistical data and the presentation of information relating to cost and revenue to management.

In a small business concern, the cost - benefit analysis may reveal that the constitution and running of a cost accounting organisation is too expensive. As the business grows in size and complexity, not only would there be need for cost accounting but for the cost accounting organisation also. Initially, the organisation may feel satisfied with manual accounting, in the long run, however, the increase in the volume of transactions, the cost accounting organisation will certainly be forced to introduce mechanisation in the interests of concurrent costing, accuracy, efficiency and timely reporting.

Manual Vs. mechanised Accounting

Any accounting system involves the collection of accounting information, analysis and classification, recording preparation of statistical any analytical statements and presentation of the same to management for control and decision - making.

Although the cost accounting organisation does not concern itself with the preparation of the basic documents but starts with the information already recorded in these documents, it has to make use of the information in a way suited for the purpose of costing. It is here that we find and the work involving considerable labour. The introduction of mechanical appliances not only simplifies the complex work of accounting but speeds up the work also, at a lesser cost in the long run.

Disadvantages of Manual System:

The manual system of writing up cost accounts suffers from the following disadvantages.

- a. Since "cost account function by analysis of expenses under heads of performance as distinct from heads of expenses". It is necessary to analyse and copy the basic documents for suit the purposes of cost accounting. This involves duplication of work.
- b. When the basic documents are voluminous, arithmetical calculations become tedious.
- c. Mistakes are bound to creep in specially in additions, subtractions, multiplications, divisions and balancing.
- d. There may not be any agreement between the same data used in different statements and reports when the basic documents are handled by different persons.

- e. The manual system affects legibility and neatness of the forms and records used.
- f. Since preparation and presentation of accounting information demand speed, manual system is bound to be slow.

Factors that would necessitate mechanisation

It should be basically understood that what a machine can do a man can do. In an office, there is nothing which is mechanically done that cannot be manually done. No machine can function on its own, it can do only what is asked to do, or what is set up to do. The intelligence has to be supplied by the man, the machine can only carry out the instructions, if properly set to do it, or programmed for it. Machines are also not infallible, they also commit mistakes, once they start doing it, it is done at a fast rate till the fault in the machine, is located and corrected. Mechanisation is also not always the better method of doing a work. In spite of all these limitations, mechanisation is being increasingly applied to accounting and other office functions. The factors that necessitate mechanisation are.

- i) The volume of work to be handled.
- ii) The time lag between the availability of basic data and the preparation of final statements.
- iii) Degree of accuracy required.
- iv) Frequency with which results are required.
- v) Number of results/ statements to be prepared from a given data, and
- vi) Economy in cost.

What is to be Mechanised:

The clerical functions in an office can be broadly classified under the following heads.

- a) Writing, copying and or posting
- b) Calculating with or without posting, and
- c) Analysing, preparing comparative statements and columnar tabulations with or without calculations.

The extent of mechanisation required and the nature of machines to be used will depend upon which of the above functions are to be mechanised. To decide on this, each one of the functions should be studied with respect to the factors enumerated above. It is possible that to complete all the calculations manually within the available time, may be the only bottleneck in pay roll preparation. In such cases, giving the clerks few calculating machines may be enough. If, however, writing out of the pay roll, preparing the wages tickets, etc., are also of such a load as to indicate the need for mechanisation, then punched Card Accounting would probably be the answer. Hence, before the introduction of mechanisation, a careful study should be made of every function involved in the manual procedure, so as to determine the function to be mechanised, the extent of mechanisation required, and the type of machine to be used. If this is not done, the

advantages of mechanisation both from the angle of cost and utility will not be derived.

PUNCHED CARD ACCOUNTING

This is an advanced and well developed system of mechanised accounting, and is also referred to as the Data Processing System. (Note. the computer system is referred to as the Data Processing System ED.P.) In Punched Card Accounting the basic data from the Primary documents is transferred in the form of punched holes, to cards of standard sizes. These cards with the punched holes, to cards of standard sizes. These card with the punched holes are processed through different machines to prepare the required statements and tabulations. In India, there are two types of punched card equipments available. One is the I.C.T. equipment supplied by the International Computers and Tabulators (India) P. Ltd., and the other is the I.B.M., equipments work supplied by the IBM. World Trade Corporation. Both the equipments work exactly on the same principles and use similar type of machine to carry our the various accounting functions. Punched Card Accounting can be used with advantage for the following items of work.

i. Stores Accounting

Preparation of purchase summaries, issued summaries, stock lists, and stores ledger posting.

ii. Wages Accounting

Preparation to pay roll, analysis of wages for cost ascertainment, provident fund accounting E.S.I., returned and labour statistics.

iii. Cost Ledger

Posting of Cost Ledgers and preparation of P and L A/c.

iv. Financial Ledger

Posting of Financial ledgers, extraction of trial balance, and preparation of P and L a/cs.

v. Share Department work

Addressing of envelopes of post notices, preparation of dividend warrents, preparation of dividint list and registrar's statement.

The Four Basic Machines

The four basic operation in punched card accounting are

- a) To punch the required information from the primary documents into the cards.
- b) To verify the accuracy of punching.
- c) To sort and arrange the cards in a desired order, and
- d) To tabulate and print the required statements.

The machines that are used for these basic operations are the key punch verifying punch the Sorter and the Tabulator.

Key Punch

This is the machine which punches the small holes in the cards at the relevant position in each column. It has a key board consisting of 15 keys. The 15 keys are for one each of the 12 punching positions and the balance three are the space key, card release key and the skip key. The card is manually fed into the machine, and is brought into the first punching position. The desired information is punched by depressing the relevant keys, one at a time. The card will move one position to the left after each depression, the operation of the machine is similar to the typewriter and it has its own blin touch system. The number of keys being lesser than in a typewriter the speed is much higher. The Automatic key punch is an improvement on the hand key punch. In it, the feeding of the card, bring it into the first punching position, and the ejection of the card after punching, are all automatic. The actual punching of the card is however done manually. In addition to these automatic devices, there are also certain other operating advantages. The speed of operation in the automatic key punch is higher than in the manual key punch.

The verifying punch

The function of this machine is to verify accuracy of punching i.e., to ensure that the holes have been punched in the correct columns and positions. This is an important step in punched card accounting. Since it ensures the correctness of the basic record that is created for further processing. The verifying punch is exactly the same as the key punch, it has the same key board, and the operation is also similar to punching. The punched cards are fed into the machines one at a time and the operator repeats the punching operation from the primary documents. The machine moves on from the column to another as long as there is a hole in the correct position in each column. If the original punching is wrong, the machine automatically stops, so that the card can be removed, examined, and replaced by a new card. (The mistake in a punched card cannot be corrected or altered, the card with the wrong punching has to be destroyed and replaced by a new one). Once the punched cards are verified, they are then ready for further processing through other machines.

The Sorter

This machine automatically classifies and arranges the cards in a required order at the rate of 400 cards per minute. Sorting is a necessary primary operation before any tabulation can be done. In printing a pay roll, for example, all the pay roll cards should be first sorted by clock number and then by department, so that the cards of each department will all be together duly arranged in the order of clock number. The sorter has 13 pockets one each for the 12 punching positions on the card, and another for receiving the card on which no position is punched in the column that is being sorted. The sorting done one column at a time, by setting a brush on the column to be sorted. The cards are all kept in a hopper near brush end of the sorter, and the machine is set in motion. As each card moves below the brush, the brush senses the position of the hole in the card and guides it through chute blades to the relevant pocket number. Thus, if column 6 is to be sorted the brush is set on column 6. All cards with a hole punched in the "0"

position in column 6 will be guided to the pocket marked "0"; those which holes punched in position. "I" will be guided to the pocket marked "I" and so on. By successively sorting the cards one column at a time, the cards can be arranged in any order required. The number of columns to be started will depend upon the number of columns allotted for the particular information to be sorted. Thus if the pay roll cards are to be arranged in clock number order, four sortings have to be done, since the clock number consists of 4 columns. The accuracy of sorting can be verified by needling through the came in each pocket or by visual checking against light.

Tabulator

This is the most important machine in the punched card system. It is the machine which prints the final statements in the required manner giving all the tabulations and total necessary. As the cards pass through this machine one by one a set of brushes in the machines senses the holes in each card and transfers on to numerical counter the number represented by the position of the holes. These counters are similar to the counters in a calculating machine and can add and subtract through rolling. They can also be made to print the numbers on the, when necessary. The speed of the tabulator varies according to the nature of the job that is being done. Simpler the job, higher is the speed. the printing portion of the tabulator is very much similar to a typewriter. The forms and papers are fed in exactly as in a typewriter and the printing on the form is done through type bars located in a print bank. As in a typewriter, the print impression is through a ribbon, and carbon copies can also be taken. The tabulator can be used to:

1. Add figures in any one or more field and print the totals thereof.
2. Add or subtract figures in one field to and from another field and print the gross or net totals as the case may be .
3. Take Sub- totals, group totals, and final totals as required; and
4. Print the information from the required field at pre-determined printing position on the form.

Apart from these certain special devices are attached to the tabulator to give a greater convenience in handling and to increase the speed of operation. The use of such additional devices depends upon the nature of the job and the requirements of the organisation.

The operation on the tabulator is controlled through three control panels. These panels are plugged through wires which give the necessary electrical impulses at each stage for the specific function (adding, subtracting, totalling and printing) to be performed. The control panels are the nerve centres of the machine and are the medium through the instructions are conveyed to the Machine. Accurate plugged of the control panels is thereof an important factor in punched card accounting.

Other auxilliary machines used in punched card accounting.

Apart from the four basic machines discussed so far, a few other auxiliary machines are also commonly used in punched card accounting. These are called the collator, the reproducing Gang Punch, the Electronic Calculator.

Collator

This machine is used to automatically

- i) Clock the serial number sequence in a file of cards
- ii) Separate a file of merged cards into either two or three packs; and
- iii) Merge of match in sequence two files of cards selecting unmatched cards from both the files.

The above operations are necessary in certain cases, e.g., before gang; punching of common from a matter card into detail cards and in arranging balance cards, purchase cards, and issue cards in the proper order for ledger printing.

Reproducing Gang Punch

This is a high speed automatic punch used for reproducing the punched data from one set of cards to another set. It is used for performing the following functions:

- i) To reproduce in part of whole the data recorded in one set of cards into another set;
- ii) To gang punch standard repetitive data from one master card into the required number of detailed cards, and,
- iii) To compare the accuracy or reproducing the punching operations already carried out.

The above operations are necessary for punching the ledger prices in stores issued cards, the earnings rates in pay roll cards, etc.

The Machine can also be used in conjunction with tabulator; to punch summary cards for balance arrived at in the tabulator, the stores balance cards in stores ledger printing.

Electronic Calculator

This is a high speed calculating machine which can multiply the information on any two fields and punch the result in a third field of the same card. It can also multiply two sets of information on the same card, add or subtract the result of one with another, and punch the net figure on the card. The accuracy of multiplication can be automatically checked in the same run of the card. Like the reproducing punch the calculator can also be used in conjunction with the tabulator. This machine is very useful for the pricing of stores issue cards, calculation of workers earnings etc.,

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Chapter3

MANAGEMENT CONTROL AND PERFORMANCE REPORT

The three broad divisions of cost accounting are cost ascertainment, cost control and cost presentation, the third-cost presentation - is the vital link between cost ascertainment and cost control. Maximisation of profits through efficient methods of producing and through control of expenditure is the ultimate goal of all management. To achieve this, they have to be kept informed of their actual performance, their shortcomings, and of the line of action to be pursued. The compilation of accurate cost reports preaction to be pursued. The compilation of accurate costs reports prepared on time, and effectively presented, is an useful service that a cost department can render to the organisation. Though the subject ' presentation of information and reporting' is taken up last, in the installation of cost system, however, the nature of reports to be prepared, the details of information to be presented, and the manner of reporting, should all get prior attention. The entire system for cost ascertainment and control should be so designed as to suit the scheme of information to be presented in order that there could be better management control at all levels.

Levels of Management and Reporting:

In any organisation, there are three distinct levels of management: the Board of Directors who lay down the policy; and the departmental heads who actually carry out what is laid down in the policy. The information to be presented and the manner of reporting should serve the specific requirements of these three levels of management. The two basic principles to be remembered in this connection are:

- a) Higher the level of management, more summarised and brief should be the form the reporting, lower the level of management, more analysed and detailed should be information presented.
- b) Higher the level of management, less frequent should be the period of reporting; the lower the level of management the reporting should be at as brief intervals as are necessary.

The Board of Directors who are primarily concerned with the formation of policy would like to know periodically, whether the policy as laid down is being effectively carried out. What interest then more is the general trend of performance rather than the actual day to day performance. The number of reports which the Directors receive for study and assimilation will be many since they have to control every function in the organisation. Hence the reports should be in a summarised form giving only the essential information; this will facilitate concentrating on points which would require their attention.

The department head, on the other hand, is responsible for the efficient working of his particular department only. He has therefore to keep a day to day watch on the production performances of his department, and the expenses incurred therefore. For him to know, to what extent he has been achieving the targets set, he should be given as much detailed information as

is necessary about his department so that he can put his finger right on the item which requires his attention. Timely presentation is an important factor for department for departmental reports. If a particular machine is an important factor for department is producing a higher percentage of defectives, the sooner it is reported upon, the earlier will be the corrective action taken. A greater frequency in reporting and a more detailed reporting are therefore necessary to this level of management.

As far as the functional managers are concerned, they will require;

- a) Periodical reports - say fortnightly or monthly - on the working of the departments under their control; and
- b) Special reports which will help them in giving the necessary information to the Board of Directors for the formulation of future policy.

This periodical reports are a summary of the daily or weekly reports given to the departmental heads. The special reports will be on matters such as, comparative costs under different methods of production, the effect of a change in design on product costs, etc., The Special reports are generally for a temporary period and in most cases they are one time reports. Since such reports have a direct bearing on the formulation of future policy. The details to be collected and the final results to be presented must be carefully thought out and planned.

Basic principles of Report Presentation

In order to create an interest in the minds of those who receive the report and to make it easily understandable to them, certain basic principles have to be followed in reporting. This is to ensure that the reports are diligently read and are correctly understood; as otherwise the expected action arising out of the reports may not result. The basic principles are:

- i) The report must have a title, to describe the subject matter reported upon. The title should be brief and at the same time not vague.
- ii) It should mention the period of time covered by the report, e.g., Machine Shop Scrawp Report for the week - ended 11th February, 1967.
- iii) Where quantitative information is presented, the units in which the quantities are expressed must be indicated, e.g., production in tonnes, idel time in hours, etc., Similarly where values are expressed otherwise than in units of rupees, the system used should be mentioned e.g., 'sales in lakhs of rupees'.
- iv) The date on which the report is presented should be shown. This is an important information since the time - lag between the period covered by the report and the date of on which it is presented will help the person receiving the report to assess the effect of any changes or action that might have taken place during this time - lag;
- v) The name of the person for whom the report is prepared, the person who prepares the report, and those to whom copies are endorsed, should be mentioned at the end of the report. Since reports will necessarily initiate discussions, the recipient of the report

should know who are all aware of the contents of the report and to whom he should refer for further clarifications when required.

- vi) The standard of reporting must be suited to the standard of knowledge expected of the person receiving the report. While technical formulate and intricate calculations to the production managers, or event to the board of directors.
- vii) Wherever possible, visual reporting through charts and diagrams may be preferred to descriptive reports. The former catches the eye more easily and throw out comparisons and trends more effectively.
- viii) columnar headings, scales and legends used, abbreviations and symbols adopted, must all precise;
- ix) Where the reported wants to give his recommendations on the subject matter reported upon, they should be summarised at the beginning of the report itself. It will help the reader to align his thoughts on the required lines and to weight the arguments and facts presented in the backgrounds of the recommendations made.

Type of Reports

Reports can be generally classified as under:

REPORTS		
FORM	FREQUENCY	INFORMATION
Descriptive - comparative Graphic	Periodical Special Production	Cost Sales Finance

The title of a report will thus consist of 3 parts, viz., form, frequency, and information presented. The monthly report on "Products sold in each sales region", is a report in the statement form, presented periodically and pertaining to sales; the report on the 'advisability of replacing an existing machine by a more improved model', is a descriptive report prepared on special request and pertaining to production.

FORMS OF REPORTING

Descriptive Reports

These are reports which are written out in narrative style. They might include also statements and charts in order to illustrate some of the points discussed. The language used is an important factor in descriptive reports. The language should be lucid, simple and correct. Verbosity and literary embellishments should be avoided. The report should not be written out as one continuous long essay. It should be suitably sectionalised and paragraphed. Every section must have a heading and every para subheading, to indicate exactly which particular aspect of the subject is being dealt with therein. This is particularly necessary in long reports prepared for a specific purpose, e.g., Investigation report on a suspected case of fraudulent record keeping; an assessment report on the company's working results of the year, etc., Every descriptive report should include:

- i) The terms of reference which form the background for the report, or the factors which have necessitated the report.
- ii) The correct and specific facts concerning the subject matter reported upon;
- iii) The names of persons from whom or records from which these facts were gathered;
- iv) The inferences drawn by the writer and his interpretations of the facts arising out of (ii) and (iii) above.
- v) Recommendations on the action to be taken and the procedure for its implementation; and
- vi) The Writer's conclusion - a clear opinion on both the facts and recommendations.

In the case of lengthy reports, it would be advisable to show the details covering (ii), (iii) and (v) above, separately. The main report should be in a summary form, so that the recipient will readily know the basic facts, opinions formed, and the recommendations made, without going through the full details. Where the details have to be referred to for further clarification or discussion, a reference can always be made to the annexures.

Comparative Statements

This form of reporting normally adopted in the case of periodical reports which are submitted regularly, designed, should focus the attention of the recipient on points which require his attention. They should be in the same standard form from period to period so that the recipient will know where to look for what information. As the name itself indicates, the actual figures should show a comparison with pre-determined targets; brief and intelligent comments should be made on the differences between the targets and actuals.

Graphic Charts

The presentation of information through graphic charts is a useful and popular method. Within a short space they can be designed to show comparisons and trends over fairly long periods. This method of presentation is generally applied for presenting figures, particularly when they have to be displayed in a central place, for the information of a group of persons like the machine operators, maintenance mistries, salesman, etc., The one main advantage of graphic charts is that they are not bound by the language barrier and can be understood by one and all. In order to correctly understand the details presented through them, the legend and / or scales used in the presentation should be clearly indicated in the chart itself. In the absence of this, a comparative study of the data presented will not be possible. The technique for the display of information through charts is rapidly growing; mechanical aids and equipments are being increasingly employed so that the presentation can be continuous, easy, flexible and above all colourful and attractive. Graphics charts are commonly used for the presentation of the following comparisons;

- i) Direct comparisons - between products, periods and areas.

ii) Percentage comparisons

To show the sales mix of products, analysis of total costs etc;

iii) Frequency Comparisons:

To throw out abnormal figures outside a given range, as in the case of production loss, rejections, etc;

iv) Budget Comparisons - To present an analysis of variances from the standards or budgets; and

v) Cumulative comparisons:

To show the trend in costs, production, sales, etc; progressively.

There are different types of charts which can be issued for the above comparisons. Of these, the bar charts, the Gantt Chart, and the pie chart are more commonly used. These are discussed below:

Bar Chart:

The bar chart provides a convenient method of presenting comparative sizes of scales, production cost per unit, process loss percentage, etc., The bars could either be drawn horizontally or vertically, though the latter form is generally preferred. The height of the bar denotes the size to be reported and the bars are drawn to a scale which relates its height to the units in which the size is measured. The bar chart could either be a simple bar chart - showing multiple bar chart - showing a comparison between two or more connected data for different periods; or a component elements. In drawing the Multiple Bar Chart and the Component Bar Chart, either different colours or some other mode of identifications is used to differentiate between the data that are compared or the various components making up the total. In this method of represent the size of the standard or the budget, so that a comparison between the actual and the standard can also be readily seen.

Instead of the component bar chart, a percentage bar chart can also be drawn to present the same data. In this, the size of each component part is expressed as a percentage of the total which is taken as 100%. This is kept constant. Though this chart serves to illustrate the relative sizes of each element of cost, it does not show the specific size either of the individual element or of the total cost from period to period.

Gantt L.Chart:

This is a chart originated by Henry L.Gantt for the purpose of showing divisions of space represent either a period of time or a quantum of work to be done in that time. A small straight line drawn through that space represents the actual time taken or the actual quantity produced during the time. The space not covered by the line represents either the lost production as the case may be. Where the cumulative or progressive completion of task is to be shown, as other thick line is drawn to show the progressive total.

To increase the usefulness of this chart, the difference between the planned task and the actual task is analysed by the different causes and this analysis is shown along side the chart itself. The Gantt Charts are generally used for the measurement of machine man-power utilisation and to show progressive completion of a task to be completed in a given time.

Pie Chart:

This is also called as the circular chart. This chart is an alternative from of presenting the data shown through percentage bar charts, Instead of vertical bars, the segments of a circle are used to indicate the percentage - the full circle itself representing 100% . This chart is commonly used to present to the shareholders such information as 'How your company earned its rupee' and How your company utilised its rupee', etc., The circular chart drawn to the size of a rupee helps the understanding better.

Frequency of Reporting

The interval at which periodical reports should be presented should be laid down individually for each report. This will depend upon:

- i) The contents of the report;
- ii) The time intervals at which the required data are recorded and accumulated
- iii) The time and effort required for the preparation of the report; and
- iv) The degree to which taking corrective action will suffer, through delay if any, in reporting.

As a rule, production reports and production costs reports should be prepared at shorter intervals; though this need not be so with regard to sales and financial reports. Delayed reporting on production activities will result in a continuing loss, which could perhaps be avoided if taken not of earlier. The time taken to compile the report is an other important aspect in connection with the periodical reports. As far as possible, it should be ensured that the report for any one time cycle should be for week ended 18th January, 1967, should be ready before 22nd January, 1967 if not earlier. The recipient should be given enough time to take corrective action before the next time cycle ends. This will prevent inefficiencies due to the same cause being carried over two or more time cycles.

Length of a report and the accuracy of figures reported upon are factors which are linked up with the frequency of reporting. Though these three are inter-dependent, it will be wrong to ignore one to the advantage of another. Just because there is enough time available to prepare a report, it does not mean that a lengthy report should be made containing a lot of unnecessary details. Similarly, if there is not enough time available, it will be wrong to condense the report to an extent it becomes incomplete and vague. The length of the report should be devoted to it. The human tendency is to postpone the reading of lengthy reports, and delayed reading will defeat the very purpose of reporting.

Accuracy in reporting is another factor on which an equitable compromise is to be sought. The degree of accuracy to be ensured must be weighted against the time required to obtain that accuracy and the cost at which it can be ensured. Accuracy V.time is a factor which is of greater significance in the case of special reports than in the case of periodical reports. If there is a general wage increase in an industry, coupled with the immediate payment of an interim bonus to all workers the management would want to know the effect of this on the cash flow position. If the information could be supplied within two days even with 90% accuracy, it will be more useful than giving 100% accurate figures after 2 weeks. The length accuracy time are factors for which rules cannot be laid down. Their relative importance is different in each report. This fact should be recognised in deciding on the system of reporting to be followed.

Information to be presented:

On the basis of the nature of information presented, the reports can be divided into four groups, viz., production, sale, cost and finance. All the periodical reports and most of the special reports will fall under either one of these categories. The importance of the nature of information to be presented vis-a-vis the levels of management have been discussed earlier under 26.2 listed below are some of the more important periodical reports generally prepared in any organisation. These have been listed under production sales and finance divisions. The cost reports have been included under the relevant heads to which they pertain.

a) Reports to production division

- i) Statement showing actual capacity worked against budgeted capacity;
- ii) Statement showing actual production obtained against budget the standard production.
- iii) Machine and man-power utilisation report.
- iv) Analysis by causes, a lost machine hours and idle man hours.
- v) Analysis by causes, of rejected and defective production.
- vi) Stock summarises of raw materials, materials - in - progress semi - finished components and finished goods.
- vii) Cost of each department/ process / operation, duly analysed by elements of cost, and items of expenses to the extend necessary; and
- viii) Summary of cost variance from standards with an analysis under specific factors.

b) Reports to sales division.

- i) Summary of orders on hand, orders received and orders executed;
- ii) Comparison of budgetd sales with actual sales;
- iii) Comparison of budgeted selling and distribution expenses with the actual expenses.
- iv) Product and ara-wise analysis of expenses incurred against sales obtained.
- v) Gross profit earned in each area on each product based on standard cost of product, actual selling price, and actual expenses.

- vi) Statement of outstanding debtors in respect of credit sales.
- vii) Market survey reports on anticipated sales trends, and the potential demand for the company's products ; and
- viii) Present and anticipated participation in the total potential demand.

c) Reports to finance division

- i) Anticipated cash flow position for the next quarter;
- ii) Summary of cash receipts and payment as compared with the cash budget;
- iii) Statement showing outstanding debtors against credit sales;
- iv) Statement showing outstanding creditors against credit purchases;
- v) Statement showing other sundry creditors and debtors;
- vi) Monthly P and L Account, compared with the budgeted P and L Account; and
- vii) Quarterly statement of expenditure incurred on capital projects and the extent to which they are completed.

Prepared by

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CHAPTER 4

BUDGET AND BUDGETARY CONTROL

Budget is an important tool of planning and control in the hands of the management. I.C.M.A., London defines, "A budget is a financial and or quantitative statement prepared prior to a defined period of time, of the policy to be pursued during that period for the purpose of attaining a given objective".

Characteristics of good Budgeting

1. Persons at different levels of the organisation should be involved in the preparation of budgets.
2. The targets of the budgets should be realistic.
3. The authority and responsibility should clearly defined
4. A good system of accounting should be followed.
5. The employees should be promptly recorded for the purpose of performance appraisal.

Budgetary control

Budgetary control is the process of comparing the budgetary figures with the actual performance, for calculating variances, in order to control the variances. in order to control the variances.

Brown and flowerd defined as "*Budgetary control is a system of controlling costs which includes the preparation of budge, co-ordinating the department and estabilishing responsibilities, comparing actual performance with the budgeted and acting upon results to achieve maximum profitability*"

J.Batty defines Budgetary Control as, "*A system which was budgets as means of planning and controlling all aspects of producing and / or selling commodities and services*".

According to **Welsch**, "*Budgetary Control involves the use of budget and budgetary reports throughout the period to co-ordinate, evaluate and control day-to-day oplerations in accordance with the goals specified by the budget*".

It is clear from the definitions that budgetary control is a process of comparing the budget figure with actual figures. It helps to know the variations so that it can be controlled and also to plan for the future. Hence the efficiency of the company can be improved through budgetary control.

Objectives of budgetary control:

The following are the important objectives of budgetary control.

1. To provide a detailed plan of action for a business over a period of time.
2. To co-ordinate all activities of the organisation.
3. To increase profitability and elimination of wants.
4. To operate various cost centres and departments with efficiency and economy.
5. To correct the variations.
6. To fix responsibilities of various individuals in the organisation.

Essentials of budgetary contal

The essential steps for budgetary control are stated as follows.

1. Organisation for budgetary control

A budgetary committee should be formed with departmental heads of various departments as its members. They should be entrusted with the responsibility of implementing the respective departmental budgets.

The Chief Executive is the overall incharge of budgetary system. A budget officer is the Convenor of the budget committee. He co-ordinate the budget of different departments.

2. Budget Centres

A budget centre is that part of the organisation for which budget is prepared eg. departments. The establishment of various centres should be done as per the requirements of the organisation.

3. Budget Manual

A Budget manual is a document which states the duties and responsibilities of the persons concerned with the budget.

4. Budget Officer

The budget Officer is appointed by the Chief Executive. He scrutinises all the budgets prepared by various functional heads. He can make necessary corrections in the budgets so prepared. He also receives the performances report sent by various functional heads and makes comparison of the performances with budget. He also finds out the variances and takes necessary steps to rectify them now, and for future. He also reports to the top management about the various aspects related to budget.

5. Budget Committee

In large scale business concerns, Budget Committee is responsible for the head of departments as its members.

6. Budget period

The period of the budget depends upon various factors like types of budget; nature of the organisation; the length of trade cycle, demand and supply of the product, etc.

7. Determination of Key Factor

The factor which influence all the budgets is called the Key Factor Principal Factor. (e.g.) Supply of Raw Material or Sales may be the Key factor which influence the preparation of all the budgets by various departments heads.

Other Key factors are, finance, man power etc., The Key factor should be indentified well in advance before preparing the various budgets.

Advantages of budgetary control

The important advantages of budgetary control are stated below:

1. The budgetary control helps in co-ordinating activities of various departments.
2. It aims at maximisation of profits.
3. It helps in making suitable plans, policies and goals.
4. It helps in measuring the performances of managerial personnel and thereby helps in improving their performance.
5. It measures the variances in all aspects and helps in identifying the reasons for the variances.
6. The planning of expenditure will be systemetic and there will be an economy in spending.
7. It enables the introduction of incentive scheme of remuneration.
8. It creates budget consciousness among employees.

Limitations of budgetary control

The limitations of budgetary control are stated as follows:

1. The future uncertainties affects the performance of budgetary control system.
2. It discourages efficient persons since they will also be contended by the achievement of targets fixed in the budget.
3. The lack of co-ordination of various departments affects the performance of the budgetary control.
4. It may lead to conflicts among functional departments. All functional heads of aims of showing performance without looking into the general business goal. They may try to get maximum allocating of funds which may lead to conflict among them.
5. Lack of support from the top management affects the budgetary control system.

CLASSIFICATION OF BUDGETS

The budgets may be classified as follows:

I. Classification on the basis of Time

1. Long - term budgets.
2. Short - term budgets.
3. Current Budgets.

II. Classification on the basis of function

1. Master budget.
2. Functional or Subsidiary budget.

III. Classification on the basis of flexibility

1. Fixed budget.
2. Flexible budget.

I. CLASSIFICATION ON THE BASIS OF TIME

1. Long - term budget

The period of long-term budget varies between five to ten years. It is based on long - term planning and prepared by top level management. Long-term budgets are prepared for some sectors of the management like capital expenditure, research and development etc.

2. Short- term budget

The period of short-term budget is one or two years. The consumer goods industries like textile, cotton, sugar, coffee etc., prepare short-term budget.

3. Current budgets

The period of current budgets is generally of months and weeks.

II. CLASSIFICATION ON THE BASIS OF FUNCTIONS.

1. Functional budgets

The important functional budgets are stated as follows;

- i) Sales budget
- ii) production budget, including
 - a) Raw material budget
 - b) Labour budgeted and
 - c) Plant Utilisation budget
- iii) Purchase budget
- iv) Cash budget
- v) Finance budget.

2. Master Budget

According to ICWA London "The Master Budget is the summary budget incorporating its functional budget. Master budget is prepared by the budget officer and it remains with the top level management. It is used to co-ordinate the activities of various functional departments.

III. CLASSIFICATION ON THE BASIS OF FLEXIBILITY

1. Fixed budget

I.C.W.A. London defines "Fixed budget is a budget which is designed to remain unchanged irrespective of the level of activity actually attained". It is prepared for a given level of activity. The budget is prepared before the beginning of the financial year.

2. Flexible budgets

A flexible budget consists of a series of budgets for different levels of activity. It varies with the level of activity attained. It will be useful where level of activity changes from time to time.

PREPARATION OF IMPORTANT FUNCTIONAL BUDGETS

1. Sales Budget

Illustration : 1

M/s. Silpa & Company manufacture 2 types of products named X and Y and sells them in Madras and Bombay markets. The following information is related to the year ending 31st Decmeber 1995.

	Market	Budgeted Sales	Actual Sales
Madras	X	600 @ Rs.12	800 @ Rs.12
	Y	500 @ Rs.35	400 @ Rs.35
Bombay	X	900 @ Rs.12	1200@Rs.12
	Y	700 @ Rs.35	500 @ Rs.35

Market studies reveals that product X is popular as it is underpriced. It is observed if its Price is reduced Rs.1 it will find a good market. On the other hand product is overpriced and

market could absorb more sales if its selling price is reduced to Rs.33. The management has agreed to give effect to the above price change.

On the above the following estimates have been prepared by Sales Manager.

Product	% increase in Sales Over	
	Madras	Bombay
X	+20%	+ 10%
Y	+25%	+ 5%

With the help of an intensive advertisement comparison, the following additional sales above the estimated sales are possible.

Product	Madras	Bombay
X	50 Units	70 Units
Y	60 Units	50 Units.

You are required to prepare a budget for sales incorporating the above estimates.

SOLUTION

SALES BUDGET

Area	Product	Budget for Current year			Actual Sales			Budget for the future period.		
		Units	Price Per Unit Rs.	Value Rs.	Unit	Price Rs.	Value Rs.	Unit	Price Rs.	Value Rs.
Madras	X	600	12	7,200	800	12	9,600	770	11	8,470
	Y	500	35	17,500	400	35	14,000	685	33	22,605
	Total	1100		24,700	1200		23,600	1,455		31,075
Bombay	X	900	12	10,800	1200	12	14,400	1060	11	11,660
	Y	700	35	24,500	500	35	17,500	785	33	25,905
	Total	1600		35,300	1700		31,900	1,845		37,565
Total	X	1500	12	18,000	2000	12	24,000	1830	11	20,130
	Y	1200	35	42,000	900	35	31,500	1,470	33	48,510
	Total sales	2700		60,000	2,900		55,500	3,300		68,640

WORKING :**Budgeted Sales of Madras**

	X Units	Y Units
Budgeted	600	500
ADD Increase	120(20%)	125(25%)
	-----	-----
	720	625
Increase due to advertisement	50	60
	-----	-----
Total	770	685
	-----	-----

Budgeted Sales of Bombay:

Budgeted	900	700
ADD Increase	90(10%)	35(5%)
	-----	-----
	990	735
Increase due to advertisement	70	50
	-----	-----
Total	1060	785
	-----	-----

PRODUCTION BUDGET**Illustration: 2**

The following informations are collected from a limited company for 6 months ending 31st March 1995.

The Units to be sold for the different month are

October	1994	4,000
November	1994	4,500
December	1994	4,800
January	1995	5,000
February	1995	5,500
March	1995	6,200
April	1995	7,000

Finished equal to half the sales for next - months will be in at the end of each month including September 1994. Budgeted Production for the year ending 31st March 1995 is 55,000 units. Budgeted Material and Labour cost per unit are Rs.12 and Rs.5 respectively. Total Factory overhead absorbed is Rs.1,65,000.

Prepare production budget for each month and summarised Production cost Budget for six months ending 31st March 1995.

Solutions:

Production budget for 6 months from October 1994 to 31st March 1995.

Months	Opening Stock (Units)	Sales (Units)	Closing Stock (Units)	Production (Units)
October 1994	2,000	4,000	2,250	4,250
November 1994	2,250	4,500	2,400	4,650
December 1994	2,400	4,800	2,500	4,900
January 1995	2,500	5,000	2,750	5,250
February 1995	2,750	5,500	3,100	5,850
March 1995	3,100	6,200	3,500	6,600
		Total		31,500

Production = Sales + Closing Stock - Opening Stock

Production Cost Budget for 6 months ending 31st March '95.

(for 31,500 Units)

	Rate per Unit Rs.	Amount Rs.
Direct Material	12	3,78,000
Direct Wages	5	1,57,500
Factory Overheads	3	94,500

(1,65,000) / 55,000	Total	6,30,000

Illustration: 3

Prepare a production budget for each month and production cost budget for one year from the information given below: the budgeted Sales in units are given below:

	Product X (Units)	Product Y (Units)
January	120	40
February	132	52
March	124	60
April	152	64

May	160	68
June	160	80
July to Dec	200each	100each

The details of expenses are given below:

	Product X Rs.	Product Y Rs.
Direct Material per Unit	30	25
Direct Wages	24	20
Total factory Overhead	85,000	60,000
Total Administration Overhead	70,000	45,000
Total Selling & Distribution Overhead	60,000	50,000
Selling price per Unit	70	110

It is assumed that (i) there will be no work - in - progress at the end of any month and (ii) finished units equal to half the sales for the following month will be kept in stock.

PRODUCTION BUDGET

Months	Product X			Product Y				
	Sales Stock	Closing Stock	Opening	Produc tion	Sales	Closing Stock	Opening Stock	Produc tion.
January	120	33	30	123	40	13	10	43
February	132	31	33	130	52	15	13	54
March	124	38	31	131	60	16	15	61
April	152	40	38	154	64	17	16	65
May	160	40	40	160	68	20	17	71
June	160	50	40	170	80	25	20	85
July	200	50	50	200	100	25	25	100
August	200	50	50	200	100	25	25	100
September	200	50	50	200	100	25	25	100
November	200	50	50	200	100	25	25	100
December	200	50	50	200	100	25	25	100
	3048			2068	964			979

SUMMARIESED PRODUCT COST BUDGET

Particulars	Product X 2068 Units		Product Y 979 Units.		Total
	Cost Per Unit Rs.	Amount Rs.	Cost per Unit Rs.	Amount Rs.	
Direct Material	30	62,040	25	24,475	86,515
Direct Wages	24	49,632	20	19,580	69,212
Factory Overhead		85,000		60,000	1,45,000
Works Cost		1,96,672		1,04,055	3,00,727
Administration Overhead		70,000		45,000	
1,15,000					
Cost of Production		2,66,672		1,49,055	4,15,727
Selling & Distribution		60,000		50,000	1,10,000
Overhead					
Cost of Sales		3,26,672		1,99,055	5,25,727
Cost per unit		157.96		203.32	

MATERIAL BUDGET:
Illustration: 4

Prepare raw materials purchase budget from the following figures.

Materials (Units)

	A	B	C	D	E	F
Estimated Stock in 1st January 1996	20,000	5,000	12,000	18,000	10,000	15,000
Estimated Stock on 31st January 1996	18,000	7,000	8,000	24,000	13,000	19,000

Estimated Consumption	90,000	45,000	30,000	1,10,000	80,000	1,30,000
Standard Price Per Unit Rs.	2	2.5	5	7	6	3

Solution:

Raw Materials Purchase Budget for January 1996

Particulars	Type of Raw Materials.					
	A	B	C	D	E	F
Estimated Consumption (Units)	90,000	45,000	30,000	1,10,000	80,000	1,30,000
ADD Estimated Stock on 31st January	18,000	7,000	8,000	24,000	13,000	19,000
	1,08,000	52,000	38,000	1,34,000	93,000	1,49,000
LESS Estimated Stock on 1st January	20,000	5,000	12,000	18,000	10,000	15,000

Particulars	Type of Raw Materials.					
	A	B	C	D	E	F
Estimated Purchases (Units)	88,000	47,000	26,000	1,16,000	83,000	1,34,000
Rate Per Unit (Rs)	2	2.5	5	7	6	3

Estimated Purchase (Rs.)	1,76,000	1,17,500	1,30,000	8,12,000	4,98,000
4,02,000					

CASH BUDGET**Illustration: 5**

Prepare a cash budget for 4 months ending 30th April, 1996 from the following information.

Months	Sales	Purchase	Wages Expenses	Manufact- uring Expenses	Adminis- tration	Selling Expenses
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
November 1995	50,000	13,000	4,000	1,500	1,700	1,000
December 1995	60,000	15,000	5,000	2,000	1,800	1,200
January 1996	55,000	14,000	4,500	1,600	1,750	1,100
February 1996	70,000	20,000	6,000	2,200	1,900	1,300
March 1996	80,000	24,000	8,000	2,600	2,200	1,500

Additional Information

1. Wages are paid in the 1st of the next month.
2. Balance of Cash in hand on 1st January 1996 is Rs.40,000
3. Tax of Rs. 11,000 payable is the month of March.
4. A dividend of Rs.15,000 payable in the month of April.
5. Furniture worth of Rs.6,000 to be purchased in the month of February.
6. A Machinery worth Rs.80,000 Purchased on October 1995 and the payment is to be done on instalment basis @ Rs.6,000 per month.
7. The Creditors are allowing a credit of 2 months.
8. Lag in payment of manufacturing and selling expenses are one month.
9. The cutomers are allowed a credit period of 2 months.
10. Lag in payment of administrtion expenses in 1/2 month.

Solution:

Cash Budget for 4 months ending 30th April 1996

Particulars	January Rs.	February Rs.	March Rs.	April Rs.
Receipts:				
Balance b/d	40,000	61,025	85,000	97,450
Cash received from Drs.	50,000	60,000	55,000	70,000
Total	90,000	1,21,025	1,40,000	1,67,450
Payments:				
Payment to				
Creditors	13,000	15,000	14,000	20,000
Wages Payable	5,000	4,500	6,000	8,000
Manufacturing expenses.	2,000	1,600	2,200	2,600
Administration expenses	1,775	1,825	2,050	1,100
Selling expenses	1,200	1,100	1,300	1,500
Tax payable	--	---	11,000	---
Dividend payable	--	---	--	15,000
Furniture purchase	--	6,000	--	---
Payment for Purchase of Machinery	6,000	6,000	6,000	6,000
Total	28,975	36,025	42,550	54,200
Closing Balance	61,025	85,000	97,450	1,13,250

Illustration: 6

Prepare a cash budget from the following data for 3 months ending 31st March 1996.

Month	Sale Rs.	Purchases Rs.	Wages Rs.	Other Expenses Rs.
November '95	1,60,000	90,000	20,000	26,000
December '95	2,10,000	1,10,000	30,000	42,000
January '96	2,30,000	1,20,000	60,000	35,000
February '96	2,50,000	1,60,000	75,000	50,000
March '96	2,40,000	1,30,000	59,000	34,000

Additional Information

1. Corporate tax due on 31st March Rs.35,000
2. Interest to be received for investment Rs.5,000 monthly
3. Cash in hand on 1st January 96 Rs.7,000
4. Dividend of Rs.15,000 to be paid during March.
5. 30% of the sales amount realised in the month of sales, discount allowed 5% the balance amount realised equally in 2 subsequent months.
6. Lag in payment of purchase 2 months.
7. 20% of the wages remains arrears and will be paid in the following month.
8. Other expenses are paid in the following month.

Solution:

Cash Budget for the months from 1st January to 31st March 1996

Particulars	January Rs.	February Rs.	March Rs.
Opening Balance	7,000	21,050	34,300
Receipts			
Receipts from Debtors and Cash Sales	1,95,050	2,25,250	2,36,400
Interest received	5,000	5,000	5,000
Total	2,07,050	2,51,300	2,75,700

Payments:

Creditors	90,000	1,10,000	1,20,000
Wages	54,000	72,000	62,200
Other Expenses	42,000	35,000	50,000
Corporate Tax	---	---	35,000
Dividend	---	---	15,000
	-----	-----	-----
Total	1,86,000	2,17,000	2,82,200
	-----	-----	-----
Closing Balance	21,050	34,300	(-) 6,500
	-----	-----	-----

Workings:

(i) Calculation receipts from Debtors and Sales.

Rs.

January

Cash Sales (30% iof 2,30,000) 69,000

LESS Discount @ 5% 3,450

65,550

ADD 35% of Rs.2,10,000

(Sale of December '95) 73,500

ADD 35% of Rs.1,60,000

(Sale of November '95) 56,000

1,95,050**February**

Cash Sales (30% of Rs.2,50,000) 75,000

LESS Discount @ 5% 3,750

71,250

ADD 35% of Rs.2,30,000

(Sale of January) 80,500

ADD 35% of Rs.2,10,000 73,500

2,25,250

March:

Cash Sales (30% of Rs.2,40,000)	72,000
LESS Discount @ 5%	3,600

	68,400
ADD 35% of Rs.2,50,000 (Sale of February)	87,500
ADD 35% of Rs.2,30,000 (Sale of January)	80,500

	2,36,400

ii) Calculation of Payment for wages

Rs.

January:

Wages of January 80% of Rs.60,000	48,000
Arrear wages of December 20% of Rs.30,000	6,000

	54,000

February:

Wages of February 80% of Rs.75,000	60,000
Arrear wages of January 20% of Rs.60,000	12,000

	72,000

March:

Wages of March 80% of Rs.59,000	47,200
Arrear wages of February 20% of Rs.75,000	15,000

	62,200

FLEXIBLE BUDGET:**Illustration: 7**

The following information regarding the expenses of a company at 40% Capacity are given below:

Fixed Expenses:	Rs.
Salaries	80,000
Rent	40,000
Administrative expenses	60,000
Depreciation	40,000
Variable expenses	
Material	1,90,000
Labour	60,000
Others	30,000
Semi Variable expenses	
Indirect Labour	95,000
Repair & Maintenance	75,000
Electricity	30,000

The estimated sales at various levels of capacity are:

- Rs.8,00,000 at 40% Capacity
- Rs.10,00,000 at 50% Capacity
- Rs.12,00,000 at 60% Capacity and
- Rs.15,00,000 at 70% Capacity.

The fixed expenses will remain same at all capacities till 100% capacity. Semi - Variable expenses remains constant till 50% capacity. It will increase by 15% between 50% and 65% capacity and further increased by 10% when capacity crosses 65%

Prepare a flexible budget and find out the profit at various level of capacity. (i.e. 40%, 50%, 60% and 70%)

Solution:

FLEXIBLE BUDGET

Particulars	Capacities			
	40%	50%	60%	70%
Fixed Expenses:				
Salaries	80,000	80,000	80,000	80,000
Rent	40,000	40,000	40,000	40,000
Administrative Expenses	60,000	60,000	60,000	60,000
Depreciation	40,000	40,000	40,000	40,000

Variable Expenses:

Material	1,90,000	2,37,500	2,85,000	3,32,500
Labour	60,000	75,000	90,000	1,05,000
Others	30,000	37,500	45,000	52,500

Semi-variable Expenses:

Indirect Labour	95,000	95,000	1,09,250	1,18,750
Repairs & Maintenance	75,000	75,000	86,250	93,750
Electricity	30,000	30,000	34,500	37,500

Total Cost	7,00,000	7,70,000	8,70,000	9,60,000
Profit	1,00,000	2,30,000	3,30,000	5,40,000

Estimated Sales	8,00,000	10,00,000	12,00,000	15,00,000
-----------------	----------	-----------	-----------	-----------

Indirect Labour Rs. 95,000 at 40% Capacity & 50% Capacity.

15% more

14,250

1,09,250

at 50% capacity.

10% further increase

9,500

1,18,750

at 60% capacity

Illustration : 8

The following information are related to the budgeted production of 10,000 units of a product manufactured by X Limited. The actual production during the period was 7000 units. Find out the budgeted cost per unit.

	Rs.
Direct Materials	1,25,000
Direct Labour	90,000
Direct Expenses	25,000
Works overhead (75% fixed)	1,60,000
Administrative Overhead (60% Fixed)	1,20,000
Selling Overheads (40% Fixed)	80,000

Solution:**FLEXIBLE BUDGET**

Particulars	Production Cost for 10,000 Units		Production cost of 7,000 Units.	
	Per Unit Rs.	Total Rs.	Per Unit Rs.	Total Rs.
Direct Material	12.5	1,25,000	12.5	87,500
Direct Wages	9	90,000	0	63,000
Direct Expenses	2.5	25,000	2.5	17,500
Prime cost	24	2,40,000	24	1,68,000
Works overhead				
Fixed	12	1,20,000	17.14	1,20,000
Variable	4	40,000	4	28,000
Works Cost	40	4,00,000	45.14	3,16,000
Administrative				
Overhead Fixed	7.2	72,000	10.29	72,000
Variable	4.8	48,000	4.8	33,600
Cost of Production	52	5,20,000	60.23	4,21,600
Selling Overheads				
Fixed	3.2	32,000	4.57	32,000
Variable	4.8	48,000	4.8	33,600
Cost of Sales	60	6,00,000	69.60	4,87,200

Workings:

Works Overheads	Rs. 1,60,000	
Fixed 75%	1,20,000	for 10,000 Units.
Variable 25%	40,000	
Work overhead	=	Fixed 75% Rs. 1,20,000
Variable	=	40,000 / 10,000 x 7,000
	=	Rs. 2,80,000 for 7,000 units.

Prepared by:
Dr.M.Wilson.

Chapter 5

RESPONSIBILITY ACCOUNTING

The costing system are useful to management for controlling the costs. Emphasise one the devices of control and not on those who work on the system. Responsibility accounting is a method of accounting where responsibility is assigned for the control of cost.

Authority should be given to persons responsible for the control of costs. Responsibility accounting helps the management to improve the performance of the persons.

Definitions of Responsibility Account:

According the Charles, T. Horngreen, Responsibility accounting in system of accounting that recognises various responsibility centres throughout the organisation and reflects the plans and actions of each of these centres by organising particular revenue and costs to the one have the pertinent responsibility. It is also called profitability accounting and activity accounting.

The Institute of cost and works Accountants of India, defines responsibility accounting as, "a system of management accounting under which accountability is established according to management information and reporting system instituted to give adequate feedback in terms of the delegated responsibility. Under this system divisions or units of an organisation under a specified authority in a person are developed as responsibility centres and evaluated individually for their performance".

Anthony and Reece defines, "Responsibility accounting is that type of management accounting that collect and reports both planned actual accounting information in terms of responsibility centres".

According to David Fanning, responsibility accounting is a system or mechanism for controlling the wider freedom of action that executives - decision centre manages in other words - are given by Senior management and for holding those executive responsible for the consequence of their decisions.

It is clear from the above definitions that responsibility accounting is a system of accounting to record the performance and deviations from the standard performance of the people who are assigned authority for controlling the cost at various cost centres. Steps of Procedures for Responsibility Accounting.

The following are the important steps in responsibility accounting.

1. The organisation should be divided into various responsibility centres. Each responsibility centre should be assigned to responsibility persons.
2. The targets and standards for each responsibility centres should be decided in advance. The targets should be fixed with the consultation of the managers in respective responsibility centres.

3. The goal or targets of each responsibility centres should be properly communicated to the people.
4. The actual performance of each responsibility centres should be recorded.
5. The actual performance should be compared with the standard performance and if there exists any variance, it should be recorded properly.
6. The variance in the actual performance and standard performance should be reported to the top management for necessary action.
7. The top management should take necessary action to control the variance in future.

Responsibility Centres

A cost centre where responsibility is assigned to control costs called the Responsibility centres. Responsibility centres may be fixed both for inputs and outputs in the organisation. The total inputs is called cost and the total output is called revenue. Hence, the responsibility centres may be fixed for revenues and costs as follows.

- i) Expenses Centres
- ii) Profit Centres and
- iii) Investment Centres.

i) Expenses Centres

Expenses Centres are centres related to the expensed incurred in responsibility centres. The authority is assigned to officer in charge of spending the respective expenses. Expenses of service centre may also be determined. Responsibility centre may be fixed for service centre also.

ii) Profit Centres

The responsibility centre formed for profit is called profit centre. Profit is the difference between revenue and cost. The profit centre should provided information regarding the amount of profit to be earned for various level of input and output. Actual profit earned can be compared with the standard profit, in order to measure the variations. If there exists unfavourable variances corrective measures can be taken to increase the profit.

iii) Investment Centre

Investment Centre deals with the rate of return on investment on assets in the respective responsibility centres. It is the resoponsibility of the centre to find out whether the assets utilised in the centre, gives fair rate of return. It is difficult to calculate the fair rate of return related to one centre if it utilises the assets of other investment centres. Hence, investment centre may be responsibility centre when the assets utilised by the centre are not utilised in other centres.

Advantages of Responsibility Accounting:

The following are the important advantages of responsibility Accounting.

1. The authorities and responsibilities of each individuals in the organisation are assigned. Hence each individual knows the nature and quantum of his work. This may motivate each individual to do better work.
2. The performance of individuals will improve. The persons in the organisation feels that his performance may be reported to mangement. It induces him to improve his performance.
3. The date collected through responsibility accounting may be utilised for fixing standard and planning for future.
4. Responsibility accounting helps the management to take necessary and proper control measure.
5. It helps in taking managerial decisions for all managerial problems.

Prepared by

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Chapter 6

STANDARD COSTING AND VARIANCE ANALYSIS

Meaning and definition

Ascertaining cost after they are incurred is historical costing or actual costing. it is just postmortem of the expenditure which has been incurred. It does not seek to find out mistakes and inadequancies which will ultimately lead to profit variations. Therefore it is not an effective device for cost control. It becomes important to determine what a product or a unit of service should cost and if the actual cost is more than the determined cost then why it is. A Standard cost system fulfils this needs. A Standard system can provide large amount of useful historical cost system. It establishes the cost of product, operations, or process under standard operating conditions with a view to eliminate the influences of abnormal changes on prices.

“Standard is a desired attainable objective, a performances, a goal, a model” Eric. L.Kohler it may be used as a predetermined rate or a predetermined amount or a predetermined cost.

“Standard cost is a predetermined cost, which is calculated from management standards of efficient operations and, the relevant necessary expenditure. It may be used as a basis for price - fixing and for cost control through variance analysis”. I.C.M.A Technology. Other terms of standard costs are predetermined costs, budgeted costs, projected costs, model costs, measured costs, specification costs, etc., It is the predetermined cost based on a technical estimate for materials, labour and overhead for a selected period of time and for a prescribed set of working conditions.

“Standard Costing is the preparation and use of standard costs, their, comparison with actual costs and they analysis of variances to their causes and points of incidence, I.C.M.A.”. London. It is a method of ascertaining the cost whereby statistics are prepared to show. (a) the

standard cost, (b) the actual cost, and (c) the different between these two costs, which is termed as variance. Thus the technique of standard cost system comprised of.

1. Fixed up and using of standard costs.
2. Comparison of actual costs with the standard costs and measuring the variances.
3. Control of costs by variance analysis.
4. Reporting to the management for taking proper action to maximize.

The system of standard costing can be found useful to all types of industries, and more effectively to industries producing standardised products which are repetition in nature.

Comparison of features:

The features of standard cost can be compared to other types of costs for better appraisal.

1. Standard cost and Historical cost.

Since the standard cost is estimated cost and historical cost is the actual cost, the following different can be noted.

Standard Costs	Historical Cost
1. It is a predetermined cost	It is a recorded cost
2. It is the ideal cost	It is the actual cost.
3. It is future cost It can be used for cost control purpose	It related to the post and it is not useful for cost control.
4. It is used for the measurement of operational efficiency.	It is used to ascertain the profit or cost.
5. It sets up target	It attempts to attain the target.

2. Standard costing and budgetary Control

Both standard costing and budgetary control are bent on the same objective of maximum efficiency and cost reduction by establishing predetermined standards, comparing actual performance with the predetermined stands and taking corrective measures wherever necessary. Although both are useful tools in the hands of the management for controlling costs and maximizing efficiency, they are different in the following respects.

Standard Costing	Budgetary Costing
1. It is intensive in nature as it is applied to manufacturing of a product or providing a service.	It is extensive in nature as it deals with the department or business as a whole.
2. It is determined by classifying recording etc., and allocating expenses to cost unit	Budget are prepared for sales production cash.

3. It is part of cost accounting a projection of all cost accounts.	It is part of financial account a Projection of financial accounts.
4. Variances are revealed through different account.	Control is exercised by taking into account budgets and actuals Variances are not revealed.
5. Standard costing cannot be applied in parts	It can be applied in parts.
6. It is not comparatively expensive because it relates only to elements of cost.	It is more expensive and broad as it relates to production, sales, finance, etc.
7. This system cannot to operated without budget	Budgets can be operated either with or without standards.

3. Standard cost and Estimated cost

Standard cost and estimated cost are predetermined costs. But their primary objectives are different. Important different are:

Standard Cost	Estimated Cost.
1. It is scientifically used and it is a regular system of account based upon estimation and time studies.	It is used as a statistical data and leads to considerable Guess work.
2. it is used for effective cost control	It gives importance to cost ascertainment for fixing selling price.
3. Its object is to ascertain "what the cost will be	"it object is to ascertain what the cost should be".
4. It is continuous process of costing and taking into	It is used for scientific purpose such as fixing upsetting price.
5. It can be used where standard costing is in operation.	It can be used where Costing is in operation.
6. As it is based on scientific analysis, it is more accurate than the estimate cost.	It is not so accurate It is only an approximation based on past experience.

4. Standard costing and Standardized Costing.

Standard costing is synonymous to uniform costing is a system under which several undertaking use the same costing principles and practices. With the help of uniform costing several common process of various industrial units can be standardized which will be helpful in improving the performance of inefficient units. Both standard costing and standardized costing

can be used for better management or industrial units.

5. Standard Costing and Marginal Costing;

Standard costing system takes into account both fixed and variable expenses for the determination of standard cost for a prescribed set of working conditions. On the other hand, marginal costing is a technique in which only variable expenses are aggravated to arrive at marginal cost. Both standard, costing and marginal costing are completely independent of each other and may be installed jointly. Variance can be calculated in the same way as in standard costing system with the only difference that volume variances are absent because fixed expenses are charged in totals in each period.

Establishment of Standard Costs:

Establishment of standard costs involves consideration of the following preliminaries:

1. Establishment of cost centers.
2. Types of standard.
3. Setting the standards.

1. Establishment of cost centers.

A cost center is usually a location, person or item of equipment for which cost may be ascertained and used for the purpose of cost control. Establishment of cost centers is necessary for fixing responsibilities for unfavourable variances.

2. Types of standard:

There types of standard are being considered in this respect They are (1) Current standard (2) basic standard and (3) normal standard.

Current standard

It is the standard which is related to current conditions and is established for use over a short period of time. This may be fixed either on the basis of ideal standard or expected standard.

Ideal standard is one which can be attained under the most favourable conditions. This standard is based upon a very high degree of efficiency which is well neigh impossible to achieve. but it is assumed that there will be the most desirable conditions of performance and that there will be no wastage of materials or time and no inefficiencies in the manufacturing processes. This standard is not likely to beachieved because the presumed ideal conditions of performance may not be obtained. It is therefore, remarked as a theoretical standard. It only indicates a standard which sets the target aims at.

Expected standard is the standard which is anticipated during a future specified budget period. In order to fix this type of standard, present conditions and circumstances prevailing within a particular industry are taken into consideration. Besides, due weightage is given to the expected changes is the present conditions and circumstances. A reasonable allowance in also

made for unavoidable and normal wastages. This standard is more realistic because it is based on realities rather than on the most ideal conditions. Hence this type of standard is well suited from control point of view.

2. Basic Standard

It is the standard established for use unaltered over a long period of time. Basic standard is established for some base year and is not changed for a long period of time as material prices, labour rates and other expenses change. Deviations of actual costs from basic standard will not serve any practical purpose because basic standard remain unaltered over along period of time and are not adjusted to current market conditions. Therefore, this type of standard is not suitable for cost control purposes because this standard reveals real variances from the attainable performance. Variances calculated on the basis standard will be helpful to study the trends in manufacturing costs over along period of time.

3. Normal Standard

It is the average standard which can be attained over a future period of time preferably to cover one trade cycle. Such standards are established on the basis of average estimated performance over a future period of time covering one trade cycle. It is difficult to follow normal standards in practice as it is not possible to forecast performance with a reasonable degree of accuracy for a long period of time. Such standards are attainable if anticipated conditions do not prevail over a future period of time. Therefore, normal standards may not be a useful device for the purpose of cost control.

4. Setting the standards or establishment of standard cost:

There should be a standards committee which should be entrusted with the task of setting standards for various costs. Usually such a committee comprises of the general manager, purchase manager, Production engineer, salesmanager, cost account and other functional heads, if any of all the persons, the cost accountant plays a very important role in setting the standards because he is to supply the necessary information on cost and co-ordinate the activities of the committee so that standards are set as accurate as possible.

The success of standard costing system depends upon the establishment of correct standards. Every possible care should be taken in the establishment of standards and standards should be established for each element of cost, viz., direct labour, direct materials and overheads.

In order to set the standards, the following preliminaries should be attended to:

1. Study the existing costing system, cost records and forms in use. If necessary, review of the system.
2. A technical survey of the existing methods of production should be undertaken so that accurate and reliable standards can be established.
3. Determine the type of standard to be used.
4. Fix standard for each element of cost.

5. Determine standard cost for each product.
6. Fix responsibilities for setting standards.
7. Classify the accounts properly so that variances may be accounted for in the manner desired.
8. Comparison of actual costs with the predetermined standards to ascertain the deviations.
9. Action to be taken by the management to ensure that adverse variances are not repeated.

On these lines, standards for materials may be determined. Standard material cost for each product should be considered. This will include.

- i) Determine of standard quantity of materials needed for the production.
- ii) Determination of standard price per unit of material.

Standard Material Quantity and Price.

The standard specification of materials should be planned by the engineering department after consulting the past records. Standard may be based on technical data or part performance data. While setting the standard, allowance should be made for normal wastage. This must be fixed very carefully. Where different kinds of materials are used as a mix for a process, a standard material mix is determined to produce the desired quantity product.

A detailed listing of all the materials required for a product is made on a standard materials specifications. The specimen form may be designed as follows:

Standard material Specification

No.....

Date:.....

Description of the product

Code No.	Description of Material	Quantity of the material per Product.	Remarks

Prepared by:

Checked by:

Fig 6.1

The standard price of materials should be determined for the various types of materials needed for the production. Setting of standard price is usually done by the cost accountant and the purchase manager. Current standard is desirable and effective standard for fixing the price. Standard price for each item of materials is established after carefully studying the market conditions and forecasting the trend of prices in the future. The cost of purchasing and storekeeping should also be included in the price of materials.

The object of fixing standard prices for materials is to increase the efficiency in the purchase process so that prices of materials may be kept down.

Standard labour Cost.

Determination of standard direct labour cost involves the determination of

- i) Standard time
- ii) Standard rate.

Standard time should be determined for each category of labour and for each operation involved. Time and motion study is helpful to determine how much time can be allowed for each operation. While fixing up the standard time, due allowance should be made for fatigue, tool setting, receiving instructions and normal idle time. Thus standard time can be established more scientifically through time and motion study and this is done with the help of the work study engineers.

Standard rates of payment should be established for every category of labour. Any expected increase in rates may be considered for the determination of standard rates. Establishment of standard rates of pay to do not present by contracts, law, wage tribunals and wage boards. Fixation of standard rates depends upon the method of wage payment. Standard rates per hour or day is fixed if wages are paid according to time wage system and when the method of wage payment is piece rate, standard wages per piece is fixed.

C. Overheads standards

Overheads are classified into fixed overheads and variable overheads and standard overhead rate is determined for fixed and variable overheads separately. Standard overhead rate is determined on the basis of the past record and future trend of prices. This rate can be calculated per unit or per hour. The formula for calculating the overhead is:

Standard variable overhead rate = $\frac{\text{Standard variable overhead for the budget period.}}{\text{Budgeted production units or budgeted hours for the budgeted period}}$

Budgeted production units or budgeted hours for the budgeted period

Standard fixed overhead rate:

Standard fixed overhead for the budget for the budget period

Budgeted production in units or budgeted honour for the budget period.

Standard hour

A standard hour can be defined as an hour which measures the amount of work that is performed in one hour under standard conditions. The time factor is common to all the products, and therefore, production can be expressed in standard hours. For example, if 500 units of product X can be produced in 10 hours and 2000 units of product Y in 20 hours, a standard represents 50 units of product X and 100 units of Y. When a factory manufactures a variety of products and all of them cannot be measured in any common units, standard hour is used as a tool of common measure. According to I.C.M.A., London, a standard hour is a hypothetical hour which represents the amount of work which should be performed in one under standard conditions.

Revision of standards

Standard cost is the resultant effect of a number of factors that vary from time to time in different situations, both internal and external. Standards become unrealistic with the changing conditions and, therefore, they need changes and revision. Without revision the standard become outmoded. If the changes are of a temporary or minor nature, it is not advisable to revise the standards. Current standards are reviewed every year at the beginning of the accounting period for.

- a) Errors in setting the standards
- b) Changes in price level of materials
- c) Changes in method of production.
- d) Change in designs or specification.
- e) Technological advances.

Standard cost card

When all the standard costs are determined, a standard cost card is prepared for each product or unit of service. The process of setting standards for materials, labour and overheads results in the establishment of the standard cost for the product. The standard cost card shows for specified unit of production, quantity and price of each type of materials to be used, the time and the rate of pay for each type of labour, their various operations the product would pass through, the recovery of overhead and the total cost. The build up of each standard cost for each item is recorded in the standard cost card. These details serve as a basis to measure of the effi-

ciency against which actual quantities and costs are compared. The type of standard cost and varies with the requirements of individual firm and hence, no uniform format is usually prescribed.

Analysis of variances

The difference between the standard cost (or the budgeted cost if budgets and not standard costs are considered) and the comparable actual cost incurred a period is called cost variance. When the actual cost is less than the standard cost it indicates efficiency and the difference is known as a favourable variance. It is also called credit variance. Whereas actual cost higher than the standard cost is a sign of inefficiency and the difference is called unfavourable or adverse variance. It is also called debit variance. Variances are also classified into controllable variances and uncontrollable variances. When the variances are due to inefficiency of individual or department it is said to be controllable variance. An uncontrollable variance is related to external reasons like increase in price of materials. Such variances cannot be controlled by managerial actions.

Control is a very important function of management. Through control procedure, the management ensures that performance of the organization conforms to its plans and objectives. Analysis of variance is helpful in controlling the performance and achieving the have been planned.

Moreover, there are a number of reasons which give rise to variances. The analysis of variances helps to locate the reasons and the person or department responsible for a particular variance. Analysis of variances is usually made in respect of each element of cost and sales. Such an analysis involves.

- i) Direct material variances.
- ii) Direct labour variances.
- iii) Overhead variances
- iv) Sales variances.

Direct material variances

The variances which occur between the various components of materials cost and their set standard from the material variances.

These variance may be presented as follows;

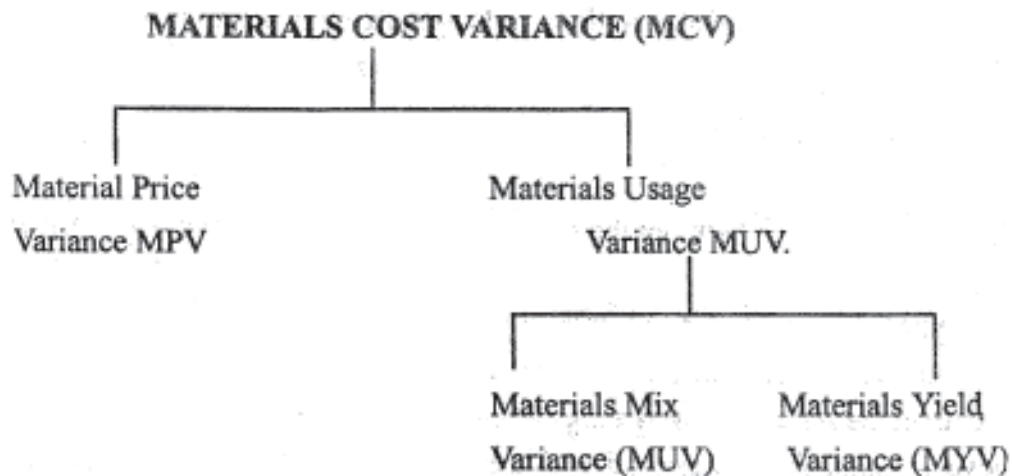


Fig. 6.1

Since the cost of indirect materials is added to overhead direct materials variances are computed for analysis purposes. In other words, materials variances mean only direct materials variances.

Fig. 6.1 classified the components of the materials variances primarily into materials usage variances, or quantity variances, and the material usage variance into materials mix variance and material yield variance.

1. Materials Cost Variance:

Direct materials cost variance is the difference between the actual direct material cost incurred and the standard direct material cost specified for the production achieved. Materials cost variance may arise due to variations in the price of the materials or in its usage. The material cost variance is calculated by the formula;

Material Cost Variance(MCV)

$$= (\text{Standard cost of material}) - (\text{Actual cost of Materials})$$

(OR)

$$= (\text{Standard cost of Actual output}) - (\text{Actual Materials cost})$$

(OR)

$$= \begin{array}{cccc} \text{Standard Quantity} & \text{Standard} & \text{Actual} & \text{Actual} \\ \text{-----} \times & \text{-----} \times & \text{-----} \times & \text{-----} \\ \text{For actual output} & \text{Price} & \text{Quantity} & \text{Price} \end{array}$$

With Symbol:

$$\text{MCV} = (\text{SC} - \text{AC}) \text{ OR}$$

$$= (\text{SC of Actual output} - \text{AC}) \text{ OR}$$

$$= (\text{Sq for Actual out put} \times \text{SP}) - \{\text{AQ} \times \text{AP}\}$$

Illustration:

The prescribed standard cost of manufacturing a unit of product A is estimated as follows.

16 kg of raw materials @ Re.1 per Kg.

On completion of the unit it was found that 20 Kg. Of raw materials costing Rs.1.50 per Kg. Has been consumed. Calculate the material cost variances.

Solution:**STATEMENT OF MATERIAL COST VARIANCE.**

$$\begin{aligned} \text{MCV} &= (\text{SQ} \times \text{SP}) - (\text{AQ} \times \text{AP}) \\ &= (16 \times 1) - (20 \times 1.50) = 14 \\ &= \text{Rs.14(Adverse)} \end{aligned}$$

It is adverse because cost is more than the standard cost.

i) Materials Price Variance

This is component of material cost variance, which arises due to the difference between the actual and standard price per unit of the material applied to the actual quantity of material used. The formula is :

$$\begin{aligned} \text{Materials Price Variance} &= (\text{Actual Price} - \text{Standard Price}) \times \\ &\quad \text{Actual Quantity (OR)} \\ &= (\text{AP} - \text{SP}) \text{AQ (OR)} \\ &= (\text{Actual quantity} \times \text{Actual price}) - \\ &\quad (\text{Standard price} \times \text{Actual Quantity}) \\ &\quad \text{(OR) (AQ} \times \text{AP) - (AQ)} \end{aligned}$$

Illustration:

From the following particulars, Calculate the materials price.

Variance

Materials	Standard Units	Standard Price (Rs)	Actual Units	Actual Price (Rs)
A	1,010	1.00	1080	1.20
B	410	1.50	380	1.80
C	350	2.00	380	1.90

Solution**STATEMENT OF MATERIAL PRICE VARIANCE**

Materials Price variance(MPV)	=	AQ (SP - AP)	
For Material A	=	1080 (1.00- 1.20)	= Rs.216 (A)
For Material B	=	380 (1.50 - 1.80)	= Rs.114(A)
For Material C	=	380 (2.00 - 1.90)	= Rs.38(F)

			Rs.292(A)

Material Price Variance

Material price variance arises due to the following causes:

1. Change in the basic purchase price of material.
2. Change in the quantity of purchase or uneconomical size of the purchase order.
3. Rush order to meet the shortage of supply or purchase in less on more favourable market.
4. Failure to obtain cash and trade discounts or charge in the discount rates.
5. Failure to obtain cash and trade discounts or charge in the discount rates.
6. Weak purchase organization.
7. Pyament purchase organization.
8. Transit losses and discrepancies, if purchase price is inflated to include the loss.
9. Change in materials purchase, upkeep, and store-keeping cost.
10. Change in the pattern or amount of taxes and duties.

Price variance analysis will bring out the effect of efficiency or inefficiency due to other causes which are controllable. Sometime the impact of these factors may be more significant than the more rise in the basic purchase price.

iii) Materials Usage Variance

This is that portion of materials cost variance which arise due to the difference between the actual quantity used and the standard price. The formula to calculate the material usage variance is

$$\begin{aligned}
 \text{Materials Usage Variance} &= (\text{Actual Quality} \times \text{Standard Price}) \\
 \text{(MUV)} & \quad (\text{Standard Price} \times \text{Standard Quantity}) \\
 & \quad (\text{AQ} \times \text{SP}) - (\text{SP} \times \text{SQ}) \\
 & \quad \text{(OR)}
 \end{aligned}$$

$$= \text{Standard Price (Actual Quantity} \\ \text{Standard Quantity)} \\ \text{(OR)} \\ = \text{SP (AQ - SQ)}$$

Illustration

From the following particulars, compute the material variance.

Standard	-	20 Kg at Rs.5.50 per Kg.
Actual	-	25 Kg. at Rs.6 Per kg.

Solution:

$$\begin{aligned} \text{Material Usage Variance} &= \text{SP (AQ - SQ)} \\ &= 5.50 (25 - 20) \\ &= \text{Rs.27.50 (F)} \end{aligned}$$

The causes for materials usage variance are:

1. Careless handling of materials
2. Changes in specification of a design of product.
3. Inefficient and inadequate inspection of raw materials.
4. Purchase of inferior materials or change in quality of materials.
5. Rigid technical specifications and strict inspection leading to more rejections which require more materials for rectification.
6. Inefficiency in production resulting in wastages.
7. Use of substitute materials.
8. Theft or pilferage of materials.
9. Inefficient labour force leading to excessive use of materials.
10. Defective tools machines and equipments and bad and improper maintenance leading to breakdowns and more use of materials.
11. From materials in excess of less than that prescribed as standard yield.
12. Faulty material processing.
13. Accounting errors.
14. Inaccurate standards.
15. Change in composition of a mixture of materials for a specified output.

a) Materials Mix Variance

It form that portion of direct material usage variance which is the difference between the

actual quantities of ingredients used in a mixture at standard price and the total quantity of ingredients as shown by the standard cost sheet. Such a situation arises quite often in textile, chemical, rubber and similar other industries where definite proportions of different raw materials are mixed to get the product completed.

Materials mix variance can be calculated by the formula.

$$\begin{aligned} \text{Material Mix variance (MMV)} &= (\text{Quantities in actual mix} - \text{quantities in} \\ &\quad \text{Standard Mix}) \\ &\quad \text{Standard Price} \\ &\quad \text{(OR)} \\ &\quad (\text{AQ-SQ}) \text{ SP (OR)} \\ &= \text{Standard Price (Revised)} \\ &\quad \frac{\text{Standard Quantity} - \text{Actual Quantity}}{\text{Total Weight of actual mix}} \end{aligned}$$

$$\text{Where Revised Standard Quantity} = \frac{\text{Total Weight of actual mix}}{\text{Total Weight of Standard mix}} \times \text{SQ}$$

When the actual weight of mix and standard weight of mix differ from each other the formula to find new standard mix is:

$$\text{Revised Standard Mix} = \frac{\text{Total Weight of actual mix}}{\text{Total Weight of Standard mix}}$$

Illustration

Calculate the materials mix from the following information

Material	Standard	Actual
A	90 Units at Rs.12 each	100 Units at Rs.12 each
B	60 Units at Rs.15 each	50 Units at Rs.16 each.

Solution

Material	Standard			Actual		
	Qty Rs.	Rate Rs.	Amount Rs.	Qty Rs.	Rate Rs.	Amount Rs.
A	90	12	1080	100	12	1200
B	60	15	900	50	16	800
	150	---	1980	150	---	2000

Materials Mix Variance	=	SP (SQ-AQ)
For Material A	=	12(90-100)
	=	Rs.120(Adverse)
For Material B	=	Rs.15(60-50)
	=	Rs.150 (Favourable)
MMV Total	=	Rs.30(Favourable)

The major reason for this variance may be the non-availability of the requisite quantity of one more of the specified materials for the mix, or the use of substitute for the mix or the use of substitute material. This may further be on account of general shortage due to non-purchase of the material at the proper time thus indicating the fault of the purchase department.

b) Materials yield variance

Another sub-variance to materials mix variance is materials yield variance. It is especially applicable to process industries where a certain specified yield is expected from a given input of materials but the actual yield is different. Yield variance is the difference between the standard yield of actual material input and the actual yield, both valued at the standard material cost of the product. A lower actual yield is an unfavourable yield variance which indicates that the consumption of materials has been more than the standard. A higher yield is the indication of efficiency, but a consistently high yield is generally expressed in terms of percentage as described below.

Input in a manufacturing process	=	120 Kgs.
Output of the process	=	100 Kgs.
Yield from the process	=	$100/120 \times 100 = 83.3\%$

The formula for calculating the yield variance is as follows:

Material yield Variance (MYV)	Standard Yield Price (Actual Yield - Standard Yield)
----------------------------------	---

Illustration

The standard materials cost for 100 kg of chemical D is made up of;

Chemical A	-	30 Kg. @ Rs. 4 Per kg.
Chemical B	-	40 Kg. @ Rs. 5 Per kg.
Chemical C	-	80 Kg. @ Rs.6 Per kg.

In a batch, 500 Kg. of Chemical D were produced from a mix of;

Chemical A	-	140 Kg. at a cost of Rs.588
Chemical B	-	220 Kg. at a cost of Rs.1,056
Chemical C	-	440 Kg. at a cost of Rs.2,860

Calculate the Yield Variance.

Solution**1. Statement of data of actuals**

Chemical A	=	588/140	=	Rs.4.20 per Kg.
Chemical B	=	1056/220	=	Rs.4.80 per Kg.
Chemical C	=	2860/440	=	Rs.6.50 per Kg.

2. Statement of Cost for 100 Kg. of Chemical D

Chemical A	=	$140/500 \times 100$	=	28 Kg.
Chemical B	=	$220/500 \times 100$	=	44 Kg.
Chemical C	=	$440/500 \times 100$	=	88 Kg.

3. Materials Yield Variance

Average Standard Price	=	$\frac{\text{Total standard price}}{\text{Standard output.}}$
Total Standard cost	=	$(30 \times 4) + (40 \times 5) + (80 \times 6)$ = Rs.800
Average Standard price	=	$800/100 = \text{Rs.8}$
150 Kg. of mix will produce 100 Kg.		
160 Kg of mix will produce	=	$100/150 \times 160$ = $106 \frac{2}{3}$ Kg.
Material Yield Variance	=	Sp. (Actual production - Standard production) = $8(100 - 106 \frac{2}{3}) = 8 \times 6 \frac{2}{3}$ = Rs.53.36(A)

This variance measures the abnormal loss or saving of materials. It is significant in the case of process industries where certain percentage of loss of materials is inevitable. It is also known as scrap variance. The application of the formula depends upon the situations under which the yield variance arise. They are:

i) When standard and actual mix do not differ the formula to applied is.

$$\text{Yield Variance} = \text{SP (Actual Yield - Standard Yield)}$$

$$\text{Where standard price} = \frac{\text{Standard cost of standard mix}}{\text{Net standard output.}}$$

ii) Where actual mix differ from standard mix, the formula is:

$$\text{Standard rate} = \frac{\text{Std. cost of Revised Standard Mix}}{\text{Net Standard output.}}$$

$$\text{Yield Variance} = \text{SP (AY - Revised Standard Yield)}$$

Illustration:

From the following data, calculate materials yield variance:

Materials	Standard Mix	Actual Mix.
A	200 Units @ Rs.12	160 Units @ Rs.13
B	100 Units @ Rs.10	140 Units @ Rs.10

Standard loss allowed is 10% of output Actual output is 275 Units.

Solution:

Materials	Standard Mix	Actual Mix
A	200 Units @ Rs.12 = Rs. 2400	160 Units @ Rs.13 = Rs.2080
B	100 Units @ Rs.10 = Rs. 1000	140 Units @ Rs.10 = Rs.1400
	300 Units = Rs. 3400	300 Units = Rs.3480
Less Std Loss	30 units	25 Units
	270 Units	275 Units
	Rs.3400	Rs.3480

$$\text{Standard cost per unit} = \text{Rs.3400/270} = \text{Rs.12.593}$$

$$\begin{aligned} \text{Yield Variance} &= \text{Sp (AY -SY)} \\ &= 12.593 (275-270) \\ &= 12.593 \times 5 \\ &= 62.97 \text{ (Favourable)} \end{aligned}$$

Note:

In this case there is no difference between the standard mix and the actual mix. Therefore revised standard mix is not calculated.

Illustration

The standard cost of chemical mix is as under:

Material A	-	8 tons @ Rs.40 per ton.
Material B	-	12 tons @ Rs.60 per ton.

Standard yield is 90% of input.

Actual cost for a period is as follows:

Material A	-	10 tons @ Rs.30 per ton
------------	---	-------------------------

Material B - 20 tons @ Rs.68 per ton.

Actual yield is 26.5 tons.

Compute the materials yield variance.

Solution

REVISED STANDARD MIX

Material A

For a standard mix of 20 tone A's mix = 8 tons

For a mix of 30 tons A's mix = $\frac{8}{20} \times 30 = 12$ tons.

Material B

For a std mix of 20 tons B's mix = 12 tons.

For a std mix of 30 tons B's mix = $\frac{12}{20} \times 30 = 18$ tons.

Total standard cost of revised mix

Material A - 12 tons @ Rs.40 per ton = Rs. 480

Material B - 18 tons @ Rs.60 per ton = Rs.1,080

	-----		-----
30 tons			Rs.1,560
	-----		-----

Less Std

loss @ 10%	3 tons		---
	-----		-----
	27 tons		Rs.1,560
	-----		-----

Standard cost per unit = $\frac{1560}{27} = \text{Rs.}57.78$

Material yield Variance

SR(A_Y - S_Y) = $57.78(26.5 - 27)$

= 57.78×0.5

= Rs.28.89(A)

Purchase Price Variance.

The Price Variance on the total purchahse made is termed as purchase price variance.

Illustration

Standard price of material Rs.2.10 Per kg.

Material purchased 1,000 Kgs. @ Rs.2 per Kg.

Materials output 750 Kgs.

Standard quality of materials allowed for the output 700 Kgs.

Calculate the purchase price variance.

Solution

STATEMENT OF PRICE VARIANCE.

	Kgs.	Per Kgs. Rs.	Amount Rs.
Quantity purchased at actual price	1,000	2.00	2,000
Quantity purchased at standard price	1,000	2.10	2,100
	-----	-----	-----
	1,000	0.10	100
	-----	-----	-----

There are possibility three alternative methods for recording the materials purchase variance and they are:

i) Material when purchased are debited to the Stores Control Account at standard price such as that the entire purchase price variance is recorded at the time of purchase. The standard price is noted at the top in each stores ledger page and the quantities of receipts and issues are cost at the standard price.

JOURNAL ENTRIES

Stores Control Account	Dr.	Rs. 2,100	
To Sundry Creditors			Rs. 2,000
To Purchase Price Variance			100
(Purchase of Materials)			
Work in progress	Dr.	Rs. 1,470	
Materials Quality Variance	Dr.	105	
To Stores Control			Rs. 1,575
(Being the issue of materials)			

2. The purchases are recorded in the Stores Control Account at cost and the Price variance is calculated at the time of issue only alongwith Quantity or usage Variance. The price variance is worked only for the quantity issued and not for the entire purchase.

JOURNAL ENTRIES.

	Dr.	Cr.
	Rs.	Rs.
Stores Control A/c. Dr.	2,000	
To Sundry Creditors		2,000
(The Purchase of materials)		
Work - in - progress A/c. Dr.	1,470	
(Std. Qty X Std Price)		
Materials quantity Variance Dr	105.	
To Stored Control A/c.		1,500
To Materials Price Variance		75
Actual Quantity issued x actual price =	750 x 2	= Rs.1,500
Actual Quantity X standard price =	750 x 2.10	= Rs.1,575
Materials price variance =	Rs.75.	

3. If the variance are charged to the Profit and Loss Account at the time of purchase, the net profit arrived at may be unrealistic as it would fluctuate depending upon the time lag between the purchase and consumption of the materials. In order to avoid this, the purchase price variance is calculated at the time of purchase, but the variance is charged to production only when the materials are issued, and that too only to the extent it relates to the quantity issued, and the balance remains merged in the closing stock of materials.

JOURNAL ENTRIES

	Dr.	Cr.
	Rs.	Rs.
Stores Control Account	2,100	
To Sundry Creditors		2,000
(the purchase of materials)		
Work-in-progress Dr.	1,470	
Materials Quality Variances Dr.	105	
To Stores Control		1,575
(The issues of materials)		
Purchase Price Variance Dr.	75	75
To Materials price Variance		
(Purchased price variance)		
Charged on issue of materials		

Illustration

Jerry Limited are producing an article by blending two raw materials. It is operating a standard costing system. The following cost standards have been set for materials.

Materials	Standard Mix	Std. Price Principle
X	40%	4.00
Y	60%	3.00

The Standard loss in the processing is 15%

During April, 1996 the company produced 1,700 Kgs of finished output the position of stocks and purchases for the month of April, 1996 is as under.

Material	Stock on Kgs.	Stock on Kgs.	Purchased during April 1996 Kgs.	Cost Rs.
X	35	5	800	3400
Y	40	50	1200	3000

You are required to calculate the following variances.

1. Material Price Variance.
2. Material Usage Variance.
3. Material Yield Variance.
4. Material Mix Variance.
5. Total Material Cost Variance.

Solution**1. Standard Yield Rate**

Finished output	=	1700 kgs.
Standard loss in processing	=	15%
Input = $1700 \times 100/85$	=	2000 Kgs.

For an input of 2,000 kgs, the standard cost is:

X - 40% of	2,000 kgs	=	800 at Rs.4	= Rs.3,200
Y - 60% of	2,000 kgs	=	1200 at Rs.3	= Rs.3,600
Less 15% Loss	2,000 Kgs.			Rs.6,800
	300 kgs.			
	-----		-----	
Finished output	1,700 Kgs.			Rs.6,800
	-----		-----	

Standard Yield rate = $6800/1700 = \text{Rs.4 per kg.}$

2. Actual Cost.

Material X (35 + 800)	=	830 Kgs.	
		Rs.	
Consumed (35 x 4)		140	
-(795 x 4.25)		3,378.75	

		Rs. 3,518.75	

Material Y (40 + 1200 - 50)	=	1190 Kgs.	
Consumed (40 x 3)		120.00	
-(1150 x 2.50)		2,875.00	2,995.00
		-----	-----
Total	- 2,020	Rs.6513.75	
Less Std Loss	320	-----	
	-----	-----	
	1,700	6513.75	
	-----	-----	
Material Price Variance	=	(SR-AR) or (AQ x SR) - AQ x AR	
For Material X	=	830 x 4 (3320 - 3528.75)	
	=	Rs.198.75 (A)	
MCV	=	MPV + MYU + MMV	
286.25 (F)	=	376.25 (F) + 68A + 22(A)	

Labour Variance

Since indirect labour cost forms part of over head cost at appropriate levels, all that are discussed here relate only to direct labour and its wages. Direct labour cost variance also known as direct wage variance or simply labour cost variance or wage variance is the difference between the actual direct wages incurred and the standard direct wages specified for the activity achieved. The general formula for calculating this variance is :

$$\begin{aligned} \text{Labour Cost Variance} &= (\text{Actual hours} \times \text{Actual rate}) - (\text{Standard hours} \times \\ &\quad \text{Standard rate}) \\ &= \text{Actual Cost (AC)} - \text{Standard Cost (SC)} \end{aligned}$$

The various component or sub variances are:

1. Labour Rate Variance
2. Labour Time or Efficiency Variance.
3. Labour Idle Time Variance.
4. Labour Mix Variance or Gang Composition Variance.

Labour Cost variance may have to be calculated (1) when the same kind of labour is employed and (2) when varied grades of labour is employed. Classification of the sub variances can be presented in charts as follows:

	=	Rs.575-00

		Rs.376.00(F)

Material Usage Variance	=	SR (SQ-AQ)
For Material X	=	4 (800 -830)
	=	Rs.125(A)
For Material Y	=	3 (1200 - 1190) = 30 (F)

		Rs.90(A)

Material Yield Variance	=	SYR - (AY - SY)
For 2,000 Kgs. input SY	=	1700
For 2,020 Kgs. input SY	=	1700/2000 x 2020
	=	1717(APP)
MYV	=	4 (1700 - 1717)
	=	Rs.68(A)
Material Mix Variance	=	SR (RSQ - AQ)
RSQ=	=	$\frac{\text{Total weight of actual mix}}{99} \times \text{SQ}$
Total weight of standard mix		
For X =	=	2020/2000 x 800 = 808
For Y =	=	2020/2000 x 1200 = 1212.

MMV

$$\text{For X} = 4 (808 - 830) = \text{Rs.88(A)}$$

$$\text{For Y} = 3 (1212 - 1190) = \text{Rs.66(F)}$$

$$\text{-----}$$

$$\text{Rs.22(A)}$$

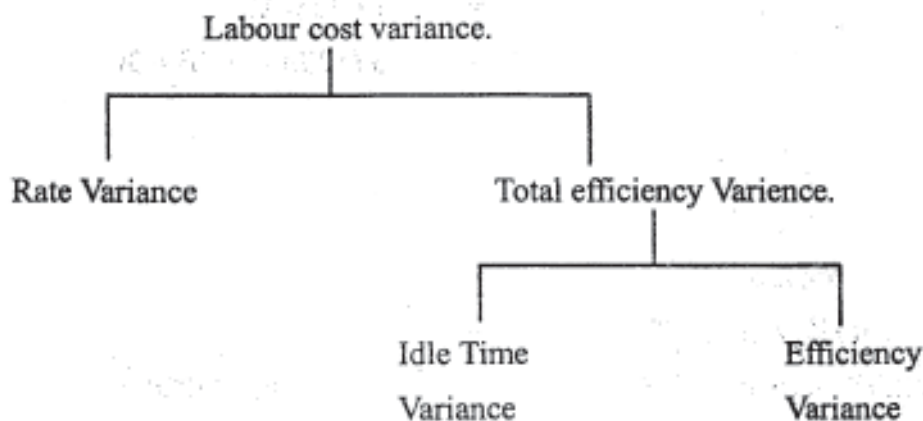
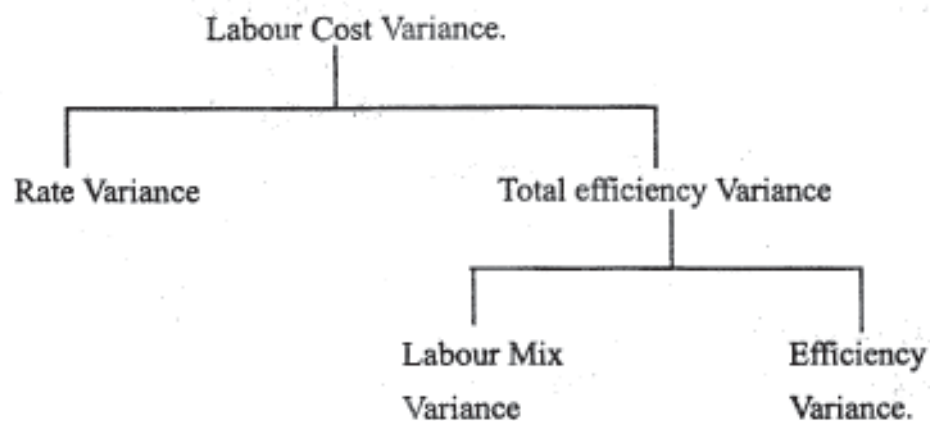
$$\text{-----}$$

Material Cost Variance

$$\begin{aligned} \text{MCV} &= \text{SC} - \text{AC} \\ &= 6800 - 6513.75 = \text{Rs.286.25 (F)} \end{aligned}$$

Verification

$$\begin{aligned} \text{MCV} &= \text{MPV} + \text{MUV} \\ &= 376.25 \text{ (F)} + 90 \text{ (A)} = \text{Rs.286.25(F)} \end{aligned}$$

1. Labour Cost variance when same kind of labour is employed.**2. Labour Cost Variance when varied kind of labour is employed.****Fig. 6.3**

1. Labour Rate Variance.

According to ICMA, London the wages rate Variance is "the difference between the standard and the actual direct labour rate per hour for the total hours worked". It is calculated by the formula.

Labour rate variance : $\text{Actual Time (Standard Rate - Actual Rate)}$

Direct Labour rate variance occurs due to the following reasons.

- i. Change in basic wage occurs due to the following reasons.
- ii. Employment of workers of grades and rates of pay different from those of specified standards, due to shortage of labour of the required category or by mistake or retention of surplus labour.
- iii. Payment of guaranteed wages.
- iv. Use of a different method of payment, for example payment at day rates while standard rate is based on piece rate.
- v. New workers not allowed full normal wage rates.
- vi. Higher or lower rates paid to casual and temporary workers.
- vii. Overtime or night shift work in excess of or less than the standard.
- viii. The composition of a gang as regards the skill and rates of wages different from that laid down in the standard.

2. Labour Efficiency variance:

It is a major component of labour cost variance. It has been defined as "the difference between the standard hours for the actual production achieved and the hours actually worked valid at the standard labour hour rate"

The formulation is as follows:

Labour Efficiency variance = $\text{Standard rate (Standard Time - Actual Time)}$

Here actual time adjusted to abnormal idle hours.

The various causes for this variance are:

- i) Lack of proper supervision or stricter supervision than specified.
- ii) Poor working conditions.
- iii) Delays due to waiting for materials, tools, instructions, etc., if not treated as idle time.
- iv) Defective machine, tools and other equipments.
- v) Machine break down, if not booked to idle time.
- vi) Work on new machines requiring less time than provided for as long as the standard is not revised.

- vii) Basic inefficiency of workers due to low morale, insufficient training, faulty instructions, incorrect scheduling of jobs etc.
- viii) Use of non - standard material requiring more or less operation time.
- ix) Carrying out operations not prescribed for and working them as direct wages.
- x) Incorrect standards.
- xi) Wrong selection of workers.
- xii) Incorrect recording of performance.
- xiii) Fixation of incorrect standard.
- xiv) Lack of co operation.

Labour total efficiency variance has two sub - variance, viz., (i) labour idle time variance and (ii) labour efficiency variance.

(i) Labour idle Time variance:

This type of variance arises mostly on account of abnormal reasons such as power failure, strikes, machine break down, shortage of materials, etc., It is a portion of labour efficiency variance which is due to the abnormal idle time of workers.

labour idle time is usually expressed as:

$$\text{Idle Time variation} = \text{abnormal idle time} \times \text{standard rate.}$$

ii) Labour Efficiency variance

It is the variance basically computed in the same manner as described above by the formula:

$$\text{Labour Efficiency variance} = \text{Std. rate (Std. Time Actual Time)}$$

3. Labour mix variance or gang composition variance.

It is a sub-variance of labour efficiency variance when different grades of labour is employed. It is the indication of how much of labour force. The calculation of this types of variance under four different situations.

i) When there is no change in the standard composition of labour force and total time expended is equal to the total standard time,

the formula is

$$\text{Labour mix variance} = \text{Std. cost of std. composition} - \text{Std cost of actual composition.}$$

ii) When the standard composition of labour force is received due to shortage of a particular type of labour force and the total time expended is equal to the total standard time, the formula is:

$$\text{Labour mix variance} = \text{Std. cost of revised composition} - (\text{Std. Cost of Std. Composition})$$

iii) When the total actual time of labour differs from the total standard time of labour, the formula is

$$\text{Labour mix variance} = \left(\frac{\text{total time of actual labour composition}}{\text{total time of std. Labour composition}} \right) - (\text{Standard cost of actual composition})$$

4. Labour Yield variance

It is like material yield variance and arises due to the difference between yield that should have been obtained by actual time used on production and actual yield obtained. It is usually calculated as follows:

$$\text{Labour Yield variance} = \text{Standard labour per unit (actual yield units expected from the actual time worked production) - (Standard labour per unit (actual yield units expected from the actual time worked production))}$$

SOME MORE SUB - VARIANCE

i) Scrap variance

It is a part of material; usage variance and reflects the difference between the scrap expenses incurred. It is calculated by using the formula.

$$\text{Scrap Variance} = (\text{Actual quantity of scrap} \times \text{Std scrap price}) - (\text{Standard Quantity of scrap} \times \text{Sts. Scrap price})$$

ii) Quality cost variance

This variance arises from failure to conform to quality specifications. It is difference between the amount included in standard costs and the actual cost or loss incurred in scrapping, rectifying, or selling at sub - standard prices.

The formula to calculate it is:

$$\text{Quantity cost variance} = (\text{Number of units rejected or returned} \times \text{cost per Unit} + \text{rectification cost} - \text{Disposal value}) - (\text{Number of units produced} \times \text{standard allowance per unit})$$

iii) Substitution variance

This is the variance in labour cost which arises due to substitution of labour particularly when one grade of labour is substituted by another. It is the difference between the actual hours at standard rate of standard worker and the actual hours at standard rate of actual worker. In the formula it is:

$$\text{Substitution variance} = (\text{Actual Hours} \times \text{Standard rate of standard worker}) - (\text{Actual Hours} \times \text{Standard rate of actual worker})$$

Illustration:

From the following data, compute the labour variances:

gross direct wages = Rs.3000

Standard hours produced = Rs.1600

Standard rate per hour = Rs.150

Actual hours paid 1500 hours out of which 50 hours not worked being abnormal idle time are so.

Solution:**a) Labour cost variance**

$$\begin{aligned} \text{LCV} &= \text{SC} - \text{AC} \\ &= (\text{SH}) \times (\text{SR}) - (\text{AH}) \times (\text{AR}) \\ &= (1600 \times 1.5) - (1500 \times 2) \\ &= 2400 - 3000 = \text{Rs.}600 \text{ (A)} \end{aligned}$$

$$\text{Where AR} = 3000/1500 = \text{Rs.}2.$$

b) Labour Rate variance

$$\begin{aligned} \text{LRV} &= \text{AT} (\text{SR} - \text{AR}) \\ &= 1500 (1.50 - 2) \\ &= \text{Rs.}750 \text{ (A)} \end{aligned}$$

c) Labour Efficiency variance

$$\begin{aligned} \text{LEV} &= \text{SR} (\text{ST} - \text{AR}) \\ &= 1.50(1600-1450) \\ &= \text{Rs.}225 \text{ (F)} \end{aligned}$$

$$\text{Where actual hours} = 1500 - 50 = 1450 \text{ hours.}$$

d) Idle time variance

$$\begin{aligned} \text{ITV} &= \text{Abnormal Time} \times \text{Standard rate} \\ &= 50 \times 1.50 = \text{Rs.}75 \text{ (A)} \end{aligned}$$

Verification

$$\begin{aligned} \text{Labour cost variance} &= \text{Labour rate variance} + \text{Labour efficiency variance} + \\ &\quad \text{idle time variance.} \\ &= \text{Rs.}750 \text{ (A)} + \text{Rs.}225 \text{ (F)} + \text{Rs.}75 \text{ (A)} \\ &= \text{Rs.}600 \text{ (A)} \end{aligned}$$

Illustration 2

Standard labour hours and rate for production of Articles A are as follows:

	Hours	Rate Rs.	Total Rs.
Skilled worker	5	1.50 per hour	7.50
Unskilled worker	8	0.50 per hour	4.00
Semi skilled worker	4	0.75 per hour	3.00
			14.50

Actual data

	Rate per hour Rs.	Total Rs.
Articles produced 100 units		
skilled worker 4500 hours	2.00	9,000
Unskilled worker 10,000 hours	0.45	4,500
Semi skilled worker 4,200 hours	0.75	3,150
		16,650

You are required to calculate from the above data.

- Labour cost variance.
- Labour rate variance.
- Labour efficiency variance.
- Labour mix variance.

Solution**a) Labour cost variance.**

$$\text{LCV} = (\text{SH for actual production} \times \text{SR}) - (\text{AH} \times \text{AR})$$

$$\text{Standard hour for actual production} = \text{Actual units} \times \text{SH}$$

$$\text{For Skilled worker} = 1000 \times 5 = 5000 \text{ hours.}$$

$$\text{For unskilled worker} = 1000 \times 8 = 8000 \text{ hours.}$$

$$\text{For semi skilled worker} = 1000 \times 4 = 4000 \text{ hours.}$$

Now LCV

$$\text{For skilled worker} = (5000 \times 1.50) - (4500 \times 2)$$

$$= \text{Rs.1500 (A)}$$

$$\text{For unskilled worker} = (8,000 \times 0.50) - (10,000 \times 0.45)$$

$$= 4,000 - 4,500$$

$$= \text{Rs.500(A)}$$

$$\text{For semi skilled worker} = (4,000 \times 0.75) - (4,200 \times 0.75)$$

$$= 3000 - 3150$$

$$= \text{Rs.150(A)}$$

$$\text{Total labour cost variance} = \text{Rs.1500 (A)} + \text{Rs.500(A)} +$$

$$= \text{Rs.150(A)}$$

$$= \text{Rs.2,150(A)}$$

b) Labour price variance

$$\text{LPV} = \text{AH} (\text{SR} - \text{AR})$$

$$\text{For Skilled worker} = 4,500 (1.50 - 2)$$

$$= \text{Rs.2250(A)}$$

$$\text{For Unskilled worker} = 10,000 (0.50 - 0.45)$$

$$= \text{Rs.500(F)}$$

$$\text{For Semi skilled worker} = 4,200 (0.75 - 0.75)$$

$$= \text{Nil}$$

$$\text{Total labour price variance} = \text{Rs.2,250(A)} + \text{Rs.500(F)} + \text{Nil}$$

$$= \text{Rs.1,750(A)}$$

c) Labour Efficiency variance

$$\text{LEV} = \text{SR} (\text{SH for actual production} - \text{Revised standard hours})$$

Where Revised standard hours

RSH	=	Std. mix/total std. hrs x total Actual hours.
For skilled worker	=	5000/1700 x 18700
	=	5,500 hours.
For unskilled worker	=	8000/17000 x 18700
	=	8,800 hours.
For semi skilled worker	=	4000/17000 x 18700
	=	4,400 hours.

Now LEV for

Skilled worker	=	1.50 (5000 - 5500)
	=	Rs.750(A)
Unskilled worker	=	0.50(8000 - 8800)
	=	Rs.400(A)
Semi skilled worker	=	0.75 (4000-4400)
	=	Rs.300(A)
Total Labour Efficiency Variance	=	Rs.750(A) + Rs.400(A) + Rs.300(A)
	=	Rs.1,450(A)

c) Labour mix variance

LMV	=	(Revised std mix of actual labour worked) Actual mix.
For skilled workers	=	1.5 (5500 - 4500)
	=	Rs.1500(F)
For unskilled workers	=	0.5 (8800-10000)
	=	Rs.600 (A)
For Semi skilled workers	=	0.75 (4400 - 4200)
	=	Rs.150(F)
Total mix variance	=	Rs.1500(F) + Rs.600 (A) + Rs.150(F)
	=	Rs.1050(F)

Verification

LCV	=	L.R.V. + L.E.V. + L.M.V.
-----	---	--------------------------

$$\begin{aligned}
 &= \text{Rs.1750(A)} + \text{Rs.1450(A)} \\
 &\quad + \text{Rs.1050(A)} \\
 &= \text{Rs.2150(A)}
 \end{aligned}$$

Illustration

Rambo & co., turns out only one product, the prime costs standards for which have been established as follows:

	Per Completed price.
	Rs.
Material - 5 Kgs. @ Rs.4.20	21
Labour - 3 hours @ Rs.3.00	9

The production schedule for the months of July 1995 required the completion of 5,000 pieces. However 5120 pieces were actually completed.

Purchases for the month of July 1995 amounted to 30,000 gs of material at the total invoice price of Rs.1,35,000

Production records for the month of July 1995 showed the following actual results.

Materials requisitioned and used 25,700 kgs.

Direct labour 15,150 hours Rs.48,480

You are required to calculate the appropriate material and labour variances.

a) Material Cost Variance.

$$\begin{aligned}
 \text{MCV} &= (\text{SR} \times \text{Actual output}) - \text{AC of material} \\
 &= (21 \times 5120 - 1,35,000/30,000 \times 25,700) \\
 &= \text{Rs.1,07,520} - \text{Rs.1,15,650} \\
 &= \text{Rs.8,130(A)}
 \end{aligned}$$

b) Material Price Variance

$$\begin{aligned}
 \text{MPV} &= \text{AQ (SR - AR)} \\
 &= 25,700 (4.20 - 1,35,000 / 30,000) \\
 &= 25,700 (4.20 - 4.50) \\
 &= \text{Rs.7,710(A)}
 \end{aligned}$$

c) Material Usage variance

$$\begin{aligned}
 \text{MUV} &= \text{SR (Standard Usage - Actual Usage)} \\
 &= 4.20(5120 \times 5 \text{ kgs} - 25,700 \text{ kgs}) \\
 &= 4.20 (25,600 - 25,700) \\
 &= \text{Rs.420(A)}
 \end{aligned}$$

d) Labour Cost Variance

$$\begin{aligned}
 \text{LCV} &= (\text{Standard Labour cost per unit} \times \text{Actual output}) \\
 &\quad \text{Actual Cost of Labour} \\
 &= 9 \times 5120 - 48480 \\
 &= 46,080 - 48480 \\
 &= \text{Rs.2,400(A)}
 \end{aligned}$$

e) Labour Rate Variance

$$\begin{aligned}
 \text{LRV} &= \text{AT} (\text{SR} - \text{AR}) \\
 &= 15150(3 - 48,480 / 15,150) \\
 &= 15150(3 - 3.2) \\
 &= \text{Rs.3,039(A)}
 \end{aligned}$$

f) Labour Efficiency Variance

$$\begin{aligned}
 \text{LEV} &= \text{SR} (\text{ST} - \text{AT}) \\
 &= 3 (5120 \times 3 - 15,150) \\
 &= \text{Rs.630(F)}
 \end{aligned}$$

Illustration 4

The original standard rate of pay in a factory was Rs.4 per hour. Due to settlement with trade unions, this rate of pay per hour is increased by 15%. During a particular period, 5,000 actual hours were worked whereas work done equivalent to 4,400 hours, the actual labour cost was Rs. 24,000. Calculate labour variances,

Solution

$$\begin{aligned}
 \text{Original standard rate per hours.} &= \text{Rs.4} \\
 \text{Current Standard rate per hour (Rs.4 + 15\%)} &= \text{Rs.4.60}
 \end{aligned}$$

a) Labour Rate Variance

$$\begin{aligned}
 \text{LRV} &= \text{AT} (\text{CSR} - \text{AR}) \\
 &= 5000(4.60 - 24,000/5000) \\
 &= 5000(4.60 - 4.80) \text{Rs.1000(A)}
 \end{aligned}$$

b) Wages Revision Variance

$$\begin{aligned}
 \text{WRV} &= (\text{Standard labour cost of actual output at original} \\
 &\quad \text{standard rate}) - (\text{Standard labour cost of actual} \\
 &\quad \text{output at current standard rate}) \\
 &= (4400) - (4400 \times 4.60) \\
 &= 4400(4 - 4.60) \\
 &= \text{Rs.2640(A)}
 \end{aligned}$$

c) Total labour cost variance

$$\begin{aligned}
 \text{TLCV} &= (\text{ST} \times \text{original SR}) - \text{AC} \\
 &= (4400 \times 4) - 24,000 \\
 &= \text{Rs.2640(A)}
 \end{aligned}$$

Overhead Variance

In a standard cost system, overheads are applied at standard predetermined rates to the standard allowed input. The standard overhead cost pertaining to a job or process is equal to standard labour hours allowed x standard overhead rates where standards allowed is equal to standard labour hours required to produce one unit x actual number of units produced.

Overhead cost variance or overall (or net) overhead variance is the difference between the actual charged or applied to the Job or process at the standard overhead rate. In other words, overhead cost variance is either under or over absorption of overheads.

The formula for calculating the over all overhead cost variance is:

$$(\text{Actual output} \times \text{Standard overhead rate per unit}) - (\text{Actual overhead cost})$$

(or)

$$(\text{Standard hours for actual output}) \times (\text{Standard overhead rate per hour}) - \text{Actual overhead cost.}$$

The overhead total cost variance is further analysed to determine the detailed causes for the variance and to assist the management in taking corrective measures. This analysis may be made under two, three or four variances.

Two variance method comprises of calculating two variances and they are (i) controllable variance, (ii) Volume variance. On the other hand, three variance method implies the calculation of (i) expenditure, spending, or budget variance, (ii) volume variance, or Idle capacity or capacity usage variance, and (iii) efficiency variance. Four variance method denotes the calculation of (i) expenditure variance (ii) variable efficiency variance (iii) fixed efficiency variance and (iv) volume variance.

But popularly overhead cost variance are classified into;

1. Variable overhead variance.
2. Fixed overhead variance.

Variable overhead variance is the difference between the standard variable overhead cost allowed for the actual output achieved and the actual variable overhead cost. It is expressed as:

$$(\text{Actual output} \times \text{Standard Variable overhead rate}) - (\text{Actual Variable Overheads})$$

(or)

$$(\text{Standard hours of actual output} \times \text{standard variable overhead rate per hour}) - (\text{Actual Variable overhead})$$

Fixed Overhead variance is that portion of overall overhead cost variance which arises due to the difference between the standard cost of fixed overhead allowed for the actual output achieved and the actual fixed overhead cost incurred. The formula to calculate their variance is:

$$(\text{Actual output} \times \text{standard fixed overhead rate}) - \text{Actual fixed overheads}$$

In order to calculate any analysis the various sub-variances 376.25 (F) + 90 (A) = Rs.286.25 (F) overhead cost variances can be presented as follows.

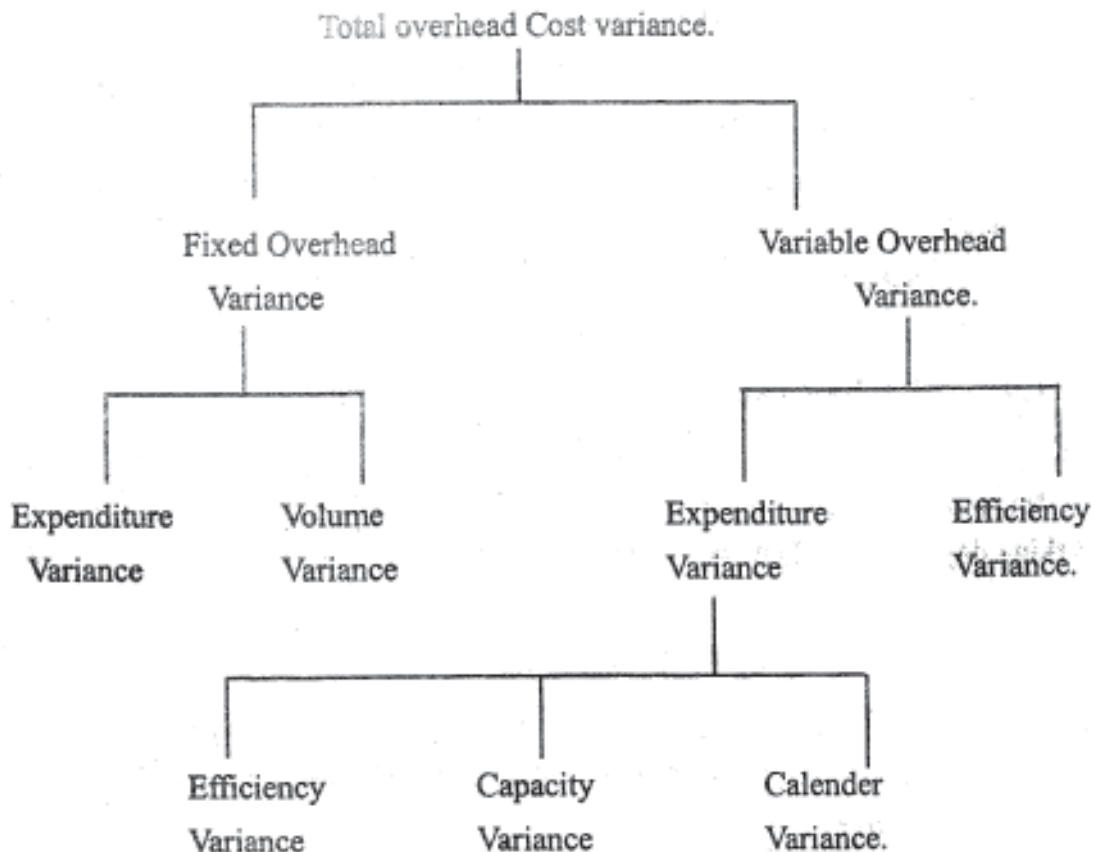


Fig. 6.4

Fixed overhead variance is further analysed into (i) Expenditure Variance and (ii) Volume Variance.

i) Expenditure variance is that portion of fixed overhead variance which arises due to the difference between the budgeted fixed overheads and the actual fixed overhead incurred during a particular period. Its formula is :

$$EV = (\text{Budgeted fixed overhead}) - (\text{Actual fixed overhead})$$

ii) Volume variance is that portion of fixed overhead variance which arises due to the difference between the standard cost of fixed overhead allowed for the actual output and the budgeted fixed overhead for the period during which the actual output had been achieved. The formula to calculate this variance is:

$$\begin{aligned}
 \text{VV} &= \frac{(\text{Actual output}) \times (\text{Standard Rate})}{(\text{Budgeted Fixed Overhead})} \\
 &\quad (\text{or}) \\
 &= \text{Standard Rate} (\text{Actual output} - \text{budgeted output})
 \end{aligned}$$

Volume variance if further analysed into three more sub - variance (a) Capacity variance, (b) Calender variance, and (C) efficiency variance.

a) Capacity Variance:

It arises due to working at higher or lower capacity than the standard capacity. It is expressed as:

$$\text{CV} = \text{SR} (\text{Revised budgeted units} - \text{Budgeted Units})$$

(or)

$$\text{CV} = \text{SR} (\text{Revised budgeted hours} - \text{Budgeted hours})$$

b) Calender Variance

It is a sub - variance to volume variance and indicates the difference between the number of working days in the budget and the number of actual working days in the period to which the budget is related to

The formula calculate this variance is ;

$$\text{Calender Variance} = \text{Increase or decrease in production due to more or less working days at the rate of budgeted capacity} \times \text{standard rate per unit.}$$

c) Efficiency Variance

It is another sub - variance of volume variance resulting from the difference between the budgeted efficiency of production and the actual efficiency achieved. This variance is related to the efficiency of workers and plant. it is computed by the formula.

Here, standard production of hours means budgeted production or hours adjusted to increase or decrease in production due to capacity or calender variances.

Similarly variable overhead variance is further analysed into its sub - variance, viz., (a) expenditure variance and (b) efficiency variance with similar formulae, but applicable to variable portion of overheads.

a) Variable overhead expenditure variance

It is the difference between actual variable overhead expenditure incurred and the standard variable overheads set in for a particular period. In a formula, it is:

$$\text{Variable Overhead Expenditure Variance} = \text{Actual hours worked} \times \text{Standard Variable overhead rate per hours} - \text{Actual Variable overheads.}$$

b) Variable overhead efficiency variance:

It denotes the effect of change in labour efficiency on variable overheads recovery. The formula to calculate this variance is:

$$\text{Variable Overhead Efficiency Variance} = \text{SR} (\text{SQ} - \text{AQ})$$

Or

Where standard overhead rate = $\frac{\text{ST}}{\text{Actual output}}$ - Actual time.

OTHER SUB - VARIANCES

There are some more sub variances and they are related to expenditure variance, volume variances, or to the total overhead variance. A few of them are:

1. Overhead price variance.

It is that portion of overhead expenditure variance which arises on account of the differences between the standard price of services specified and the actual price paid.

2. Overhead Utilisation Variance

It is calculated as another component of expenditure variance which arises due to the difference between the standard quantity of the services specified and the actual quantity of the service used.

3. Seasonal Variance

It is a component of volume variance which arises due to the difference between the budgeted seasonal output and the average output on which standards have been calculated. If a complete year is taken as a circle, the sum of the seasonal variances over a complete year will be zero. Similar situation also arises when the standard level of activity is based upon the normal capacity expected over a number of years constituting the business cycle.

4. Revision variance

It arises where a budget is revised, but the revised values are not incorporated in the standard cost rates as a matter of policy. The standard costs are sometimes affected by rate change on account of wage awards, government fiscal policy, sudden changes in material price, etc.,. There is not much use disturbing the standard costs account for these uncontrollable factors, and in order to avoid the amount of labour and cost involved in revision, the basic standards are allowed to continue. In order, therefore, to correctly analyse the other variances, it becomes necessary to isolate the variance arising out of non-revisions of standards.

Illustration

The following data are furnished by revision:

	Budget	Actual May 1996
No. of working days	25	27
Production in units	20000	22000
Fixed overheads	Rs. 30000	31000

Budgeted fixed overhead rate is Re.1 per hour. In May 1996, the actual hour worked were 31,500

You are required to calculate:

- i) Efficiency variance
- ii) Capacity variance.
- iii) Volume variance
- iv) Expenditure Variance.
- v) Total overhead variance.

Solution

$$\begin{aligned} \text{Recovered overhead} &= \frac{\text{Budgeted overhead}}{\text{Budgeted output}} \times \text{Actual output} \\ &= \frac{30000}{20000} \times 22000 \\ &= \text{Rs.33,000 or 33,000 hours.} \end{aligned}$$

i) Efficiency Variance

$$\begin{aligned} \text{EV} &= \text{SR (SC for actual production - Actual cost)} \\ &= (33,000 - 31,500) = \text{Rs.1500(f)} \end{aligned}$$

ii) Capacity Variance

$$\begin{aligned} \text{CV} &= \text{SR (Actual hour - Budget hour)} \\ &= \text{Standard overhead - Budget overhead.} \\ &= 1 (31,500 - 30000) \\ &= \text{Rs.1500(F)} \end{aligned}$$

iii) Volume variance

$$\begin{aligned} \text{VV} &= \text{Recovered overhead - Budget overhead.} \\ &= \text{Rs.33,000 - 30000} \\ &= \text{Rs.3,000(F)} \end{aligned}$$

iv) Expenditure Variance

$$\begin{aligned} \text{EV} &= \text{Budgeted overhead} - \text{Actual overhead} \\ &= \text{Rs.30,000} - \text{31000} \\ &= \text{Rs.1000(A)} \end{aligned}$$

v) Total overhead Variance

$$\begin{aligned} \text{TOV} &= \text{Recovered overhead} - \text{Actual overhead.} \\ &= \text{Rs.33,000} - \text{Rs. 31,000} \\ &= \text{Rs.2,000(F)} \end{aligned}$$

Verification

$$\begin{aligned} \text{i) Total overhead Variance} &= \text{Expenditure Variance} + \text{Volume Variance.} \\ \text{Rs.2000(F)} &= \text{Rs.1000 (A)} + \text{Rs.3000(F)} \\ \text{ii) Volume Variance} &= \text{Capacity Variance} + \text{Efficiency Variance.} \\ \text{Rs.3000(F)} &= \text{Rs.1500 (F)} + \text{Rs.1500(F)} \end{aligned}$$

Illustration 2

Luck Limited have furnished to you the following information relating to the month of April 1996

	Budget	Actual
Output (Units)	30,000	32,500
Hours	30,000	33,000
Fixed overhead Rs.	45,000	50,000
Variable overhead Rs.	60,000	68,000
Working Days	25	26

CALCULATE VARIANCE**Solution**

$$\begin{aligned} \text{Standard time per unit} &= \frac{\text{Budgeted hours}}{\text{Budgeted Units.}} \\ &= \frac{30000}{30000} = 1 \text{ hours.} \end{aligned}$$

Total standard over head=		Budgeted overhead	

Rate for hour		Budgeted hours	
	=	105000	

		30000	
Standard fixed over head			
Rate for hour	=	Budgeted fixed over head	

		Budgeted hours.	
	=	45000	
		-----	= Rs.1.50
		30000	
Standard Variable over head rate per hour			
variances	=	60000	
		-----	=Rs.2.00
		30000	

i) Overhead cost variance

OCV	=	Recovered overhead - Actual overheads
Recovered Overheads=		Actual output x Std. Rate.
	=	32,500 x 3.50 = Rs.1,13,750
OCV	=	1,13,750 - 1,18,000
	=	Rs.4,250(A)

ii) Variable overhead cost variance

VOVC	=	Recovered Overheads - Actual overheads
	=	32500 x 2- 68000 = Rs.1250(A)

iii) Fixed overhead cost Variance

FOCV	=	Budgeted overheads - actual overheads
	=	45,000 - 50,000 = Rs.5000(A)

iv) Volume Variance

$$\begin{aligned}
 \text{VV} &= \text{Recovered overheads} - \text{budgeted overheads} \\
 &= 32,500 \times 1.50 - 45,000 \\
 &= 48,750 - 45,000 \\
 &= \text{Rs.3,750(F)}
 \end{aligned}$$

v) Efficiency variance

$$\begin{aligned}
 \text{Eff. Variance} &= \text{Recorded overheads} - \text{Std over heads.} \\
 &\quad \text{or} \\
 &= \text{SR (Std. hours for actual output} - \text{Actual hrs)} \\
 &= 1.50(32,500 - 33,000) \\
 &= \text{Rs.750(A)}
 \end{aligned}$$

vi) Capacity variance

$$\begin{aligned}
 \text{CV} &= \text{Std. Overheads} - \text{Budgeted over heads.} \\
 &= \text{SR (Actual hours} - \text{Budgeted hours)} \\
 &= 1.50 (33,000 - 30,000) \\
 &= \text{Rs.4,500 (F)}
 \end{aligned}$$

vii) Calender variance

$$\begin{aligned}
 \text{Cal Variance} &= \text{Excess / Debit hours worked} \times \text{SR one excess day has been} \\
 &\quad \text{worked.}
 \end{aligned}$$

$$\begin{aligned}
 \text{Total excess hour worked} &= 30,000/25 = 1200 \\
 &= 1,200 \times 1.5 \\
 &= \text{Rs.18,000(F)}
 \end{aligned}$$

Verification

$$\begin{aligned}
 \text{OCV} &= \text{FOCV} + \text{VOCV} \\
 \text{Rs.4250(A)} &= \text{Rs.1,250(A)} + \text{Rs.3,000(A)} \\
 \text{FOFC} &= \text{FOEV} + \text{FOVV} \\
 \text{Rs.1250} &= \text{Rs.5,000 (A)} + \text{Rs.3,750(F)} \\
 \text{FOVV} &= \text{FoCAPV} + \text{FOEV} \\
 \text{Rs.3750(F)} &= \text{Rs.4,500 (F)} + \text{Rs.750(A)}
 \end{aligned}$$

Sales Variance

Variance will be complete only when the difference between actual profit and standard profit is fully analyzed. For this purpose, it is essential to make an analysis of sales variances to have a complete analysis of profit variance because profit is only the difference between sales and cost. Sales variances may be ascertained in two different ways. They may be computed to show the effect on profit or they may be calculated to show the effect on sales value. They are respectively profit method and value method.

PROFIT METHOD OF CALCULATION SALES VARIANCES

The sales variances can be analysed under this method into

1. Total sales Margin Variance.
2. Sales Margin variance due to selling price.
3. Sales Margin variance due to sales mixture.
 - 3(i) Sales margin due to sales mixture.
 - 3(ii) Sales margin variance due to sales quantities.

1. Total sales margin Variance.

It reflects the difference between actual profit and budgeted profit and budgeted profit the formula is either:

Actual profit - Budgeted Profit (or)

(Actual quantity of Sales x Actual Profit per unit) - (Budgeted quantity of sales x Budgeted profit per unit)

2. Sales Margin Variance due to selling price

It is that portion of total sales margin variance which arises due to the difference between the actual price of the quantity the sales effected and the standard price of those sales. It is calculated by the formula.

SMV due to SP = AQ of Sales (AP - SP)

3. Sales Margin Variance due to volume.

It arises on account of the number of articles sold being more or less than the standard quantity. The formula is :

SMV due to volume = SP per unit (AQ - BQ)

This portion of sales margin variance can further be divided into two sub - variances viz

- i) Sales margin variance due to sales mixture, and
- (ii) Sales Margin variance due to sales quantities.

i) Sales Margin variance due to sales mixture

It is that portion of sales margin variance due to volume which arises because of different proportion of actual sales mix. It is the difference between the actual and budgeted quantities of each product of which sales mixture is composed, valuing the difference in quantities at standard profit per unit. It is calculated by the formula:

$$\begin{aligned} \text{Either} &= \text{Standard profit per unit (Actual Quantity of sales - standard proportion} \\ &\quad \text{for actual sales) OR} \\ &= (\text{Revised standard profit}) - (\text{Budgeted profit}) \end{aligned}$$

ii) Sales Margin variance due to sales quantities.

It is that portion of sales margin variance due to volume which arises due to the difference between the actual and budgeted quantity sold of each product. The formula is:

$$\begin{aligned} \text{Either} &= \text{SP Per unit (Std. Proportion of actual Sales - Budgeted quantity of sales)} \\ &\quad \text{(or)} \\ &= (\text{Revised Standard profit}) - (\text{Budgeted profit}) \end{aligned}$$

Illustration

Toys Limited has budgeted the following for much 31, 1996

Toy A	900 Units	@ Rs.50 Per Unit
Toy B	650 Units	@ Rs.100 Per Unit
Toy C	1200 Units	@ Rs.75 Per Unit.

The actual sales were:

Toy A	1000 Units	@ Rs.55 Per Unit.
Toy B	700 Units	@ Rs.95 Per Unit.
Toy C	1100 Units	@ Rs.78 Per Unit.

The cost per unit of A,B and C was Rs.45, Rs.85 and Rs.65 respectively.

Calculate the different variances to explain the difference between the budgeted and actual profit.

1. Total sales margin Variance.

$$\begin{aligned} \text{TSMV} &= \text{A.P. - BP or} \\ &\quad (\text{AQ x AP per Unit}) - (\text{BQ x BP per Unit}) \\ \text{Actual profit} &= (\text{Actual selling price per unit}) - \\ \text{Per unit} &\quad (\text{Actual cost per unit}) \\ \text{For Toy A} &= \text{Actual profit per unit} = \text{Rs.55-Rs.45} \\ &\quad = \text{Rs.10} \end{aligned}$$

For Toy B	=	-do-	=	Rs.95 - 85
			=	Rs.10
For Toy C	=	-do-	=	Rs.78 - 65
			=	Rs.13

Total actual profit

From Toy A	-	1000 Units	@ Rs.10	=	Rs.10,000
From Toy B	-	700 Units	@ Rs.10	=	Rs.7,000
From Toy C	-	1100 Units	@ Rs.13	=	Rs.14,000

Rs.31,300

Standard profit per unit	=	SP - Cost per unit.
From Toy A	=	Rs.50 - 45 = Rs.5
From Toy B	=	Rs.100 - 85 = Rs.15
From Toy C	=	Rs.75 - 65 = Rs.10

Total budgeted profit.

From Toy A - 900 x 5	=	Rs.4,500
From Toy B - 650 x 15	=	Rs.9,750
From Toy C - 1200 x 10	=	Rs.12,000

Total Rs.26,250

Total Sales Margin Variance =	31,300 - 26,250
=	5,050(F)

2. Sales Margin Variance due to selling price.

SMV due to selling price	=	AQ(AP - SP)
Toy A 1000 (55-50)	=	Rs.5,000(F)
Toy B 700 (95-100)	=	Rs.3,500(A)
Toy C 1100 (78-75)	=	Rs.3,300(F)

Rs.4800(F)

3. a) Sales Margin variance due to volume.

SMV due to Volume	=	Std. Prof. (AQ - BQ)
Toy A-5(1000-900)	=	Rs.500(F)
Toy B - 15(700 - 650)	=	Rs.750(F)
Toy C -10 (1100 - 1200)	=	Rs.1,000(A)

		Rs.250(F)

3.a) Sales Margin variance due to sales mix.

SMV due to sales mix=	St. Profit (AQ std. Proportion for actual mix)
Toy A	= Rs.5(1,000-900 / 2,750 x 2,800)
	Rs.4,600 / 11(F)
Toy B	= Rs.15(700-650 /2,750 x 2,800)
	Rs.6,300 /11(F)
Toy C	= Rs.10(1100-1200/2750 x 2800)
	= Rs.13,400/11(A)

Total Sales margin variance due to sales mix = Rs.2500/11(A)

3.b) Sales Margin Variance due to Sales quantities.

SMV due to sales quantities =	Std. profit per unit (Std. proportion of actual sales - budgeted quantity of sales)
Toy A	= Rs.5 (900 / 2,750 x 2,800 - 900)
	= Rs.900/11(F)
Toy B	= Rs.15 (650 /2,750 x 2,800 - 1200)
	= Rs.1,950 /11(F)
Toy C	= Rs.10(1,200/2,750 x 2,800 - 1200)
	= Rs.2,400 / 11(F)

Total SMV due to sales quantities = Rs.5,250(F)

Verification

Volume Variance	=	Mix Variance + Qty Variance.
	=	2,500/11(A) + 5,250/11(F)
	=	Rs.2,750(F)

Profit and loss Statement

	Toy A	Toy B	Toy C	Total
	Rs.	Rs.	Rs.	Rs.
Budgeted Sales	45,000	65,000	90,000	2,00,000
Less Budgeted Profit	40,500	55,250	78,000	17,375
	-----	-----	-----	-----
	4,500	9,750	12,000	26,250

Variances

SMV due to selling price	5000	3500	3300	4800
	(F)	(A)	(F)	(F)
	4600	6300	13400	2500
	-----	-----	-----	-----
SMV due to mix	11	11	11	11
	(F)	(F)	(F)	(F)
SMV due to quantities	900	1950	2400	5250
	-----	-----	-----	-----
	11	11	11	11
	(F)	(F)	(F)	(F)
	-----	-----	-----	-----
	10000	7000	14300	31300
	-----	-----	-----	-----

Value method of calculating Sales Variance

Sales Variances calculating under this method enables the sales manager to know the effect of various sales efforts on his over all sales value figures. Sales value variances arise due to one or more of the following reasons:

1. Actual selling price may be higher or lower than the standard price. This is expressed in sales price variance.
2. Actual quantity of goods sold may be more or less than the budgeted quantity of sales. This is expressed in sales volume variance.
3. Actual mix of various varieties sold may differ from the standard mix. This finds expression in sales mix variance.
4. Revised standard sales quantity may be more or less than the budgeted quantity of sales. This leads to sales quantity variance.

Sales Variance calculated under value method may be analysed into:

Sales value variance and its sub -variances.

- i) Sales price variance
- ii) Sales volume variance.

Further sales volume variance can be divided into:

- i) Sales mix variance, and
- ii) Sales quantity Variance.

1. Sales Value Variance

It is the difference between the standard value and the actual value of sales effects during a period. The formula for this purpose is:

$$SVV = (\text{Actual value of sales}) - (\text{Budgeted value of sales})$$

2. Sales price Variance.

It is that portion of sales value variance, which arises on account of the difference between actual price, and the price specified standard price. The formula is:

$$\text{Sales price Variance} = AQ \text{ sold } (AP - SP)$$

3. Sales volume Variance.

It is that portion of the sales value variance, which arise due to the difference between actual quantity of sales and standard quantity of sales. The formula used is

$$SVV = SP (AQ - BQ)$$

4. Sales Mix Variance.

It is profit sales volume variance and arises on account the difference in the proportion in which various articles are sold and the standard proportion in which various articles were to be sold. It is calculated by the formula:

$$SMV = (\text{Std. Value of actual Mix}) - (\text{Std. Value of revised Std. Mix})$$

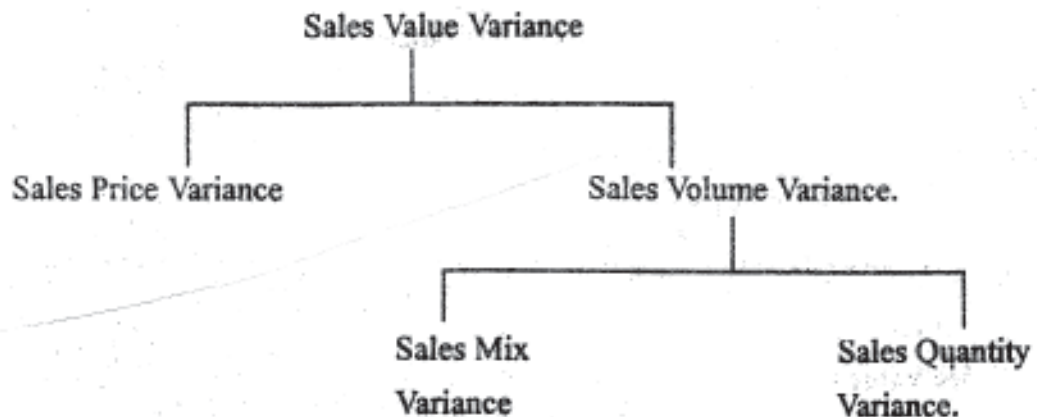
5. Sales quantity variance.

It is sub variance to sales volume variance and arises due to the difference between revised standard sales quantity and the budgeted sales quantity. It can be calculated by the formula.

$$SQV = SP (\text{Revised Std. Sales Qty}) - (\text{Budgeted Sales Qty})$$

This group of variances may be presented in a charts as follows.

SALES VARIANCE UNDER VALUE METHOD.



Illustration

X Ltd furnish to you their budgeted and actual sales for May 1996 in respecting of two products, A and B as follows.

Product	Budgeted Quantity	Price Rs.	Actual	Rate QuantityRs.
A	1,000	20	1,300	21
B	2,000	15	2,300	14

You are required to calculate the sales variances under value method.

Solution:

1. Sales Value Variance.

SVV	=	AV - BV
Actual value product A - 1300 x 21 =		Rs.27,300
Actual value product B - 2000 x 14 =		Rs.32,200

Total		Rs.59,500

Budgeted Value

Actual Value product A - 1,000 x 20=	Rs.20,000
Actual Value product B - 2,000 x 14=	Rs.30,000

Total	Rs.50,000

SVV	=	Rs.59,500 - Rs.50,000
	=	Rs.9,500(F)
2. Sales Price Variance.		
SPV	=	AQ(AP-SP)
Product A - 1300 (21-20)	=	Rs.1,300(F)
Product B - 2,300 (14-15)	=	Rs.2,300(F)
SPV	=	Rs.1,300(F) - Rs.2,300(A)
	=	Rs.1,000(A)
3. Sales Volume Variance.		
SVV	=	SP (AQ - BQ)
Product A-20 (1,300 - 1000)	=	Rs.6,000 (F)
Product B -15(2,300 - 2000)	=	Rs.4,500(F)

SVV		Rs.10,500(F)

4. Sales Mix Variance.		
Revised Standard Mix.		
Product A -1,000/3,000 x 3,600	=	1,200 Units.
Product B -2,000/3,000 x 3,600	=	2,400 Units.
Standard Value of revised standard mix		
Product A - 1300 x 20	=	Rs.26,000
Product B - 2300 x 15	=	Rs.34,500

Total		Rs.60,500

Standard Value of revised standard mix		
Product A - 1200 x 20	=	Rs.24,000
Product B - 2400 x 15	=	Rs.36,000

Total		Rs.60,000

$$\begin{aligned} \text{SMV} &= (\text{Std Value of actual mix}) - (\text{Standard Value of revised standard mix}) \\ &= 60,500 - 60,000 \end{aligned}$$

$$\text{SMV} = \text{Rs.}500(\text{F})$$

5. Sales Qunatity Variance.

$$\text{SQV} = \text{SP (Revised Std. Qty - budgeted Qty)}$$

$$\text{Product A - } 20(1200 - 1000) = \text{Rs.}4,000(\text{F})$$

$$\text{Product B - } 15(2400 - 2000) = \text{Rs.}6,000(\text{F})$$

$$\text{-----}$$

$$\text{Rs.}10,000(\text{F})$$

$$\text{-----}$$

Verification

$$\text{Total Sales Variance} = \text{Sales Price Variance} + \text{Sales volume variance.}$$

$$\text{Rs.}9500(\text{F}) = \text{Rs.}1,000(\text{A}) + 10,500(\text{F})$$

$$\text{Sales Volume Variances} = \text{Sales Mix Variance} + \text{Sales Quantity Variance.}$$

$$\text{Rs.}10500(\text{F}) = \text{Rs.}500(\text{F}) + \text{Rs.}10,000(\text{F})$$

Profit and Loss variance

Profit and loss variance is defined as the difference between the budgeted profit or loss and the actual profit or loss. It comprises of the total of variance appropriate standard cost sales, the sales margin variances and variances due to any charges which have not been included in standard cost sales, the sales margin variances and variances due to any charges which have not been included in standard cost of production.

Reporting of variances

Analysis of variances is the most important step in standard costing. It is a very important tool exercising cost control. It will help in locating the causes and persons responsible for a particular type of variance. However reporting of variance alone to the management for a particular type of variance. However reporting of variance alone to the management for appropriate action will help fulfil the objectives of the analysis of variance.

In order that reporting should be effective, it becomes necessary that the following conditions are satisfied.

1. The variances arising out of each factor should be correctly segregated. If a part of the variance due to our factor is wrongly mixed up with that of another. The analysis report submitted to the management would be misleading and wrong conclusions may be drawn from it.
2. Variances, especially the controllable variances, should be reported with promptness as soon as they occur. Mere operation of standard are themselves of no avail. The

success of a standard costing system depends upon the extend of responsibility the management assumes. The following schedule describes the nature of variances and persons responsible with the various causes.

1. Materials Price Variance	i)	Changes in market price	Uncontrollable
	ii)	inefficiency buying	Purchase manager
	iii)	Emergency Purchase	Production / Sales Manager
	iv)	loss of discount	Accounts Officer
	v)	Non-availability of Standard quality	Uncontrollable
2. Materials Usage Variance	i)	Excessive Wastage	Foreman
	ii)	Careless handling	Storekeeper
	iii)	Poor Quality of material	Purchase Manager Planning Engineer
	iv)	Wrong specification	Production Manager
	v)	Wrong mixture of materials.	Cost Accountant
	vi)	Incorrect setting of materials.	
3. Rate of pay Variance	i)	Wrong grade of labour	Foreman
	ii)	General rise in wages	Uncontrollable
	iii)	Overtime for urgent work	Production / Sales Manager.
4. Labour Efficiency	i)	Ineffective supervision	Variance Foreman
	ii)	Poor Quality of Materials	Purchase Manager
	iii)	Poor working conditions.	Personal Manager
5. Idle Time Variance	i)	Shortage of materials	Purchase manager
	ii)	Bread-down of machinery	Maintenance Engineer
	iii)	Power failure	Electrical Engineer
	iv)	Time lost in getting instructions	Production Manager
6. Expenditure Variance	i)	rise in general price level	Uncontrollable
	ii)	Changes in production methods	Production Manger
	iii)	Ineffective control	Department Manager

7. Volume Variance	i)	lack of orders	Sales Manager
	ii)	Ineffective supervision	Departmental Manager
	iii)	Poor efficiency of machinery	Maintenance Engineer Foreman
	iv)	Poor efficiency of workers	Uncontrollable
	v)	More or less working days	
8. Sales Price Variance	i)	Unexpected competition	Uncontrollable
	ii)	Rise in general Price level	Uncontrollable
	iii)	Poor Quality of products	Production Manager.
9. Sale Volume Variance	i)	Unexpected competition	Production.
	ii)	ineffective sales promotion	Uncontrollable
	iii)	Ineffective supervision and control of salesman	Sales Manager.

- For effective control, the line of organisation should be properly defined and the authority and responsibility of each individual should be laid down in clear terms.
- In certain cases, a particular variance may be the joint responsibility of more than one individual or department. it is obvious that if corrective action has to be effective in such cases, it should be taken jointly.
- Analysis of uncontrollable variance should be made with the same care as for controllable variances. Though a particular variance may not be controllable at the lowest level of management, a detailed analysis of the off-standard situation may reveal far reaching effects on the economy of the concern. This should compel the top management to take corrective action, say changing the policy which gave rise to the uncontrollable variance.

Forms of variance Reports

For forms of reports for different types of variances should be designed keeping in view the needs of management and the size of the concern, and no standard form is, therefore, suggested. Variance analysis reports submitted to the top management is obviously more formal and would contain broad details only. But reports meant for presentation to lower levels need to contain details showing the causes of each variance and the specific responsibilities of the individuals concerned.

Specimen of various reports are presented hereunder:

Material Price Variance Report

Name of Purchase Manager								Date: Week ending.					
								Actual		Standard		Variance (For A)	
Purchase order No.	Invoice No.	Stores Receipt voucher No.	Supplies	Item of mate rial	Quan tity pur chased	Price per unit	Total	Price per unit	Total	Per unit	Total	Analysis by causes	
Total													

Fig 6.6

LABOUR EFFICIENCY VARIANCE ANALYSIS

Name of Department						Shift No.			
Name of Supervisor						Date or Week ending			
Production Order No.	Actual hours	Standard hours	Standard wage Rate	Variance				Analysis	
				Favourable		Adverse			
				Hours	Cost	Hours	Cost		
Total									

Fig. 6.8

LABOUR EFFICIENCY VARIANCE ANALYSIS

Name of Department				Shift No.				
Name of Supervisor				Date or Week ending				
Production Order No.	Actual hours	Standard hours	Standard wage Rate	Variance				Analysis
				Favourable		Adverse		
				Hours	Cost	Hours	Cost	
Total								

Fig. 6.8

VARIANCE ANALYSIS (Department or Individual)

Name of Department									Week ending			
Name of Foreman												
Production order No.	Actual Cost			Standard Cost			Favourable			Variance		
	Labour	Material	Over head	Labour	Material	Over head	Labour	Material	Over head	Labour	Material	Over head
Total												

Fig.6.9

Similar reports may be prepared for other variances wherever needed.

Merits of standard costing.

Standard costing is a very important tool for cost control. Naturally it has certain advantages. Important of them are:

1. Standard provide yardsticks against which actual costs are compared to ascertain efficiency or inefficiency of actual performance.
2. Analysis of variance assists to isolate inefficiency and locate persons who are responsible for unfavourable variances.
3. The principle of management by exception can be successfully applied by the concern who follow the technique of standard costing. It is only in the cases of below or above standard performance that they may have to concentrate their attention.
4. Setting standard results improvements of methods of production or sales with results and lower costs. For example, setting of standards for labour may require the use of time and motion study with the consequent improvement in the performance of labour.
5. Standard costing provides a valuable guidance to the management in the formulation of price and production policies.
6. Standard costing makes all the executives cost conscious which increases efficiency and productivity all round. All the executives are motivated to achieve the standard performance.
7. Standard costing makes the work valuation of inventory easy because the inventory is valued at predetermined costs.
8. All effective delegation of the authority is possible because top executive may safely delegate responsibility by telling the persons concerned what standard performance they have to achieve.

Limitations of Standard costing:

The techniques of standard costing is not without limitations. They are:

1. The technique of standard costing may not be applicable of standard cost of small concerns and may not be economical to them.
2. Division of variances into controllable and uncontrollable variances is a difficult task for the purpose of fixing up responsibilities.
3. The technique of standard costing may not be very effective to the industries which deal with non-standardised products and the jobs.
4. It is very difficult to establish standard costs of materials, labour and overhead. In accurate standards may do more harm than good. Sometimes very high standard go without being achieved. On the other hand, low standard does not inspire any effort, they are achieved without any effort.

Conclusion:

Standard cost is a predetermined cost for ensuring efficient operations. It implies the preparation and use of standard costs for comparison with actuals. They are recorded in standard cost cards.

Analysis of variances is made for all the elements of cost, purchases and sales for profit variance alike. This has come to stay as a technical tool for cost control despite the fact that it has merits and demerits.

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Chapter 7**MARGINAL COSTING AND
COST VOLUME ANALYSIS**

Marginal costing is a technique of analysing the changes of cost due to the changes in volume of production. The total cost of production are classified into fixed cost and variable cost. The fixed cost remains constant upto certain level of production. The variable cost change due to the changes in volume of production. The variable cost is otherwise called as marginal cost. Hence, it studies the relationship of the changes of variable cost due to changes in volume of production.

Meaning of Marginal Cost.

The Institute of Cost and Management Accountants, London defines, "marginal cost as the amount of any given volume of output by which aggregate costs are changed if the volume of output is increased by one unit".

Blocker and Weltner defines, "Marginal cost is the increase or decrease in total cost which results from producing or selling additional or fewer units of a product or from a change in the method of production or distribution such as the one of improved machinery, addition or exclusive of a product or territory, or selection of additional sales channel".

It is clear from the definitions that marginal cost means additional or difference in cost due to the increase or decrease of producing one unit from the normal production.

Marginal cost may be termed as the total variable cost. It includes the prime cost and variable overhead.

Example:

Material cost per unit Rs.8 Labour cost per Unit Rs.5 Variable overhead Rs.3 per unit.
Number of units produced 500 units.

The Marginal cost may be calculated as,

	Per Unit	Total
	Rs.	Rs.
Direct Material	8	4,000
Direct Labour	5	2,500
	-----	-----
Prime Cost	13	6,500
Varibale Overhead	3	1,500
	-----	-----
Marginal Cost or Variable cost	16	8,000
	-----	-----

Marginal Costing

The Institute of Cost and Management Accountant, London defined Marginal Costing as, "The ascertainment of marginal cost and of the effect on profit of changes in volume or type of output by differentiating between fixed cost and variable cost".

It means that marginal costing is a technique of analysing the marginal (or variable) cost and profit in relation to the changes in volumn of production.

Contribtuion.

Contribution is the difference between sales and variable cost. Contribution includes Fixed Cost and Profit and loss. Hence, contribution can be calculated by adding the profit with the Fixed Cost or deducting loss with the Fixed cost.

$$\begin{aligned} \text{Hence, Contribution} &= \text{Sales} - \text{Variable Cost of} \\ &= \text{Fixed Cost} + \text{Profit or Loss.} \end{aligned}$$

Marginal Cost Equation:

The equation, contribution = Sales - Variable Cost, is called the Marginal Cost Equation. It helps to find out either Fixed Cost or Varibale Cost, when other informations of the equation are given.

Profit / Volume Ratio

Profit / Volume Ratio is the ratio between Contribution and Sales. It is otherwise called as 'Contribution ratio' or 'Marginal ratio'.

$$\begin{aligned} \text{P/V} &= \frac{\text{Contribution}}{\text{Sales.}} \quad \text{Or} \end{aligned}$$

$$\begin{aligned}
 PV &= \frac{\text{Sales} - \text{Variable Cost}}{\text{Sales}} \quad \text{Or} \\
 PV &= \frac{\text{Fixed Cost} + \text{Profit}}{\text{Sales}} \quad \text{Or} \\
 &= \frac{\text{Change in Profit or Contribution.}}{\text{Change in Sales.}}
 \end{aligned}$$

P/V ratio is usually expressed in terms of percentage.

Characteristics of Marginal Costing

The important characteristics of marginal costing are stated below;

1. The total cost of production is classified into Fixed and Variable Cost. Hence all the functional cost like production, Administration and selling cost are grouped into Fixed Cost and Variable cost.
2. It is a technique of costing which helps the management to take various managerial decisions.
3. The stock of finished goods and work in progress are valued at marginal cost.
4. The price of the product is determined on the basis of contribution.
5. The Variable Cost are regarded as the cost of the product.

Assumption of Marginal Costing:

The following are the important assumption of marginal costing.

1. The functional element of cost like production, administration and selling and distribution costs should be classified into fixed and variable costs.
2. Variable cost per unit should remain constant. it varies according to the changes in volume of production.
3. Fixed cost remains constant for all the level of production. Hence fixed cost per unit varies.
4. The selling price per unit should remain constant at all levels of activity.
5. The volume of production should be the only factor which influences the cost.

Illustration :1

Calculate the Profit earned of a company during the year 1995 from the following information.

Fixed Cost	Rs.3,00,000
Variable Cost	Rs.25 per Unit.
Selling Price	Rs.50 per Unit.
Number of units produced	50,000

Solution

Sales	=	50000 x 50 = Rs.2500000
Fixed Cost	=	Rs.300000
Variable Cost	=	50000 x Rs.25 = Rs.125000
S.V.C.	=	F.C. + Profit.
Profit	=	S- V.C. - F.C.
	=	2500000 - 1250000 - 300000
	=	Rs.950000

Illustration 2:

Calculated (a) P/V ratio (b) Fixed cost (c) Sales volume to earn a profit of Rs.600000

Sales	Rs.200000
Profit	Rs.25000

Variable Cost 80% of Sales.

Solution

Sales	=	Rs.200000
Variable cost	=	Rs.80/100 x 200000 = Rs.160000
a) P/V. Ratio	=	Sales - Variable Cost.
		----- x 100
		Sales.
	=	200000 - 160000
		----- = 20%
		200000
b) Contribution	=	Fixed Cost + Profit.
Sales - Variable Cost	=	F.C. + Profit.
200000 - 160000	=	F.C. + 25000
F.C.	=	40000 - 25000 = Rs.15000
c) Expected Sales	=	Fixed Cost + Profit.

		P/V.ratio.

$$\begin{aligned}
 &= \frac{\text{F.C.} + \text{Profit}}{\text{P/V. Ratio.}} \\
 &= \frac{15000 + 40000/20\%}{\text{P/V. Ratio.}} \\
 &= \text{Rs.275000}
 \end{aligned}$$

Break Even Analysis

Break - even analysis is a study of the relationship between cost, volume and profit. In narrow sense, it is an analysis to know the level of production where total revenues equal to total cost of production. In the broader sense, it is an analysis to find out the relationship between cost, volume and profit at different levels of sales of production.

Break -even Point

Break-even Point may be defined as the point of sales volume at which the total revenue is equal to the total cost. At breakeven point there will be neither profit nor loss. At this point the contribution is equal to fixed cost. Break-even point is otherwise called as "Critical Point", or "Equilibrium Point" or "Balancing Point".

Break-even point can be calculated through the following formula.

$$\begin{aligned}
 \text{Break - even point} &= \frac{\text{Fixed Cost}}{\text{Contribution per unit.}} \\
 &\quad \text{(in units)} \\
 \text{Break - even point} &= \frac{\text{Fixed Cost}}{\text{Contribution Per Unit}} \times \text{Selling Price per Unit} \\
 &\quad \text{(in value)}
 \end{aligned}$$

$$\text{Contribution} = \text{Sales} - \text{Variable Cost.}$$

Through P/V. Ratio B.E.P., can be calculated as,

$$\begin{aligned}
 \text{B.E.P.} &= \frac{\text{Fixed Cost.}}{\text{P/V. Ratio.}}
 \end{aligned}$$

Break even analysis also helps to find out the expected sales to earn a given profit.

$$\begin{aligned}
 \text{Expected Sales for} &= \frac{\text{Fixed Cost} + \text{Expected Profit}}{\text{Contribution per Unit.}} \\
 \text{an expected Profit} &
 \end{aligned}$$

Illustration 3

The fixed cost for manufacturing 500 Units of product is Rs.2000 per month and variable cost is Rs.10 per unit. Selling Price is Rs.18 per Unit. Calculate the P/V ratio the selling price is reduced by 20% find out the P/V ratio. Also calculate the number of units to be sold to earn the present total profit.

Solution**CALCULATION OF PRESENT P/V RATIO**

Sales	=	500 x 18 = Rs.9000	
Variable Cost	=	500 x 10 = Rs.5000	
Contribution	=	Sales - Variable Cost	
	=	9000 - 5000	
	=	Rs.4000	
P/V Ratio	=	Contribution	4000
		----- x 100	----- x 100
		Sales	9000
	=	44.4%	
Profit	=	Contribution - Fixed Cost.	
	=	4000 - 2000	
	=	Rs.2000	

Calculation of P/V. ratio when selling price is reduced by 20%

Selling Price	=	18-20% of 18 = 18-3.6	
	=	Rs.14.40 per unit.	
Sales	=	14.40 x 500 =	Rs.7200
Variable Cost	=	500 x 10 =	Rs.5000
Contribution	=	7200 - 5000 =	Rs.2200
Per Unit	=	2200/500 =	Rs.4/40
P/V ratio	=	7200/2200x100 =	32.73.

Expected sales to earn the present Profit of Rs.2000 is

$$= \text{Fixed Cost} + \text{Expected Profit.}$$

Contribution Per Unit.

$$= \frac{2000 + 2000}{4.4} = 909$$

$$= 909 \text{ Units.}$$

$$\text{Expected Sales in value} = 909 \times 14.40 = \text{Rs.13089/60}$$

Illustration 4

From the following information find out.

- i) P/V ratio
- ii) Sales required to earn a profit of Rs. 80000
- iii) The profit when sales are Rs.200000

Year	Sales	Profit
Rs.	Rs.	Rs.
1994	180000	40000
1995	240000	64000

Solution

- i) P/V Ratio = $\frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$
- $$\text{Changes in Sales} = 240000 - 180000 = \text{Rs.60000}$$
- $$\text{Change in Profit} = 64000 - 40000 = \text{Rs.24000}$$
- $$\text{P/V Ratio} = \frac{24000}{60000} = 40\%$$
- ii) Contribution = $180000 \times 40\%$
- $$= 180000 \times \frac{40}{100}$$
- $$= \text{Rs.72000}$$
- $$\text{Contribution} = \text{Fixed Cost} + \text{Profit.}$$
- $$72000 = \text{F.C.} + 40000$$
- $$\text{Fixed Cost} = 72000 - 40000 = \text{Rs.32000}$$

$$\begin{aligned}
 \text{Expected Sales to earn} & \quad \text{Fixed Cost + Expected Profit} \\
 \text{expected Profit of} & = \frac{\text{-----}}{\text{-----}} \\
 \text{Rs.80000} & \quad \text{P/V Ratio} \\
 & = \frac{32000 + 80000}{\text{-----}} \quad \frac{112000}{\text{-----}} \times 100 \\
 & \quad \quad \quad 40\% \quad \quad \quad 40 \\
 & = \text{Rs.280000}
 \end{aligned}$$

iii) Calculated of Profit when sales are Rs.200000

$$\begin{aligned}
 \text{Contribution} & = 20000 \times 40\% - \text{Rs.80000} \\
 \text{Contribution} & = \text{F.C. + Profit.} \\
 80000 & = 32000 + \text{Profit.} \\
 \text{Profit} & = 8000 - 32000 = \text{Rs.48000}
 \end{aligned}$$

Illustration 5

Calculate the break - even point in units and sales value from the following details.

$$\begin{aligned}
 \text{Production} & = 5000 \text{ Units.} \\
 \text{Total Fixed Cost} & = \text{Rs.50000} \\
 \text{Variable Cost} & = \text{Rs.25 Per unit.} \\
 \text{Selling Price} & = \text{Rs.50 Per Unit.}
 \end{aligned}$$

Solution

Calculate the break - even point in units and sales value from the following details.

$$\begin{aligned}
 \text{Sales} & = 5000 \times 50 = \text{Rs.250000} \\
 \text{Variable Cost} & = 5000 \times 25 = \text{Rs.125000} \\
 \text{Contribution Unit} & = \text{Sales - V.C.} = 50 - 25 = 25 \\
 \text{Breakeven Point} & = \frac{\text{F.C.}}{\text{-----}} \\
 & \quad \quad \quad \text{Contribution per unit.} \\
 & = \frac{50000}{\text{-----}} \\
 & \quad \quad \quad = 2000 \text{ Units.} \\
 & \quad \quad \quad 25
 \end{aligned}$$

$$\text{B.E.P. in Sales Value} = 2000 \times 50 = \text{Rs.100000}$$

Illustration 6

Calculated break-even point in terms of sales value and in units. Also calculate the number of units to be sold to earn a profit of Rs.75000

Fixed Factory Overheads	=	Rs.80000
Fixed Selling overheads	=	Rs.20000
Variable manufacturing cost per unit	=	Rs.18
Variable selling cost per unit	=	Rs.12
Selling price per unit	=	Rs.50

Solution

Fixed Cost	=	80000 + 20000 = Rs.100000
Variable cost per unit	=	18 + 12 = Rs.30
Sales	=	Rs.50
Contribution	=	S.V.C = 50 - 30 = Rs.20 per unit.
B.E.P.	=	Fixed Cost 100000 ----- = ----- Contribution per unit 20 = 5000 Units.
B.E.P.	=	5000 x 50 = Rs.250000
Number of units to be sold to earn a profit of Rs.75000	=	Fixed Cost ----- Contribution per unit. = 100000 ----- = 5000 Units. 20
B.E.P.	=	5000 x 50 = Rs.250000
Number of units to be sold to earn a profit of Rs.75000	=	F.C. + Expected Profit ----- Contribution per unit. = 100000 + 75000 ----- 20

$$= \frac{175000}{20} = 8750 \text{ Units.}$$

Illustration 7

The following information are related to a manufacturing company.

Selling price per unit	=	Rs.60
Fixed Costs	=	Rs.250000
Variable cost per unit		
Direct materials	=	Rs.17
Direct Wages	=	Rs.4
Variable overheads	=	75% of direct wages.

Calculated (i) P/V. ratio ii) Sales required to earn a profit of Rs.200000 iii) break-even sales with the help of P/V ratio.

Solution

Sales	=	Rs.60 per unit.
Variable cost per unit	=	17 + 4 + (75% of Rs.4)
	=	17 + 4 (3/4 x 4) = Rs.24
Contribution	=	S-V.C. = 60 - 24 = Rs.36 per unit.
i) P/V Ratio	=	$\frac{\text{Contribution}}{\text{Sales}} \times 100$
	=	$\frac{36}{60} \times 100 = 60\%$

ii) Sales required to Earn a Profit of Rs.20000

$$= \frac{\text{F.C.} + \text{Expected Profit}}{\text{Contribution per unit.}}$$

$$= \frac{250000 + 200000}{36}$$

$$\begin{aligned}
 &= 450000 && = 12500 \text{ Units.} \\
 &\quad \text{-----} \\
 &\quad 36 \\
 &= 12500 \times 60 \\
 &= \text{Rs.750000 in value.} \\
 \text{iii) B.E.P.} &= \text{F.c.} && = 250000 \\
 &\quad \text{-----} && \text{-----} \\
 &\quad \text{P/V. Ratio} && 60 \\
 &= 250000 \\
 &\quad \text{-----} && \times 100 \\
 &\quad 60 \\
 &= \text{Rs.416667}
 \end{aligned}$$

Illustration 8

Manufacturing cost for manufacturing a product by a company is Rs.120000. the variable cost is 60% of Sales. If sales are Rs.420000; at 100% capacity. Calculated the break-even point and percentage capacity when it occurred. Calculate the profit at 75% capacity.

$$\begin{aligned}
 \text{Variable Cost} &= 60\% \text{ of Sales} = 60 \\
 &\quad \text{-----} \times 420000 \\
 &\quad 100 \\
 &= \text{Rs.252000} \\
 \text{Contribution} &= \text{Sales - V.C.} \\
 &= 420000 - 252000 = \text{Rs.168000} \\
 \text{Fixed Cost} &= \text{Rs.120000} \\
 \text{B.E.P.} &= \text{Fixed Cost} \\
 &\quad \text{-----} \\
 &\quad \text{P/V. Ratio} \\
 \text{P/V Ratio} &= \frac{\text{Contribution}}{\text{Sales}} \times 100 \\
 &= \frac{168000}{420000} \times 100 = 40\%
 \end{aligned}$$

B.E.P.	=	120000	=	120000
		-----		----- x 100
		40%		40
	=	Rs.300000		
% Capacity	=	100		
		----- x 300000 = 71.4% capacity		
		420000		
Sales at 75% of Capacity	=	420000 x 75/100	=	Rs.315000
Fixed Cost	=	Rs.120000		
Variable Cost	=	60% x 315000	=	189000
Total Cost	=	120000 + 189000	=	309000
Profit	=	Sales - Total Cost.		
	=	315000 - 309000		
	=	Rs.6000		

Illustration 9

The sales of a company for 2 different periods are 10000 units and 15000 units, and the profits are Rs.90000 and Rs.30000. Calculate (i) break-even point, (ii) Fixed cost (iii) number of units to be sold to earn a profit of Rs.64000. Assume selling price as Rs.50 per unit.

Solution

Assure Selling price per unit as X

	=	Difference in Profit of two periods.
P/V. Ration		-----
	=	Difference in Sales of two periods.
	=	90000 - 30000

		(15000 x 50) - (10000 x 50)
	=	60000
		----- x 100 = 26%
		25000
Contribution	=	(15000 x 50) = x 26/100
	=	Rs.195000

$$\begin{aligned}
 \text{Contribution} &= \text{Fixed Cost} + \text{Profit} \\
 195000 &= \text{F.C.} + 90000 \\
 \text{F.C.} &= 195000 - 90000 = \text{Rs.}105000
 \end{aligned}$$

$$\begin{aligned}
 \text{Number of Units to be sold to earn a profit of} \\
 \text{Rs.}6400 &= \frac{\text{F.C.} + \text{Expected Profit}}{\text{P/V. Ratio}}
 \end{aligned}$$

P/V. Ratio

$$= \frac{105000 + 64000}{\text{-----}}$$

26%

$$= \frac{169000}{\text{-----}}$$

$$\text{-----} \times 100 = \text{Rs.}650000$$

16

Illustration 10:

Calculate Break - even point from the following information

Sales	-	Rs.400000
Fixed Cost	-	Rs.150000
Variable Cost	-	Rs.200000

Solution

$$\begin{aligned}
 \text{Break -even point} &= \frac{\text{Fixed Cost} \times \text{Sales}}{\text{Contribution.}} \\
 &= \frac{150000 \times 400000}{\text{-----}} \\
 &= \frac{400000 - 200000}{\text{-----}} \\
 &= \frac{150000 \times 400000}{\text{-----}} \\
 &= \frac{200000}{\text{-----}} \\
 &= \text{Rs.}300000
 \end{aligned}$$

Illustration 11

A manufacturing Company is providing the following information

Fixed Expenses	=	Rs.300000
Selling Price Per Unit	=	Rs.50/-
Variable expenses - Material	=	Rs.12/- per unit.
Wages	=	Rs.8/- Per unit.

Calculate the break - even point and verify the result through a schedule. Also calculate the new break-even point when the selling price reduced by 20%

Solution

Fixed Cost	=	Rs.300000
Variable cost per unit	=	Rs.12 + 8 = Rs.20/-
Selling price per unit	=	Rs.50
Contribution	=	Selling Price - Variable cost
	=	50 - 20 = Rs.30/-
		Fixed Cost
B.E.P.	=	-----
		Contribution per unit.
	=	300000
		----- = 10000 Units.
		30

If Selling price is reduced by 20%

Selling price per unit	=	50 - (20% of 50)
	=	50 - 10 = Rs.40/-
Contribution	=	40 - 20 = Rs.20 per unit.
		300000
New B.E.P.	=	----- = 15000 Units.
		20

Calculation of Break - Even point

Units	Fixed Cost	Variable Cost (Rs.20 per unit)	Total Cost	Sales at Rs.50 Per unit	Sales of Rs.40 Per unit.
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
7000	300000	140000	440000	350000	280000
8000	300000	160000	460000	400000	320000
9000	300000	180000	480000	450000	360000
10000	300000	200000	500000	500000	400000
11000	300000	220000	520000	550000	440000
12000	300000	240000	540000	600000	480000
13000	300000	260000	560000	650000	520000
14000	300000	280000	580000	700000	560000
15000	300000	300000	600000	750000	600000
16000	300000	320000	620000	800000	640000
17000	300000	340000	640000	850000	680000

It is clear from the above table that the B.E.P. is 10000 units when selling price is Rs.50/- per unit since Total cost is equal to total sales at this point. When selling price is Rs.40/- per unit B.E.P. is 15000 Units.

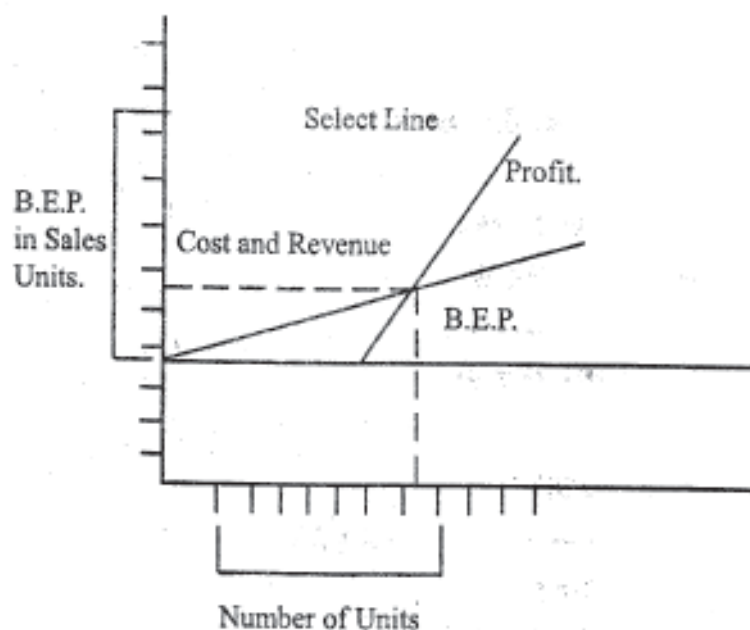
B.E.P. Chart.

Break - even chart is a graphical representation of the Break-even point. The Break - even point can be measured through a graph through the following procedures.

1. X axis should be denoted for number of units and Y axis for cost and revenue.
2. Number of Units should be provided conveniently in the X axis and the amount should be marked uniformly in Y axis through a common scale.
3. Mark the fixed cost on the Y axis and draw a parallel line to X axis through the point.
4. Plot points in the graph for the total cost (Fixed Cost + Variable Cost) at various levels of production. Join in all the points to get a straight line from the point of Fixed cost at Y axis. This is called total cost line.

5. Plot point in the graph for the sales value at different levels(units) of sales. Join the points from 0 of the graph to get a straight line. This is called sales line.
6. The sales line cut at a point in the Total Cost line. This point is called Break - even point.
7. Draw a perpendicular line to X axis from this B.E.P., Measure the number of units in the X axis, where the perpendicular line cuts to know the B.E.P., of Sales in Units.
8. Draw a perpendicular line to Y axis from the B.E.P., and measure the value in the Y axis. This is called the B.E.P., in sales values.

The model B.E.P., Graph is shown below.



Application of Break - even Analysis in Decision - Making

Marginal Costing and Break - even analysis help the management to take various managerial decisions, like profit planning policy decision and control techniques. The important managerial decisions which can be taken are stated below:

1. Pricing Decisions
2. Decisions regarding the acceptance or rejection of foreign orders.
3. Profit Planning.
4. Problems of key or Limiting Factor.
5. Make or Buy Decisions.
6. The effect of changes in selling price.
7. Selection of suitable sales mix.
8. Determination of optimum level of activity.
9. Measurement of performance.

1. Pricing Decisions

Marginal Costing technique assist the management in fixing prices.

It suggests the management to fix price at least above the marginal cost, in order to reduce the loss. It is well explained in the following illustration.

Illustration 14

Determine the minimum selling price from the following particulars.

Marginal cost per unit	Rs.25/-
Fixed Cost	Rs.10000
Number of units sold	1000
present selling price	Rs.40

State whether the compant can sell @ Rs.30/- per unit.

Solution

Marginal Cost	$Rs.25 \times 1000 =$	Rs.25,000
Fixed Cost	=	Rs.10,000

Total Cost		Rs.35,000

	=	35000
Total Cost per unit		----- = Rs.35/-
		1000
Hence, present profit	=	$40-35 = Rs.5$ per unit.
	=	$5 \times 1000 = Rs.5000/-$

When the selling price is Rs.30/-

Sales	=	$30 \times 1000 = 30000$
Total Cost	=	Rs.35000
Loss	=	$35000-30000=Rs.5000$

If there is no sales, then the company is facing a loss of Rs.10000 in the form of Fixed Cost. It can be reduced to Rs.5000 if sales can be done @ Rs.30 per unit.

The minimum selling price should be at least Rs.35/- to avoid the loss.

2. Decision regarding the acceptance or Bulk order, Special order, Additional orders and Export order

The Marginal Costing technique is helpful for the management to take a decision regarding whether to accept or reject a foreign order or special order. When fixed cost for the period is spent, then the excess amount of marginal cost for the additional sales would be the profit of the company.

Illustration 14

X Ltd, manufacturers and sells 4000 units of product 'X' @ Rs.20 per unit. The details regarding the cost of production are stated below.

	Rs.
Direct Material	20000
Direct Labour	15000
Electricity	5000
Miscellaneous Expenses	7000
Fixed manufacturing Expenses	18000
Fixed Administration Expenses	12000

The normal production capacity is 10000 units per month. The company received an order of 6000 units @ Rs.13/- per month from a foreign market. Advise, the management whether the order can be accepted or not.

Solution**STATEMENT OF COST**

Particular	Unit Rate	Present Capacity 40% (4000 units	Proposed additional 60% Capacity 6000 units)	Total
Sales(Units)		4000	6000	10000
Sales(in Value) (Rs)	20	80000	78000	158000

LESS: Variable cost				
Material	5.00	20000	30000	50000
Labour	3.75	15000	22500	37500
Electricity	1.25	5000	7500	12500
Miscellaneous Exp	1.75	7000	10500	17500
	-----	-----	-----	-----
	11.75	47000	70500	117500
	-----	-----	-----	-----

Contribution			
(Sales Variable Cost) 8.25	33000	7500	40500
Fixed Cost	30000	---	30000
	-----	-----	-----
	3000	7500	10500
	-----	-----	-----

The company should accept the order since it earns an additional profit of Rs.7500. This is due to the fact that the additional order is within 100% capacity. If the order is from local market the order should not be accepted since it affects the local sales @ Rs.20/- per unit.

3. Profit Planning

Profit Planning means planning of future production to earn maximum profit. Marginal costing technique can be applied to determine the number of units to be produced in future to get maximum profit. The expected sales to earn a desired profit can be calculated through the following formula.

$$\text{Expected Sales} = \frac{\text{Fixed Cost} + \text{Expected Profit.}}{\text{Contribution.}}$$

Contribution.

Illustration 15:

The details regarding the cost of manufacturing one units of a product manufacture by Elango & Company are stated below:

	Rs.
Direct material	18
Direct labour	13
Variable overheads	14

	45
Fixed Overheads	30
Profit	25

Selling Price	100

The capacity of the company is 30000 units per month. The Company had to reduce the selling price due to competition. Calculated the number of units the company should manufacture to earn the present profit when the selling price is reduced by 20% and 15% respectively. Assume that the present sales is 10000 units.

Solution

Fixed overhead	=	$30,000 \times 30 = 9,00,000$
Contribution	=	Sales - Variable Cost.
	=	$100 - (18 + 13 + 14) = \text{Rs.}55/- \text{ per unit.}$
Present Profit	=	$10,000 \times 25 = \text{Rs.}2,50,000/-$

Calculated of expected sales when selling price is reduced by 20%

Selling price	=	$100 - 10\% \text{ of } 100 = \text{Rs.}90/-$
Contribution	=	$90 - 45 = \text{Rs.}45 \text{ per unit.}$
		Fixed Cost + Expected Profit
Expected Sales	=	-----
		Contribution per unit.
	=	$9,00,000 + 2,50,000$

		45
	=	11,50,000

		= 25,556 units.
		45

Calculation Expected sales when selling price is reduced by 15%

Selling price	=	$100 - 15\% \text{ of } 100 = \text{Rs.}85\%$
Contribution	=	$85 - 45 = 40$
		$9,00,000 + 2,50,000$
Expected Sales	=	-----
		40
	=	11,50,000

		= 28,750 Units.
		40

4. Problems of Key or limiting factor.

A limiting factor or key factor which restricts the company from earning profit. The limiting factors may be raw material, labour, electricity, finance, capacity of plant and sales. When a company is facing any of the limiting factors, the contribution per unit of the limiting factor should be the criterion to assess the profitability. The product which gives the highest contribution per unit of the limiting factor should be preferred. If the limiting factors are more than one then all of them should be analysed.

Illustration 17

A company is manufacturing two different products namely X and Y. The details of cost are given below.

	Product X	Product Y
	Cost per unit	Cost per unit.
	Rs.	Rs.
Materials		
3 Kgs @ Rs.10	30	50
5 Kgs @ Rs.10		
Labour	10	20
Fixed Cost	15	8
	-----	-----
	55	78
Selling Price	75	105
	-----	-----
	20	27
	-----	-----

The total number of units produced in a month are X 1000 units and Y 1500 units. The raw material is the key factor availability of raw materials is 15,000 Kgs. Find out the product which give maximum profit through marginal costing techniques.

Solution:

	Product X	Product Y
	Cost Per unit	Cost per unit.
	Rs.	Rs.
Selling price	75	105
Variable Cost: Material	30	50
Labour	10	20
	-----	-----
	40	70
	-----	-----

Contribution Per unit (Sales - Variable Cost)	33	35
Contribution per 1 Kg. of Material	----- 33/3=11	----- 35/5=7

Through product y gives more contribution per unit, product X is more profitable as per the material as Key factor.

Profit.

		Product X	Product Y
Maximum Capacity		15,000 Kgs	15,000 Kgs.
Material required per unit		3 Kgs.	5 Kgs.
		15,000	15,000
Maximum capacity in units		-----	-----
		3	3
	=	5000 units	3000 units.
Sales	Rs.	3,65,000	3,15,000
		-----	-----
Material	Rs.	1,50,000	1,50,000
Labour	Rs.	50,000	60,000
Fixed Cost	Rs.	75,000	24,000
		-----	-----
Total Cost	Rs.	2,75,000	2,34,000
		-----	-----
Profit	Rs.	90,000	81,000
		-----	-----

5. Make or buy decision.

The marginal costing technique helps the management to decide whether a product should be manufactured or bought from outside. The analysis of fixed cost and variable cost of manufacturing the product should be done to such a decision. According to the marginal costing technique it is advisable to produce if the marginal cost (Variable cost) is lower than the purchase price. It is advisable to buy the product if the purchase price is lower than the marginal cost. This technique should be applied since the fixed cost should be met whether the company produce or not.

Illustration 18

The cost of manufacturing a product is Rs.80 per unit. The product is available in the market @ of Rs.75. Advise the management whether the product can be produced or bought from the market. Also suggest the management whether to make or buy if the purchasing price is reduced from Rs.75 to Rs.55.

The cost of manufacturing one unit of the product is material Rs.25; labour Rs. 20, variable overhead is Rs.15, fixed cost Rs.20.

Solution

Managerial cost (variable cost) per unit.	Rs.
Material	25
Wages	20
Variable overhead	15

Total Variable cost	60

It is advisable to make the product when the purchasing price @ Rs.75 per unit, since the purchasing price is more than the marginal cost.

When the purchasing price is reduced to Rs.55 per unit, it is advisable to buy the product since the purchasing price is less than the marginal cost.

(c) The effect of changes in selling price.

The marginal costing technique analyse and measure the effect of changes in selling price.

Illustration

Calculate (i) P/V ratio, BEP and Margin of safety (ii) The effect of 20% increase in selling price and (iii) The effect of 20% decrease in selling price, from the following information.

Solution:

) Sales	=	Rs.72,450
Contribution	=	Sales - Variable Cost.
	=	4,00,000 - 2,50,000 = Rs.1,50,000
		Contribution
P/V ratio	=	----- x 100
		Sales.

	=	1,50,000	
		-----	x 100 = 37.5%
		4,00,000	
	=	Fixed Cost	= 72,450
		-----	-----
		P/V ratio	37.5%
Margin of safety	=	present sales - Sales at B.E.P.	
	=	4,00,000 - 1,93,200	
	=	Rs.2,06,800	

ii) The effect of 20% increase in selling price.

Sales	=	4,00,000 + 20% of 4,00,000	
	=	4,00,000 + 80,000	
	=	Rs.4,80,000	
Contribution	=	4,80,000 - 2,50,000 = Rs.2,30,000	
		Contribution	2,30,000
P/V Ratio	=	----- x 100	----- x 100
		Sales	4,00,000
	=	57.5%	
B.E.P.	=	Fixed Cost	72,450
		-----	-----
		P/V ratio	57.5
Margin of safety	=	4,80,000 - 1,26,000 = 3,54,000	

iii) The effect of 20% decrease unselling price.

Sales	=	4,00,000 - 20% of 4,00,000	
	=	4,00,000 - 80,00,000 = Rs.3,20,000	
Contribution	=	3,20,000 - 2,50,000 = Rs.70,000	
		Contribution	70,000
P/V ratio	=	----- x 100	----- x 100
		Sales	4,00,000
	=	17.5%	

		Fixed Cost	72,450
B.E.P.	=	-----	-----
		P/V ratio	17.5

When selling price is reduced by 20% there will not be any margin of safety since the present sales is below the B.E.P. Sales.

7. Selection suitable Product / Sales Mix

Companies may manufacture more than one product. In such a situation, the number of units of each product to be produced to attain maximum profit should be determined. The composition of various products which gives the maximum contribution should be preferred. It is called the optimum product or sales mix. It can be determined through marginal costing principle.

Illustration 20

A manufacturing company is providing the following information related to the month of December 1995.

	Product X (per unit) Rs.	Product Y (per unit) Rs.
Direct Material	27	41
Direct Wages	22	16
Selling Price	70	80

Variable overhead 50% of direct wages. Total Fixed cost for manufacturing the 2 products Rs.12000 per month.

Sales Mixtures:

- a) 400 units of Product X and 600 units of Product Y
- i) 600 units of Product X and 400 units of Product Y
- ii) 500 units of Product X and 500 units of Product Y

Calculate the Contribution per unit, total contribution and the profits through different sales mixtures.

Select a suitable sales mixture.

Solution

STATEMENT OF COST.

	Product X (Per Unit) Rs.	Product Y (Per Unit) Rs.
Selling Price	70	80
Variable Cost: Material	27	41
Wages	22	16
Variable overhead (50% of wages)	11	8
	60	65
Contribution (S-V.C.)	10	15

Calculation of Profit for different Sales Mixtures.

i) 400 units of Product X and 600 units of Product Y

Contribution X	= 400 x 10	= 4000
Contribution Y	= 600 x 15	= 9000

Total 13000

Fixed Cost 12000

Profit 1000

ii) 600 units of Product X and 400 units of Product Y

	Rs.	
Contribution X	= 600 x 10	= 6000
Contribution Y	= 400 x 15	= 6000
Total		= 12000

Fixed Cost	= 12000

Profit	Nil

ii) 500 units of Product X and 500 Units of product Y

Contribution X	= 500 x 10	= 5000
Contribution Y	= 500 x 15	= 7500

Total		= 12500
Fixed Cost		= 12000

Profit		500

It is clear from the calculation that Sales mixture (i) (i.e. 400 units of X and 600 units of Y) is more profitable.

3. Determination of Optimum level of Activity

The optimum level of activity can be determined through marginal costing principles. The contribution and different levels of activities should be calculated. The level of activity which gives the highest contribution is called optimum level of activity.

Illustration 21

The details regarding the cost of one unit of the articles manufactured by a company at 60% capacity is stated below:

	Rs.
material cost	25
Wages	15
Overhead	20 (70% Fixed)

The number of units produced at 60% capacity is 12000 units. The selling price is Rs.75 per unit.

The company has a plan to increase the capacity from 60% to 75% and 90% capacity.

At 75% capacity the selling price is to be reduced by 15% at 90% capacity the selling price is reduced by Rs.9/- per unit and the material cost is reduced by 10%

Calculate the profit and break - even point at 75% and 90% capacities. Also state which one is the optimum capacity.

Soltuion

Number of units produced at 60% capacity	=	12000
		12000
Number of units produced at 75% capacity	=	----- x 75
		60
		15000
		12000
Number of units produced at 90% capacity	=	----- x 90
		60
		18000
Selling price at 60% capacity	=	Rs.75
Selling price at 75% capacity	=	75-10% of 75
	=	75-.75
	=	Rs.67/50
Selling price at 90% capacity	=	75-9
	=	Rs.66/-
Material cost at 90% capacity	=	25-10% of 25
	=	Rs. 22/50

STATEMENT OF COST

Particulars	60% Capacity		75% Capacity		90% Capacity	
	per Unit	Total	per Unit	Total	Per Unit	Total
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Sales	75	900000	67.5	1012500	66.00	1188000
Material	25	300000	25.00	375000	22.5	405000
Wages	25	180000	15.00	225000	15.00	270000
Variabel over head	6	72000	6.00	90000	6.00	108000
Total	46	552000	46.00	690000	43.5	783000
Variable cost						
Contribution (S-V.C.)	29	348000	21.5	322500	22.5	405000
Fixed Over head	14	168000	11.2	168000	9.33	168000
Profit	15	180000	10.30	154500	13.17	237000

	Fixed Cost	
Break-even point at 60% capacity =	-----	per unit
	Contribution	
	168000	
	= -----	= 5793 units.
	29	
Break -even point at 90% capacity =	168000	
	-----	= 7467 Units.
	22.5	

It is advisable to maintain 90% capacity since the total profit and contribution per unit is greater when compared to 75% capacity. When all the 3 capacities are compared the optimum level is 60% capacity since the contribution per unit is greater at this capacity.

3. Measurement of Performance.

The Performance of various departments can be measured through marginal costing technique. It helps the management to take necessary steps to increase the efficiency.

Illustration 22

A Manufacturing company is providing the following information, regarding the manufacturing of three different products.

Particulars	Products X	Products Y	Products Z
	Rs.	Rs.	Rs.
Selling Price	110	80	40
Direct Material	45	25	10
Direct Labour			
Department A	18	14	7
Department B	7	6	4
Department C	5	5	4

The expenses towards overhead are stated below:

	Dept. A	Dept B	Dept. C
Variable overhead			
(% on Direct Labour)	50%	60%	40%
Fixed Overhead			
(% on Direct Labour)	100%	120%	150%

Give your suggestions regarding the performance of the three products.

Solution

STATEMENT OF COST

Particulars	Products X Rs.	Products Y Rs.	Products Z Rs.
Selling Price	110	80	40
Direct Material	45.00	25.00	10.00
Direct Labour	40.00	25.00	15.00
Variable Overhead			
Dept. A	9.00	7.00	3.50
Dept. B	4.20	3.60	2.40
Dept. C.	2.00	2.00	1.60
Total marginal Cost	100.20	62.60	32.50
Contribution	9.80	7.40	7.50
P/V. ratio	8.9%	9.25%	15%
P/V Ratio	$\frac{\text{Contribution}}{\text{Sales}} \times 100 \text{ is}$		
	9.8	7.4	7.5
	$\frac{9.8}{100} \times 100 \text{ is}$	$\frac{7.4}{80} \times 100$	$\frac{7.5}{50} \times 100$

Product Z is comparatively performing better.

Advantages of Marginal Costing

The following are the important advantages of marginal costing.

1. It is simple to operate and easy to understand.
2. It helps the management to take various managerial decisions.
3. It facilitates to fix the prices.
4. Marginal Costing techniques can be applied for profit planning.
5. It facilitates for taking a decision regarding the acceptance or rejection of bulk order.

6. Marginal Costing helps the management to calculate the Break - even point.
7. It facilities the management to decide the optimum product mix when the company is producing more than one product.

Limitations of Marginal Costings.

The following are the important limitations of marginal costing.

1. Changes in the selling price affects the results of marginal costing.
2. The assumption that the Fixed Cost remains constant may not be always correct, since it may also vary due to various reasons.
3. Marginal Costing techniques, excludes Fixed Cost, for various managerial decisions.
4. The assumption that the variable cost per units remains constant is practically not possible always increase in volume of production may reduce the variable cost per unit.
5. Marginal Costing technique considers only the strength of contribution for deciding the profitability of product. It ignores the time factor.

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Chapter 8

COST CONTROL AND COST REDUCTION

In relation to any manufacturing concern or an institution rendering any service, cost is the amount of expenditure, whether actual or national, incurred on, or attributable to a given thing or rendering of a service; or to ascertain the cost of a given thing or rendering of a service. The cost ascertainment or cost estimation is the primary objective of costing. For this purpose cost is defined; elements of cost are identified; cost centre is planned; and cost unit is chosen for the measurement of cost. Thus costing is the process of determining the cost of doing something rendering a service or performing a function. Cost accounting is defined as the application of accounting and costing principles, methods and techniques in the ascertainment of costs and the analysis of savings and / or excesses as compared with previous experience or with standards. The definition presupposes that cost control is also the function of control which forms the analysis of savings and / or excesses as compared with previous experience or with the prescribed standards. The central theme of cost accounting is to provide information largely in the area of cost which will be useful in controlling the operation of a business in a broad sense.

Cost Control

Cost control is the corollary of decision - making. It is defined by the ICMA of London as "the guidance and regulation by executive action of the costs of operating an undertaking". W.H./ Harper has defined "Control is the guidance of the internal operation of all divisions of

the business produce the most satisfactory profits at the lowest cost. "The very effectiveness of cost accounting is judged primarily from the extent to which it has been able to bring about a control over the manufacturing and other expenses. Cost Control is thus an attempt at keeping costs under a specified ceiling or at the lowest possible level consistent with the performance of a specific task. The course of action here is comparison of current results with predetermined levels. Controlling costs is keeping overall costs or cost of a job, task or an activity within previously defined boundaries. These boundaries are budgets and / or standards set up for manufacturing, marketing finance and all other activities. Therefore the basic ingredient of control is an advance estimate of what an operation, a product or a profit should cost. Cost control procedure must also ensure the proper authorisation of expenditure in respect of the engagement of employees, the purchasing of materials and the use of services. In a nutshell, it is the monitored state of the cost within an organisation.

The objective of the cost control is performance of the same job at a lower cost or a better performance for the same cost. But it does not set out a limit upto which costs should be brought down. It only gives a call to continuously effect improvement in them. The management should never be satisfied that a point has been reached beyond which no further improvement is possible. Cost control involves apprising management of the fact, (i) Costs have changed (ii) the direction of change. and (iii) the reasons for the change. Whatever be the cause of change, the knowledge that the change is occurring may prompt the management to alter basic operating policies either to take up new products or to drop old ones, to replace an employee, to emphasise different marketing areas and strategies or to use substitute raw materials and so on.

Pre - requisities of Cost Control

Costs do not control themselves. But they have a tendency to rise if left unchecked. Similarly a system does not control costs however well the system is framed. The system will fail to keep expenses within the bounds. People spend money and they only must be held accountable for the expenditure. Therefore an effective cost system of control must be built around people. There are two basic facts of a cost control system and they are (i) the development and use of performance measures and standards and (2) the designing of information system to provide data for control and decisions of control system should possess in general the following elements;

1. Performance standard

The management of the firm must set up policy, goal and immediate objectives to be achieved. Pre-determined costs are assumed to be attainable standards in a cost control system.

2. A system for accumulating actual costs

Actual costs are actually compared with the standards set beforehand. Therefore there should be a fool - proof system for accumulating actual costs. They should be suitable to the nature of industry and the products or services.

3. Clearly defined authority.

The success of any cost control system is dependent upon clearly defined authority responsibility relationships within the organisation. These relationships form the basis of accountability for costs and cost control.

4. Time comparison

In a cost control system actual costs are compared with the standards set for the purpose. However, this must be done promptly in time before the standards become outdated.

5. Effective reporting system

Responsibility reporting emphasises control over cost through personalisation of costs. Personalisation of cost is achieved by relating costs to the person within the managerial hierarchy responsible for incurring the expenses. Cost control needs or profit opportunities have been delayed or missed because of poor communication system. Effective analysis of difference between goals and performance is a must to have data regarding unfavourable situations.

6. Investigation of variances

Random variations are expected and in many cases such variations are tolerated. Management by Exception should be exercised by investigating those deviations outside the predetermined limits which are significant.

7. Corrective actions;

This plays a vital role to prevent the occurrence of unfavourable difference. Unless proper follow up measures are taken in time, there is hardly any use of a cost control system. Early correction contributes towards higher profits and productivity.

8. Motivated employees

In order to ensure the presence of all the above elements in the cost control system in an organisation, employees in the firm need to be properly motivated. Although motivation is the most difficult aspect of control to achieve, they may sabotage a workable control system unless they are somehow inspired to meet the standards set and achieve the target.

Once the above elements are taken care of and are ensured to be effectively present, the cost control system can be expected to be successful.

Five steps in cost control

Organising a system of cost control and making it work successfully require the following five steps to be taken in the order as set below:

1. Set up the targets.
2. Measure the actuals.
3. Compare actuals with the targets.

4. Localise the causes for the variation between the targets and the actuals.

5. Take such actions as are necessary to eliminate these variations.

1. Setting up target

Cost control primarily requires fixing the expenses target for a given period. This target should necessarily be related to the production targets especially in respect of variable expenses.

2. Measuring the actuals

After the targets are set and are being implemented for the target period, the step is to measure the actuals. The actuals should be measured on the same basis as the targets and as frequently as possible. If the targets are set on a monthly basis, then it should be department. It is obvious that a straight comparison is not otherwise possible. Unless the actuals are measured frequently it is likely that the time lag might make it difficult for any effective action to be taken.

3. Comparison

The object of this step is to bring out the difference between these two sets of figures. It is not enough if just the arithmetical differences are calculated and the variations are expressed as just an increase or decrease with the relevant plus or minus symbols although they are necessary.

4. Localising the causes

The cost accountant should be able to analyse the differences into sufficient details and pin point the exact causes. If the labour cost per unit hour is Rs.3.50 instead of the targeted standard of Rs.3.00 he should be able to point out whether this extra cost is due to natural cause, heavy absenteeism or overtime payment. Unless this specific cause for the higher cost is localised, it will not be possible to direct any executive action, since it is the nature of the cause which indicated the particular executive to whose attention the matter must be brought up. Hence an intelligent comparison of the actuals with the targets is a vital stage in cost control in paving the way for finding out, the exact cause for the variation and instituting the right course of executive action.

5. Corrective action

Here the cost accountant should keep a watch whether or not necessary executive action is being taken to eliminate the variations. He should pursue the matter till the actuals are brought close to the target. When this is done, cost is complete.

In all these steps the cost accountant plays significant role especially in matters relating to measurement of actuals, comparison of actuals with the standards and localising the causes for the variations. However, the cost accountant is playing only an indirect part in as much as he is guiding and giving consultancy service in setting up of targets and standards and keeping a watch on the progress of action taken by periodically reviewing the extent of variation of the actuals from the targets and standards.

MAKING COST CONTROL A SUCCESS

If the cost control system is to be a success all the above basic factors should be taken care of. In brief, they are

1. Proper fixation of targets.
2. Timely presentation of comparisons.
3. Periodical review of results.

1. Proper fixation of targets.

The targets should always be fixed up in consultation with the individuals responsible for achieving the targets. The persons responsible should be convinced that the targets have been correctively and scientifically fixed up taking into consideration all the practical aspects governing producing and production expenses. The targets should be attainable and not necessarily ideal. If the targets are not attainable, even in the best of circumstances a certain amount of frustration will be created in the minds of the persons concerned and the whole object of cost control will thereby get defeated. Hence care should be taken to ensure that it will be attainable under normal circumstances. The targets once fixed should not be revised just because they are not attained. It should however be noted that target by themselves should not be considered as fixed and permanent for ever. Whenever necessary they should be revised and reviewed particularly for changes in factors governing these targets. Unless targets are corrected to the correct conditions, the usefulness of the target as a standard of measurement will be lost.

2. Timely presentation of comparisons

The comparison between the targets and the actuals should be made in right time and the report submitted promptly for necessary action to be taken. Belated presentation will only be a statistical information and not useful to take any appropriate action. For example, if the cost of material is increasing in a department due to the defective setting up of the machine causing a higher wastage, the earlier is brought to the notice of the department concerned, the quicker will be the rectification done. Presenting the information after a month will only result in the increased cost to continue unnoticed. The report of the comparison results should reach the appropriate authority who can initiate immediate action. There is no use in the information to the departmental foreman that the material cost has gone up because the purchase price of the materials has increased. As an information it may add to his knowledge, but it does not help him to take any action.

3. Periodical review of results.

The review of the results under cost control system is a prerequisite of the success of the system. Review should be arranged immediately after the comparison results are made available. When a permanent change has taken place, there is no use in continuing with old standards. When price levels of materials has changed and they wage rates increased, the review of results on the basis of the facts obtained, one should lead to the revision of targets and for that matter the prescribed standards for future control process.

COST CONTROL SYSTEM.

There are two recognised systems of cost control; namely (1) standard cost system and (2) budgetary control system.

1. Standard Cost system:

Standard cost is the pre-determined cost based on technical estimates of material, labour and overhead for selected period of time under a prescribed set of working conditions per unit of production or service. Standard costing is the preparation of the standard costs and applying them to measure the variations of actual costs from standard cost and analysing the causes for such variations with a view to maintain maximum efficiency in production.

The standards set up under a standard costing system have the following characteristics.

1. The standards are set for production performance and production costs.
2. Standards are based on technical estimates of the details of manufacture.
3. The standard for costs are related to the standards for production.
4. Standards are normally set for manufacturing expenses only. They do not cover selling, distribution and administration expenses and the income items.
5. Standards emphasise in comparison only the variation from targets; these variations are built up stage and and are accumulated to give this total variation.
6. Standards are accounting figures and are recorded in the cost ledger.
7. Standards are surrogates for performance evaluation.

2. Budgetary Control system

Budgetary control is defined as the establishment of budgets relating the responsibilities of executives to the requirement of a policy and the continuous comparison of actuals with the budgeted results either to secure by individual actions the objective of that policy or to provide a basis for its revision. "The budgets set up under a budgetary control system have the following general features".

1. Budgets are expressed in total of amounts and not costs per unit.
2. Budgets set up a ceiling. Action is necessary only when the ceiling is exceeded or is not attained.
3. Budgets are both for items of expenditure and income.
4. Budgets cover all items of expenditure, viz., materials, labour, work overhead, selling overhead, distribution overhead, and administration expenses.
5. Budgets are related to specific period of time.
6. The budget figures are not accounting figures. They are merely figures shown in reports for comparison and control purposes.

Control over wastage, scrap, spoilage and defectives

Loss occasioned in the course of manufacture by way waste, scrap, spoilage and defectives has an overall effect on the total cost of a product and therefore, forms a factor requiring a control over the cost of such items. There is always difference between the quantity of input materials and the quantity of output or products. It is a loss which are either visible or invisible. The visible loss can be seen and its presence can be identified. All the visible loss can be collected used, or sold. The invisible loss is such loss which cannot be seen and may take place in the form of evaporation, shrinkage, etc., waste, scrap, spoilage and defectives are various terms to mean different stages of these types of losses. The following chart describes the picture.

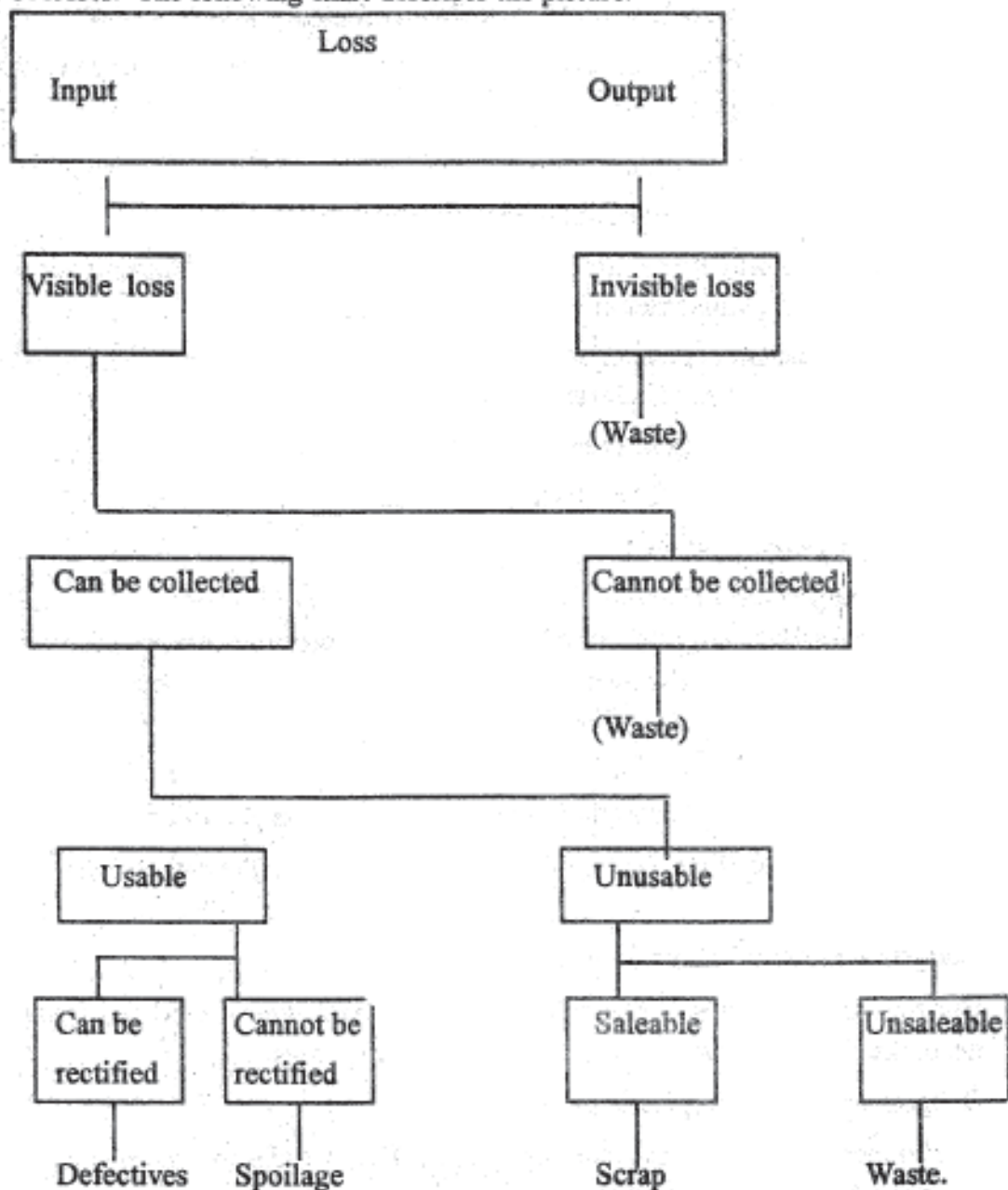


Fig. 8.1

Waste

Waste is the total of such losses which are (1) invisible, (2) which cannot be collected and (3) which cannot be sold. Examples are gases, smoke, dust, slag, etc., Waste have no recovery value. However its removal or disapproval may involve extra cost to be incurred. For example, the disposal of dust, molasses or slag, obnoxious gases, etc., can be done only spending a good deal of amount.

Scrap

Scrap is the incidental residue from certain types of manufacture usually of small amount and low value, recoverable without further processing. Scrap is a visible loss which can be collected and is unusable, but is a visible loss which can be collected and is unusable, but is a saleable. It has low recovery value. The examples of scrap varies from industry to industry. For example, in metal processing industry it may be in the form of trimmings, borings, turnings, shavings etc., in timber industry it may be in the form of sawdust, trimmings, shavings etc., in foundries, it may be in the form of bottom ends, dead ends, sprues, snaggings etc., and so on.

Spoilage

It represents that portion of processed work which has been spoiled in manufacture but which cannot be used again in manufactures as raw materials or sold as seconds. It is also remarked that spoilage is the production that does not meet the dimensional or quality standards and that is junked and sold for disposal value.

In the chart it is shown as the visible loss that can be collected and are either unusable or unusable but cannot be rectified and used in future manufacturing process. Certain productions are so damaged that they cannot be rectified economically and do not come upto the standards and as such withdrawn from the process as and when detected by inspection and by quality control process and sold disposal value as junk.

The main characteristics of spoilage are:

1. It arises during the manufacturing process.
2. Cost of material, labour and overheads stands incurred on the spoilage upto the level of detection or withdrawal.
3. The production is such that it does not meet the dimensional or quality standards.
4. The spoilage cannot be prepared or repaired or rectified at any cost, or at economic cost.
5. The spoilage is normally disposed of or sold as raw material or used up as such.

Defectives

Defectives are such finished products which have not come upto the standard. At the completed level of manufacture, they do not meet the dimensional or quality standards but which can be reworked subsequently by additional processing and sold as firsts or seconds in the market. Defectives can be rectified will within reasonable costs. Defectives arise due to

defective materials poor workmanship poor supervision, wrong planning or design or defective machines and tools. The defectives are detected at any of the following stages:

1. Raw material stage

a. At any level of manufacturing process.

b. In the stores where finished goods are stored for long and they become defective due to the long storage.

c. In transit to and from customers.

The control of these various items which are generally known as rejections in the manufacturing process involve proper accounting and monitoring since effective control helps maintaining costs within limits and prescribed standards.

Accounting and control wastage

Wastage is accounted usually under two distinct heads viz., normal wastage and abnormal wastage. Normal wastage is natural and incidental to production depending upon the natures and size of raw material and of the final product. It can be predetermined or foreseen on the basis of past experience. The wastage is natural and cannot be avoided. However it can be technically predetermined.

Wastage is left to be absorbed in the production and production cost

On the other hand, abnormal wastage occurs in the manufacturing process under abnormal conditions. Any wastage beyond normally permitted level is abnormal wastage. It arises due to defective planning, unscientific approach, natural calamities, thefts, fire etc.,

The cost of abnormal wastage is separately accumulated and accounted and finally charged to the costing profit and loss account. It is not left to be absorbed in the cost of production.

The control of wastage has two aspects one that of quantity and the other that of quality.

Quantity control

A proper record of quantities is maintained for input and output. Standards of normal yields breakage, shrinkage, evaporation level etc., are predetermined and the actual performance is compared with the standard so set carefully with help of the past experience or technical estimates and keeping in view the special features of the material process and the product, if any.

Quality Control

It is concerned with the control of loss in the quality of the product. It can be exercised with (i) out-turn control and (ii) wastage production control. Out-turn control denotes a control on the quality of the output whereas the waste production control signifies the control on the quality of wastage occurring. For example, the quality of oil produced should be as per standard, and as well, the quality of oil produced should be as per standard, and as well the wastage should not contain more oil percentage than the prescribed standard in an oil mill. Where the

materials equipments, machinery tools, and the operations are standardised, out turns from the materials and the waste production are also standardised.

For quantity and quality control purposes, responsibility accountign is suggested. For both the kinds of control, responsibility is to be fixed on the purchase, storage, maintenance production and inspection departments to ensure attainment of standards. It is suggested that for an effective control on wastage report should be submitted by the forman of the department weekly or fortnightly to the works manager and to the cost accountant.

WASTAGE REPORT

Department		No...		
Cost Centre		Date.		
Process or Job No.	Actual Weight of Waste(Kg)	Actual Percentage of wastage to production	Normal percentage of waste	Remarks
Total				
Average percentage				
Action taken by.....		Signature of		
Entered by.....		Inspector.		

Fig. 8.2

Illustration

2000 feet of leather is purchased at Rs.20 per foot. Owing to normal defect in the skin it is estimated that uppers cut there from well represent only 1800 feet and so the normal wastage is 10% . The wastage materials has saleable value of Rs.5 per foot and the waste could realise only Rs.40.

Find out the price at which you shall charge the usable materials.

If the usable skin is further reduced on account of damage by contact with acid by 300 feet, with what amount will you charge the production and for what reasons?

Solution

The normal wastage is 10%	=	200 feet	
Net Skin available	=	1800 feet	
Total cost of purchase Rs.20 x 2000	=	Rs.40000	
Wastage sale realised	=	Rs.40	

		Rs.39960	

	=	39960	
The charge rate of production	-----	= Rs.22.22	
		1800	

If the skin is further reduced, it is abnormal loss transferable to costing profit and loss account.

Here, the abnormal loss = 300 feet.

The amount chargeable to costing.

Profit and loss account = $300 \times 22.22 =$ Rs.6660

The amount chargeable to production = $1500 \times 22.22 =$ Rs.33,300

Thus the total cost is distributed to cost of production and cost profit and loss account.

Thus the total control is effective in cost appropriation and charging the reasonable cost to actual cost of production.

Scrap Accounting and Control

Scrap can either be sold, or used in the industry for some purpose. Control of scrap aim at seeing that there is no excessive scrap, but the scrap is within the limits of the standard set up. For this purpose, a scrap committee is usually appointed to decide on reasonable scrap quantity and its disposal or reuse. Regular scrap records are maintained and reports or diviations or variations from the predetermined standards or norms with reasons for such variations are prepared and submitted to the scrap committee. Scrap should be properly collected, measured, and stored as the scrapos otherwise offer a allurements of pilferage by the workers or outsiders.

There are four alternative methods in the practice of cost accounting. They are:

1. Sales value of the scrap is predicted to the profit and loss account and thereby leaving the cost of scrap being included int eh cost of production.
2. Sale value of the scrap may be credited to the job or process and the cost of production is reduced to that extent.
3. The scrap may be credited to factory overhead control account. For this purpose the scrap value is estimated and debited to scrap account and credited to factory overhead control account. When the scrap is sold, scrap account is credited. The difference represents the sale of scrap and transferred to the profit and loss account.

4. Where the scrap is transferred from one job to another for use in the manufacturing process, it is done on the basis of transfer note. Alternatively the scrap is deposited in the store and then it may be issued to the job on requisition. In this case, the receiving job is debited and the transferring job is credited. The value of transfer is the assigned cost.

Control of Scrap

Control of scrap depends upon the design of the product. The quality of the material supplied and the type of equipments used also determine the quantity of scrap to arise. The control process aims at minimising the quantity of scrap. In order to minimise the scrap rate, therefore every care should be exercised to use right type of raw materials and equipments. A technically decided standard allowance should be laid down and compared to the actual position. It may be difficult to lay down standard in the case of job orders where the designs and materials contents differ from order to order. In such cases past experience would be the guide. In process costing standards can be set and can play a determining role. A periodic scrap report are prepared by the production departments indicating the percentage of normal scrap and that of actual scrap for the purpose of control. Scrap reports are regularly sent to the top management for action purposes and the scraps are sent to be stored and to be reissued to jobs or for sale against authorisation.

“ A model of scrap report may be as follows”

SCRAP REPORT							
Department						No.....	
Cost Centre.....						Date.....	
Type Job Description Actual Normal of difference of order of the Qty. of scrap No. Product out put%	Actual scrap		Abnormal scrap		Variance		Reasons for
	%	Qty	%	Qty	Qty	Value.	
Entered by	Signature of Inspector.						
Action taken by							

Fig. 8.3

Illustration

In a square sheet weighing 2 Kg. each and costing Rs.20 per kg. 40 holes are to be punched and all the corners are to be given a crescent shape. The standards for the hole-scrap and the corner cutting scrap are 200 grams, and respectively per sheet, and the standard prices fixed for the sale of scrap are Rs.5 per kg. and Rs.3 per kg. for the hole - scrap and cutting scrap respectively.

Show the scrap variance and the total profit earned if the sale price is Rs.50 per kg. of the finished product.

Solution**STANDARD COST AND PROFIT**

	Rs.
Material 100 sheets 2 kgs @ Rs.20 each	4000
Labour and over heads sheets 10% Rs.15 each	1500

	5500

Less Sales of scrap:	
Holes : 200 gms x 100 sheets.	
20 Kgs. X Rs.5 each Rs.100	
Cuttings:	
300 gsm/ 100 sheets.	
= 30 kgs x Rs.3 = Rs.90	190
Cost of 150 kgs. of finished products	5310 @ Rs.35.40 per kg.
Sale value of 150 kgs. @ Rs.50 each	7500

Profit	2190 @ Rs.14.60 per Kg.

Actual cost and Profit.

Cost of material and labour and overheads	5500 as above.
less sale of scrap:	
Holes: 25 kgs @ Rs.6 per Kg.	Rs.150
Cuttings: 35 kgs @ Rs.4 per kgs.	Rs.140

	290

	5210 @ Rs.36.50 per kg.
Sales value of 140 kgs	7000 @ Rs.50 per kg

Profit	1790 @ 13.50 per Kgs.

Variance:

Profit Variance	=	Rs.2190 - Rs.1790 = Rs.400(adverse)	
Scrap variance			
Sale price variance	=	(SP - AP)AQ	
Holes	=	(20-25) 5	Rs.25(F)
Cuttings	=	(30-35) 3	Rs.15(F)

			Rs.40(F)

		Total Variance	Rs.100(F)

Spoilage

Spoilage arises as a result of some defect in the production and the defect is such that the defective products cannot be improved upon, and the spoilage can either be sold as seconds or it is treated as a waste.

The spoilage can be eliminated with the help of suitable techniques. But it involves cost. If the cost of application of techniques is more than the cost of spoilage, it would not work. Similarly, if the spoiled products are to be rectified at much greater cost which is unenconomical. The mangement however, is concerned with the etiology that the spoilage should remain within reasonable limits as set up after careful perusal and past performances.

The spoilage may again be normal spoilage and abnormal operating spoilage. The normal spoilage arised under efficient is inherent in the production process and conditions, is uncontrollable in the short run. The normal spoilage is therefore, naturally a production cost, and so it is borne by the net production units. Thus normal spoilage is a planned spoilage.

Any spoilage beyond the normal spoilage is abnormal spoilage. This kind of spoilage arises due to inefficient production, abnormal causes and is controllable. The main causes for abnormal spoilage are the machine breakdowns, accidents, power failure, and the like. But these causes can be controlled by the managers or the concerned executives. The cost of abnormal spoilage is not borne by the production, but is transferred to the profit and loss account as it is a 'lost cost'. The loss occasioned due to abnormal spoilage should be shown separately on the accounting stagement as a distinct item so that its reasons may be analysed for proper control. For informative feedback, the management may introduce a system of preparation of periodical spoilage report containing the details about the abnoraml spoilage and fixing responsibilities.

When the sub standard production is sold as seconds or thirds, the charge can be of one of the following methods.

1. Treatment by neglect.

The cost of production minus sale proceeds of the spoiled goods is transferred to the profit and loss account. In other words the cost of spoilage is not considered.

2. Treatment of Cost by assignment.

Under this method, cost is assigned to the spoiled units on the basis of market value less selling cost. This method is generally considered better than the first method.

Control

For the purpose of control of spoilage, a proper planning of the operations, appropriate quality of materials, and equipments of standard are the necessary requisites. The actual spoilage should be compared with the standard spoilage and the variances analysed. The spoilage report prepared periodically gives a full view of the normal and abnormal spoilage along with the reasons there of and assists in the control of spoilage. A model spoilage report is presented below.

SPOILAGE REPORT							
Department.....				No.....			
Cost Centre.....				Date.....			
Production order No.	Units Produced	Units Spoiled	Normal Spoilage		abnormal Spoilage		Reasons.
			%	Qty	%	Qty	
Entered by.....				Signature of Inspector.			
Action taken by.....							

Fig. 8.4

Illustration

Input 5000 units, Normal spoilage 2%. Actual production of good units 4700 units at a total cost of Rs.49300. Spoiled units can be sold @ Rs.3 per unit. Show how the cost of spoilage would be treated in the process account.

Solution

Input	5000 units	Cost	Rs.49300
Normal Spoilage @ 2%	100 units	Sold @ Rs.3	Rs.300
	-----		-----
	4900 units	Cost	Rs.49000
Actual Output	4700 units	Cost	Rs.47000
	-----		-----
Abnormal loss	200 units	Cost	Rs.2000
LESS Sale			
Proceeds @ Rs.3			Rs.600

Less transferred to profit and loss account			Rs.1400

PROCESS ACCOUNT

	Unit	Amount Rs.		Unit	Amount Rs.
To materials	5000	49300	By Normal spoilage	100	300
			By Abnormal Spoilage	200	2000
			By cost of production	4700	47000
	5000	49300		5000	49000

NORMAL SPOILAGE ACCOUNT

	Unit	Amount Rs.		Units	Amount Rs.
To Process A/c	100	300	By Sale	100	300
	100	300		100	300

ABNORMAL SPOILAGE ACCOUNT

	Unit	Amount Rs.		Units	Amount Rs.
To Process A/c	200	2000	By Sale	200	600
			By Profit		
			Loss A/c	---	1400
	200	2000		200	2000

Defectives

Defectives are amenable to rework and rectification. Generally, the foreman are tempted to re-work the defective units. If the re-work or rectification does not work out to be economic, the defectives are to be sold as seconds and thirds, and in that case the defectives are named spoilage. But where the cost is incurred on the rectification of the defectives on their transformation back to be standard products, they would be treated as defectives.

The problem of accounting defective work is the problem of accounting of the costs of rectification or re-work. The work or rectification is worthwhile only if its cost is within limit and does not outweigh the value of the product. Generally the rectification is done under work order and all the costs of rectification regarding materials labour and overheads and debited to this order. Where the defectives can be identified with the specific jobs production orders, the cost of rectification is charged to those jobs as the cost of manufacturing good units of products. When the defectives cannot be identified with any specific job or order, the normal cost is charged to the manufacturing overheads and the abnormal cost of rectification is charged to the profit and loss account.

Control of defectives

As in the case of any other system for rejection control, performance standards are set up for the control of defectives. The manufacturing operations should be examined and the normal defective rate estimated. At regular intervals, the report on defectives are obtained from each

production department in order to fix up the responsibility on the individuals where the percentage of defectives is more than the normal. Specimen of the report is as follows.

REPORT ON DEFECTIVE WORK				
Department.....		Number of Units.		
Production Order No.....		Week ending.....		
Type of Defective work				
Operation	Details of Rectification	Cost		
		Material	Labour	Overhead.
Entered by		Signature of Inspector		
Action taken by				

Fig 8.5

Illustration

200 wooden plants each weighing 10 Kgs. and valued at Rs.80 were issued for the manufacture of medium Size 'A' Cartons. On completion of manufacture, the following information was collected.

- 300 'A' cartons each weighing 5 kgs were manufactured.
- The cut offs weighing 200 kgs were used for the manufacture of small - sized 'B' Cartons. These cartons would otherwise require timber worth Rs.1200
- 20 'A' Cartons were declared defective on inspection and were rectified at an additional material cost of Rs.300
- 150 Kgs of cut offs were sold as scrap for Rs.100. Find out the cost of materials of medium sized 'A' Cartons showing the different losses of materials.

Solution

	Qty (kgs)	Amount (Rs.)
Input materials - wooden planks	2000	16000
Less cut offs transferred to 'B' Carton	200	1200
	-----	-----
	1800	14800
Less Value of scrap sold	150	100
	-----	-----
	1650	14700

Add Cost of rectifying 20 'A' cartons (respectives)	----	300
	-----	-----
	1650	15000
Cost of 320 'A' Cartons	1600	15000
	-----	-----
Waste	50	---
	-----	-----

Cost per medium sized 'A' Carton Rs.46.88

As the control monitoring process of all types of rejections the management maintain a rejection control chart on weekly basis.

Example is

Fig 8.6

Rejection control chart is useful as a guidance tool to effect rectifying measures without delay.

Cost Reduction

Cost reduction is the real or permanent reduction in the cost of the unit manufactured or the service rendered without impairing its quality or efficiency owing to managerial efforts. It aims at effecting economies in costs, alternatively, at cost savings. It is an attempt to bring down costs generally permanently, and in some cases by eliminating wastes, and in efficiency and in others by major changes in product content and operating methods. Cost reduction is a dynamic function a function which can seen no end. There always exists a scope to effect improvement in cost and it is a continuous affair for managerial effort to improve cost. In other words, cost reduction presents continuous challenge. Costs tend to increase constantly and they decrease only when concerted. action is applied to them.

Need for cost Reduction.

The need for cost reduction arises on account of serveral reasons. Important among them are:

1. The margin of profit is the excess of sales value over the cost. Therefore only when cost is reduced or the selling price is increased while cost remains to same, profit increases, in a competitive market it is difficult to increase the selling price. Even in a phase of monopolicstic business is also temporary due to entry chances for the competitors into the business. So the only course left is to effect cost reduction.
2. The increase in costs without equitable rise in the selling price cuts the margin of profit. Unless it is sellers market for product selling price may not go up, the cost reduction is the right approach.

3. In internal markets, quality of the products and their selling prices are the two important factors affecting the buyers. Cost reduction is necessary to the products competitively while maintaining the quality of the products, to effect dumping in the foreign market.
4. Towards social responsibility, industries have to perform an important function to the people and raise the standard of living by providing quality products at cheaper prices. The buyers' purchasing capacity should match with the selling prices. Here again cost reduction is the solution to the situation.

Cost Reduction and Cost Control

The basic distinction between these two basic functions may be understood from the following chart.

Cost Reduction

1. It is not concerned with maintenance of performance according to standards. Infact it challenges standards.
2. Emphasis is on present and future.
3. It is a continuous process searching
4. Applied to every section of the business
5. It is a contractive function and does operate when a cost control system exists.
6. Recognises no conditions as permanent since a change
7. It adds thinking to doing at all levels of management.
8. It represents achievement in reduction costs in all efforts to reach the goal.
9. It is a constant effort
10. It implies executive action.

Principles of Cost Reduction

Certain techniques and approaches in combination with good and solid experience can be brought to bear on the problems involved. No one technique stands fool proof to all situations. Therefore certain basic principle need be followed in effecting cost reduction programmes. They are:

1. The programme must be based on a management cycle.
2. It must be based on a sound management organisation.

Cost Control

1. The process of cost control is to set target, ascertain actual; performance and compare it with target, investigate the variances and rectify the adverse.
2. Emphasis is on present and past.
3. It tends to set up a conservative procedure and lacks dynamic approach.
4. Usually limited to items which have Standards.
5. It is preventing function. Costs are optimised before they are incurred.
6. Sells to attain lowest cost possible under existing condition.
7. It is management by directive how to do a things.
8. It represents efforts mainly towards achieving a target or goal.
9. It is a periodical efforts.
10. It implies planning.

3. It must be a systematic job coupled with every activity of the company.
4. It is a continuous line responsibility for which every employee must be held consistently accountable.
5. Responsibility for cost reduction must be delegated and accompanied by corresponding authority.
6. The programme must be evaluated, redesigned and re-evaluated in a continuous process of follow up.

COST REDUCTION PLAN AND PROGRAMME

The cost reduction plan and programme should proceed on the following lines:

1. Report and Information.

Reports and information regarding the following matters are necessary for cost reduction planning.

1. Profit or loss of each product or a group of products in the immediate preceding periods.
2. The manufacturing cost of the products as analysed into materials, labour and overheads.
3. The budgets and standards pertaining to each elements of cost compared to actuals and variance analysed.
4. The areas of wastage scraps and defectives, idle time over time, inefficiencies and the scope of their minimisation.
5. Departmental analysis of overheads seeking to plug the loopholes of unnecessary expenditure and the economy which can be exercised in the incurrence of these items of expenditure.
6. Material, labour and plant utilization reports.
7. Inventory reports regarding purchasing storing pilferage and loss by evaporation shrinkage, etc.,
8. Areas of possible economy in selling distribution research and development programmes.

2. Scrunity Procedures and methods:

A critical review of existing procedures, methods and operations should be made with the intention to eliminate unnecessary and avoidable elements and functions in order to simplify the operations to cast away delays and to do away with the avoidable costs, all in the direction of reducing the cost of production. Seminars and lively discussions should be organised to suggest better ways of doing the task and eliminating the avoidable.

3. Programming and Control

The best programme is one which achieves its objects without causing much disturbances, fear and commotion rather on the contrary, which is achieved with the whole hearted support and co-operation of all working together. The cost reduction programme should be ta

time bound one and it should be controlled by the periodical responsibility reports regarding action taken.

Requisites of Cost Reduction

The following are the requisites for satisfactory working of cost reduction programme:

1. Proper organisation having cost reduction cell.
2. Cost reduction plan and programme.
3. Good system of report and communication.
4. Sustained interest of the management in the programme and not simply a routine affair.
5. Employees participation and close co-operation.
6. Coverage of all the different areas of cost for the programme and execution of the programme according to the priorities fixed.
7. A system of operational and procedural research.
8. Regular follow up of the plan and evaluation of the programme performance.

AREAS OF COST REDUCTION

The scope for possible economics exists in all principal elements of cost and in all major divisions of the organisations. The major areas of cost reduction are product design and production planning.

1. Product design.

Product design offers an important field for cost reduction as designing of the product is the first step in production process and the economics effected in designing go a long way to reduce the cost throughout the life of the product. Several engineering designs of the product may be presented each being the best in the minds of the design maker, but business had to choose one which is to be liked by the customers on the basis (a) being less costly (b) having more functional efficiency (c) being of good quality and appearance (d) being durable and (e) being likely to surpass products in the market in the same line. The product may be either introducing a new design careful planning and execution of cost minimisation is necessary in relation to materials, labour, exercise skill effect of the design on the final shape of the product its weight, compactness reduction in packing and transportation charges increase in the esteem value of the product reduction in the after sale service costs and the effect of newly designed products on the remaining stock of the old design.

On the other hand improvement on the existing design is less risky as the reputation gained by the old product is only likely to be enhanced by the improvement to be made.

The basic approach to both these cases should be cost reduction. A critical review of the various factors should lead the management to find the most suitable course for cost reduction and value analysis.

2. Production Planning

Production planning has decidedly a great impact on cost reduction. Factory location and lay out are to be considered for reduction running costs. necessity of replacing the existing plant, expansion of existing facilities and mechanisation should be considered for cost reduction. The plant performance its difficultiles and bottlenecks are to be studied for its efficient working. Certain primary principles should be followed for a sound production planning system. Important of them are:

1. Production planning should be based on realistic and detailed sales forecast.
2. The fullest employment of the production faciliteis, the elimination of unnecessary movement and handling of materials, the provision of adequate working instructions drawing tools, and the most economical storages of stocks are the requirements for efficient production planning.

Location may decide the following costs.

- a. Whether or not power in purchased.
 - b. The extent of air conditioning or humidification required.
 - c. Whether local sub - contracting facilities for components has to be made in the factory.
 - d. Storage space requirements depending upon the availability of raw materials in the vicinity.
 - e. The type of transportation facilities available for receiving raw materials and despatching finished goods.
3. The assessment and co-ordination of equipments labour and material requirements demand the formulation of a complete operation sequence.
 4. Efficient production control and economy require careful determination of lot size.
 5. Machine loading and labour requirements should be related to the full capacity available.
 6. The production plan once formulated should be used as a measure of the effectiveness of actual performances.

In the light of the above principles, cost reduction efforts should be made to see that.

1. There is little wastage of materials and labour efficiency.
2. Inventory control is efficiently exercised.
3. Idle time and idle capacities are minimised.
4. Productivity is increased by removing defects in plant layout plant working production methods etc.,
5. Good incentive schemes are introduced for the workers.
6. Factor expenses are controlled by budgets and standards and these standards are continuously challenged to bring further economy.
7. Improved methods of production should match with sales and production schedules with sales schedules.

Other areas of cost reduction

They include cost reduction in respect of materials labour selling and distribution cost, and miscellaneous services.

1. Control material costs is largely helpful in cost reduction. Material cost can be considerably reduced through effective purchasing by economic lot size and at economic prices. Inventory control is the next area of material cost reduction. Efforts should also be made intensely to avoid losses and wastages and bring economy in the cost of handling.
2. Labour cost reduction can be achieved by retaining efficient workers by paying them well and creating conditions of low labour turnover rate. Then, a good method of production planning and control can help the foreman keep production flowing smoothly.
3. Selling and distribution cost reduction scope has wider coverage. The efforts should be made to see that.
 - a. there is an efficient system of sales promotion.
 - b. market research and analysis is adequate and continuous.
 - c. marketing methods for home and foreign markets are satisfactory.
 - d. channels of distribution are efficient and economical
 - e. sales and distribution departments ensure promptness.
 - f. the selling and distribution overheads are minimised as possible without impairing efficiency.
 - g. sales are increased with lesser increase in cost.

Miscellaneous services and cost reduction.

- I. Cost reduction in the area miscellaneous works services may include the following.
 1. Consumption of power and energy, coal, fuel and water supply.
 2. Avoidance of waste in power production and curative maintenance of the power plant water supply plant etc.,
 3. Application of quality control methods.
 4. Economy in inspection costs.
 5. Economy in office and administration costs.

II. Cost reduction is also possible in the area of utilisation of finance through.

- a. Control over utilisation of finances, working capital and fixed capital
- b. Investments in new projects.
- c. control over capital expenditure.
- d. Economic employment of capital from the point of view of maximum return.
- e. Avoidance of over investments.
- f. Capital formation and capital mix at economic terms.

III. Cost of repairs and maintenance is another area of cost reduction. Repairs and maintenance cost is a necessity which must be incurred, but within limits only and not with extravagance. These costs go on increasing as the assets go older, but this increase should not be allowed beyond reasonable limits'.

These cost become excessive due to the factors such as:

1. Use of substandard materials and components in repairs.
2. Inefficiency of the mechanics and workers and use of the substandard tools.
3. Careless in handling and maintaining the assets.

For cost reduction efforts are made to see that repairs and maintenance are attended to immediately, efficiently and economically but without impairing the quality of materials and components used.

Role of Inspection in Cost Reduction

The area of inspection is wide since inspection is carried out from the stage of receipt of materials to the stage of finished goods and there after at the stage of sales and distribution. Inspection ensures standardisation of materials used, manufacturing done and quality maintained. In the field of sales and distribution it ensures that the correct supplies are being made and packing is done well to avoid breakage and damage in transit. As such inspection is very essential for cost reduction. However inspection should be the job of experts in the line.

Techniques of Cost Reduction

Techniques used for cost reduction are many and varied. They are summarised as follows

1. Budgetary control and standard costing.
2. Production planning and control
3. Inventory Control
4. Product designing
5. Works study and methods study.
6. Jobs evaluation and merit rating
7. Reduction in variety of products, methods standardisation simplification quality control.
8. Value analysis experimental production.
9. Market research.
10. Business forecast.

Majority of the above techniques have been discussed in different contexts earlier. Worth referring back are work study time study and motion study.

Work Study

Work study is a combination of (1) Methods study and (2) work measurement. It is necessary for laying down standards for successful implementation of incentive plans. Work study is used to cover up the taken the mean work measurement and motion study is a narrower term and it does not include the complete concept of methods study.

Methods study is an effort to develop improved methods of production by which the existing resources are more effectively utilised. For this purpose of this study, the job or the process is analysed into operation elements and unnecessary and wasteful operations are eliminated. The desired operations are arranged into orderly sequence. Work is allotted to right type of workers. Effort is also made to develop new and improved methods which are easy to operate. The improved methods should be introduced after due experimentation and training to the workers. Thus by employing methods study men, materials and the resources can be best utilised and the highest level of activity can be achieved.

Moting Study:

Motion study aims at eliminating of unnecessary movements or motions in the process of performance of a job. Every motion has a bearing on the time consumed and the fatigue caused to the worker. If the number of movements required to do a job is reduced to minimum, it would keep the worker energetically fit to undertake other operations of the job with greater efficiency besides rewarding the management with saved time and increased output.

"Motion study consists in dividing work into most fundamental elements possible, studying these elements separately and in relation to one another; and from these studied elements when time, building methods of least waste," F.B.Gilbreth. The motion study is conducted while the worker is on the job. Subsequently these movements and motions are shown to the worker and this unnecessary movements are eliminated.

Motion study helps in proper scheduling of the operational functions, devising the proper factory layout minimising the organisation functions and setting up standards with the help of time study. This motion study is an important part of methods study.

Time Study:

F.W. Taylor the father scientific management, based his study on twin studies viz., motion study and time study. He analysed the job into required or movements operations with minute details decided the motions or movements needed and recorded time with the help of stop watch for each motion, and so far each operation and for the job. He provided all concessions and allowances of time for rest and facilities to the labour while deciding on the standard time for the job. Thus time study aims at determining the standard time for the job. It is also the study of work measurement. The objectives of time study are;

1. determining the effective time for doing a job after eliminating the ineffective wasteful time.
2. helping in setting standards for wage payment.
3. developing improved utilisation of plant and man power.
4. assisting in labour cost control and cost reduction and ultimately the production control.

The standard time determined by the time study is the time required to perform the job by an operator of an average skill and training working under normal conditions and with an average effort. For time study of an operation two things are needed.

1. Ascertainment of the time on the operation and
2. level of the worker in terms of skill effort conditions and consistency.

Normalised time can be arrived at by taking an average of the times of different workers engaged on a particular operation in relation to their levels. The average time and rating are normalised by the following formula.

$$\text{Normalised Time} = \text{Time Taken} \times \frac{\text{Rating}}{\text{Base or Normal rating.}}$$

Illustration

A, a worker takes 22,20,21 minutes in the performance of an operation on three counts and his rating has been found to be 70/60 with the help of Performance Rating Table. Another worker b takes 25, 26, 24 minutes on the same operation on three counts and his rating is 50/60. Allowance for fatigue personal needs etc., is determined at 20% Calculate the standard time.

Solution

Worker	Time Taken	Rating	Normalised Time
A	22 Minutes	70/60	25.67 minutes
	20 Minutes	70/60	23.33 minutes.
	21 Minutes	70/60	24.50 minutes.
B	25 Minutes	50/60	20.83 minutes.
	26 Minutes	50/60	21.67 minutes.
	24 Minutes	50/60	20.00 minutes.
<hr/>			<hr/>
Total	138 Minutes		136.00 Minutes
<hr/>			<hr/>
Average normalised time	=	136	
		-----	= 22.67 minutes.
		6	
Add: 20% allowance for fatigue etc.			= 4.53 minutes.

Standard time			27.20 minutes

Among many others, work study and its components viz., time study and motions study are important techniques of cost reduction.

Studies based on Time Cost Relationship.

Motion study and time study are the basic studies which have a direct bearing on the labour cost. They form the basis of fixing up standard rates of both time and wage. Labour cost represent not only basic wages but a number of other expense such as dearness allowance, employee's contribution to provident fund and E.S.I. Scheme production bonus holiday pay etc., Such expenses may be included in overheads, but is better if these expenses are treated as direct. All these are added to the basic wages and then divide the total by effective hours worked. The resulting figure will be the labour cost per hour and a job should be charged with the amount which is arrived at by multiplying the hours worked with such a figure.

Through various studies based on time cost relationships, standard labour cost is predetermined for each operation, process, product or job. Determination of standard labour cost naturally include determination of standard time and standard labour rate. Standard time should be determined for each category of labour and for each operation involved through proper time and motion study. Standard time multiplied by standard rate will give standard labour cost and it should be compared with the actual labour cost for an effective cost control and cost reduction process.

Labour cost can be considerable reduced by measuring labour productivity where most of the work is manually done. Measurement of labour productivity is essential to know the efficiency of labour. While calculating labour productivity all factory labour, both direct and indirect, should be included. A few ways of measuring labour productivity are as follow

a. In terms of hours.

i. Output per man hour	=	$\frac{\text{Total output}}{\text{Total man hour}}$
ii. Man hours per unit of production=		$\frac{\text{Total man hour}}{\text{Total output in units}}$
iii. Labour productivity of efficiency=		$\frac{\text{Production in standard hours}}{\text{Actual man hours}}$
iv. lost time percentage	=	$\frac{\text{man hour lost}}{\text{possible man hours}} \times 100$

b. In terms money

i. Labour productivity	=	$\frac{\text{man hour lost}}{\text{Possible man hours}} \times 100$
ii. Added value per unit of labour cost=		$\frac{\text{Added value}}{\text{Number of workers}}$

All these imply that labour cost is an important factor in cost reduction through higher productivity.

Employees participation in cost reduction programmes.

One among the important techniques of cost reduction is through imposing productivity. Human aspect is an important factor to be considered in all cost reduction programmes. It is relatively complicated because it is based on human nature and the success of this depends upon the co-operation between the wings of production viz., capital and labour. This co-operation gets strengthened by the effective participation of workers in the programme of cost reduction.

Some of the important points in respect of worker participation and co-operation between labour and capital are;

1. There must be mutual trust between the management and the employee.
2. Opportunities to be given to worker's participation in management to make them feel that they have a voice in the administration of the programmes.
3. Introducing rationalisation and automation by taking workers into confidence and giving them assurance that they will not be returned due to rationalisation and automation.
4. Adopting two way communication service whereby information to and from workers would reach both the ends unhampered. As remarked by Prof. Whitehead, What is feared of Senior management is not its lack of good intentions, but its distance.
5. Providing various incentives to workers for greater productivity by adopting balanced wage structure, an efficient system of recruitment, training placement and promotions and a comprehensive labour welfare scheme.
5. Following suggestion box schemes and making the programme of cost reduction open to all employees for making suggestions on work signification, improvement of working conditions or any other matter affecting the efficiency of the concern.

Special Cost Reduction Cell

A special cost reduction cell in an organisation is a separate department entrusted with the tasks of cost reduction. It is an important organ in a manufacturing concern as its functional results decide the fate and future of the business. The special cell functions under the supervision and direction of the cost reduction committee of which the managers of different departments like purchases planning, designing, production, sales, distribution, finance, research, development etc., are the associated members. Besides some experts of specific areas pertaining to the programme are also associated with this committee. The formulation of a co-ordinated plan requires a systemised approach to the problem and a decision to implement a programme of cost reduction requires an organised cost reduction cell. The functions of the cell are the following.

1. To collect cost data from different departments.
2. To invite suggestions from different executives for improvement and reduction of cost relating to their fields.
3. To create an environment of cost reduction among the workers emphasising the utility of cost reduction and the benefits which would accrue to them in terms of higher remuneration, bonus etc., thereout.
4. To invite and welcome employee participation in evolving schemes and their execution, as the costs are controllable at the point where they are incurred.
5. To select the areas where cost reductions:
 - i. necessary
 - ii. desirable, and
 - iii. possible and to fix priorities.

6. To frame policy, guidelines and directives, to suggest changes in product design or to introduce new products and new designs in consultation with the production engineers and technocrats with the view to reduce cost of production without impairing the quality.
7. To work out reduction in cost of administration, selling and distribution without impairing efficiency.

Conclusion

Cost control and cost reduction are two important functions of cost management. They are independent but mutually related. Cost control is a monitoring process, whereas cost reduction is an executive process. Cost control aims at keeping the cost movement at the right track as planned such that the performance efficiency conforms to the target.

Cost reduction is an all out effort to minimise cost without impairing the quality of the product or the services rendered. Both cost control and cost reduction have become essential features of cost rationalisation.

Chapter 9

COST STUDIES AND MANAGEMENT DECISION

Decision - making is the essence of management since it may make or mar the success as a whole. In management parlance it has a special meaning. It means the process of choosing among alternatives, since when there is no choice, there is no decision to make. Since business operates in a probabilistic world, every management decision deals with the future. The function of the decision maker is, therefore to select courses of action for the future, because there is no opportunity to alter the past. Future is risky. However routine decisions do not involve much of risk. Most of the top management decisions are not of routine nature. They are generally of strategic and crucial nature involving huge investments and heavy uncertainties. But they cannot be avoided, it has been aptly observed. "uncertainty is the executive's opponent, overcoming it is his mission. The moment of decision is the most creative even in the life of the executive".

Rational decision - making requires the following steps in the process.

1. Defining the problem

The problem at hand must be clearly and precisely defined such that quantitative amounts that are relevant to its solution can be determined.

2. Identifying alternatives

The possible alternative solutions to the problem should be identified. After identifying all possible alternatives, the analysis should be eliminated on a scientific judgement basis those that are clearly unattractive.

3. Evaluating quantitative factors.

Each alternative is usually associated with a number of advantages, relevant revenues, and disadvantages, related relevant costs. The decision maker should evaluate each of the relevant factors in quantitative terms to determine the largest net advantages.

4. Evaluating quantitative factors.

In certain cases there may be qualitative factors associated with certain alternatives which may not be capable of being expressed easily and correctly in quantitative terms. Evaluating such qualitative factors against the quantitative factors depends upon the judgement of the decision maker.

5. Obtaining additional information

In case the decision maker feels it necessary he may call for additional information and it is usually possible to obtain such information.

6. Selection of an alternative

After having identified, evaluated, weighed and obtained additional information wherever necessary the decision maker can select the right alternative and act on it.

7. Appraisal of the results

Having implemented the decision, the decision maker should also from time to time carry out an appraisal of the results. This will certainly help in correcting the mistakes, revising targets and make better predictions in the times to come.

Various cost studies and costing techniques, among other things are useful to the management in this process. Some of such occasions are discussed below.

1. Product and Production Decisions

Period decision involves the decision on a particular product whether it should be introduced or discontinued, if it is already being produced and marketed. The decision is guided by the contribution made by the sale of the product at present, its future potential to gain penetration into the market and competition, product marketing cycle, available production capacity, product substitute. Cost studies and cost analysis provide information on the level of contribution which guides the decision process.

Product line decision involves determining what different commodities should be produced added or dropped, so that the company produces an economically balanced output which can yield the maximum contribution among the alternative plans of production. Adding a new product to the existing line depends upon the availability of surplus capacity. Excess capacity is said to exist when it would cost the multiple - product firm less to make and sell new product than it would cost a new company set up to produce only that product. Hurried decision will cost heavily on the profit and other related matters. Some times it becomes necessary for a concern to introduce a new product to the existing product line. The additional product must be profitable. In order to decide about the profitability of the new product it is assumed that the manufacture of the new product will not increase fixed costs of the concern and if the price realised from the sale of such product is more than its variable cost of production.

On the other hand, when a product line is decided to be discontinued the following factors should be considered before the decision is taken to do so.

- i) The contribution made by the product should be carefully considered more than the total cost. Since the contribution is available meeting all the variable cost the covers up the fixed cost and profit, it gives better idea about the profitability of a product than the profit itself.
- ii) The capacity utilisation level needs careful scrutiny. In case the firm is having idle capacity towards the recovery of fixed cost can be justified.
- iii) The availability of a product to replace the product which the firm contemplates to discontinue.
- iv) The long term prospects in the market for the product.
- v) The effect on the sale of other products must be given consideration. In some cases the discontinuance of a product affecting the overall profitability of the firm.

Product mix is another area involving managerial decision. In deciding on the most profitable mix, the contribution per unit of each product should be the guiding factor. A product yielding the highest contribution should be given the highest priority and the product with the lowest contribution margin should be given the least priority. A product with negative contribution should be discontinued or given up unless there are other reasons to continue its production. When a concern manufactures a number of products a problem often arises as to which product mix will give maximum profit. Such a problem can be solved with the help of marginal contribution cost analysis.

The decision on product development depends upon the available production capacity, demand potentiality, feature specification regarding design, and many other similar factors. When all other physical facilities are available the decision is guided by the profitability of the product through marginal cost analysis.

Finally production decision is governed by the factors, like fixed cost factors and variable cost factors. Among other factors the key factor guides the production decision for a profitable planning. A key factor is that factor which puts a limit on production and profit of a business. Generally the limiting factor is sales. A concern may not be able to sell as much as it can produce. But sometimes a concern can sell all it produces but production is constrained by the shortage of materials, labour, plant capacity, or capital. In such a case a decision has to be made regarding the choice of the product whose production is to be increased, reduced or to be stopped. When there is no limiting factor, the choice of the product will be on the basis of highest contribution margin. But when there is a limiting factor, decision on the basis of contribution per unit of the limiting factor. The limiting factor resources should be utilised in such directions where contribution per unit is the maximum.

Illustration

The following particulars are extracted from the records of a company
per unit

	Product A	Product B
Sales price (Rs)	100	110
Consumption of materials	5	4
material Cost (Rs)	24	14
Direct wages (Rs)	2	3
machines hours used	2	3
Variable overheads	4	6

For both the products the same raw materials are used. Comment on the profitability of each product when.

- Total sales potential in units is limited.
- Total sales potential in value is limited.
- production capacity in terms of machine hour is the limiting factor.

Solution**Per Unit**

	Product A	Product B
	Rs.	Rs.
Sales Price...	100	110
less variable cost	30	23
	-----	-----
Contribution	70	87
	-----	-----

- When total sales potential in units is limited, product B will be better compared to product A as its contribution per unit is more by Rs.17
- When total sales potential in value is limited product B is preferable because its contribution per rupee sales is more 9 paise.
- When raw material is in short supply again Product B stands preferable since its contribution per Kgs. of material is more by Rs.7.75
- When production capacity is limited in terms of machine hour product A is better, because A contribution per machine hour is more by Rs.6

Illustration 2

A firm manufactures and markets three products X, Y and Z. All the three products the same set of machines. Production is limited by machines capacity. From the following data, show the priorities from the profit maximisation profit.

	Product X	Product Y	Product Z
Raw materials cost per unit	Rs.2.25	Rs.3.25	Rs.4.25
Direct labour cost per unit	Rs.0.50	Rs.0.50	Rs.0.50
Other variable cost per unit	Rs.0.30	Rs.0.45	Rs.0.71
Selling price per unit	Rs.5.00	Rs.6.00	Rs.7.00
Standard machine time required per unit	39 minutes	20 minutes	28 minutes.

In the following year the firm faces extreme shortage of raw materials. It is noted that 3 kgs, 4 kgs, 5 kg of raw materials are required to produce on unit X, Y and Z respectively.

How would product priorities change?

Solution

	Products		
	X	Y	Z
	Rs.	Rs.	Rs.
Selling price per unit	5.00	6.00	7.00
Less marginal per unit			
Raw material	2.25	3.25	4.25
Direct labour	0.50	0.50	0.50
Other variable overhead	0.30	0.45	0.71
	3.05	4.20	5.46
	-----	-----	-----
Contribution per unit	1.95	1.80	1.54
	-----	-----	-----
Standard machine time required for per unit(minutes)	39	20	28
Contribution per machine minutes	5 paise	9 paise	5 1/2 paise
Product priorities production	III	I	II
Following year			
Raw materials required to produce One unit	3 kg	4 kg	5 kg
Contribution per kg or material	65 paise	45 paise	30.8 paise.
priority change	I	II	III

Thus priorities change on the basis of contribution and key factor limitations.

Illustration:

Text tools factory has a plant capacity adequate to provide 19,800 hours of machine use. The plant can produce all A Type tools or all B type tools or, a mixture of the two types. The following information is relevant.

Per type	A	B
Selling price (Rs)	10	15
Variable Cost (Rs)	8	12
Hours required to produce	3	4

Market conditions are such that no more than 4,000 A type tools and 3,000 B type tools can be sold in a year, Annual fixed cost are Rs.9,900

Compute the product mix that will maximise the net income to the firm and find out the maximum net income.

Solution

STATEMENT OF CONTRIBUTION PER MACHINE HOUR

	Tools	
	Type A	Type B
	Rs.	Rs.
Selling price per type	10.00	15.00
Less Variable cost per type	8.00	12.00
Contribution per type	2.00	3.00
Hours required to produce	3	4
Contribution per machine hour	0.67	0.75
Ranking	II	I

From the above statement it is known that maximum of B type should be produced and the balance of machine hours may be utilised for the production of type A tools.

STATEMENT OF MAXIMUM NET INCOME

Type	No. of tools	Machine hours Rs.	Contribution per unit	Total Contribution Rs.
B	3,000	12,000	3	9,000
A	2,600	7,800	2	5,200
		19,800		14,200

Less Annual fixed cost	9,900

Net Income	4,300

Illustration 4

Even Ltd manufactures and sell a single product X whose selling price is Rs.40 per unit and the variable cost is Rs.16 per unit.

a) If the fixed cost for the year is Rs.4,80,000 and the annual sales are at 60% margin of safety, calculate the rate of net return on sales, assuming an income tax rate level of 40%

b) For the subsequent year, it is proposed to add another product line Y whose selling price would be Rs.50 per unit and the variable cost Rs.10 per unit. The total fixed cost is fixed is estimated at Rs.6,66,600. The sales mix of X and Y would be 7:3 At what level of sales in the subsequent year would break even? Give separately for both X and Y the break even sales in rupees and quantities.

Solution

a)	Product X	Rs.
	Selling Price	40
	Less Variable cost per unit	16

	Contribution per unit	24

		C
	P/V Ratio	= $\frac{\text{-----}}{\text{-----}} \times 100$
		S
		24
		= $\frac{\text{-----}}{\text{-----}} \times 100 = 60\%$
		40
	BEP (in rupees)	= $\frac{\text{FC}}{\text{-----}} \times 100$
		p/v ratio
		= $\frac{4,80,000}{\text{-----}} \times 100$
		60%
		= $\frac{4,80,000 \times 100}{\text{-----}}$
		60
		= Rs.8,00,000
		F
	BEP in Units	= $\frac{\text{-----}}{\text{-----}} \text{ Per unit}$
		C

	=	4,80,000	
		-----	= 20,000 Units
		24.	
		Actual Sales - BEP Sales	
% Margin of Safety	=	-----	
		Actual sales.	
	=	Actual Sales - 20,000	
60%	=	-----	
		Actual Sales.	
		20,000	
Actual Sales	=	-----	= 50,000 Units.
		40%	

PROFIT STATEMENT FOR PRODUCT X

		Rs.
Sales Value (50,000 x 400)		20,00,000
Less Variable Cost (50,000 x 16)		8,00,000

Contribution		12,00,000
Less fixed cost		4,80,000

Profit before tax		7,20,000
Less Income Tax @ 40%		2,88,000

Net return after tax		4,32,000

Rate of net return on sales	=	4,32,000
		----- x 100 = 21.6%
		20,00,000

FOR PRODUCT Y

		Rs.
Selling price per unit		50
less variable cost		10

Contribution		40

		40
P/V Ratio	=	----- x 100 = 80%
		50

$$\text{BEP (in rupees)} = \frac{6,66,600}{40} = 16,665 \text{ units}$$

$$\text{b) P/V} = \frac{\text{Product X}}{\text{Product Y}} = \frac{60\%}{80\%}$$

Contribution margin for the company.

$$60 \times 7 = 420 + 80 \times 3 = 240 = 660$$

$$\frac{660}{10} = 66\%$$

$$\text{Break - even sales} = 6,66,000 \times \frac{10}{66\%} = \text{Rs.} 10,10,000$$

BREAK - EVEN SALES MIX

$$\text{Product X} = 10,10,000 \times \frac{7}{10} = \text{Rs.} 7,07,000$$

$$\text{Product Y} = 10,10,000 \times \frac{3}{10} = \text{Rs.} 3,03,000 \text{ and}$$

$$\text{Product X} = 7,07,000 = 17,675 \text{ units.}$$

$$\text{Product Y} = 3,03,000 = 6060 \text{ Units.}$$

Or (for part be only product)

$$\text{Sale price} \quad 40 \times 7 = 280 \quad 50 \times 3 = 150$$

$$\text{Less Variable Cost} \quad 16 \times 7 = 112 \quad 10 \times 3 = 30$$

$$\text{Contribution} \quad 168 \quad 120$$

$$\text{Total Contribution} = 68 + 120 = 288$$

$$\frac{6,66,000}{288}$$

$$\text{BEP for the company as a whole} = \frac{6,66,000}{288} = 23146 \text{ units.}$$

BREAK - EVEN SALE MIX

$$\text{Product X} = 23,146 \times \frac{7}{10} = 16,202 \text{ units or Rs. } 6,48,080$$

$$\text{Product Y} = \frac{23,146 \times 3}{10} = 6944 \text{ units or Rs.3,47,200}$$

Illustration 4

Volume of output to be manufactured and sold may be 1,000, 2,000 or 3,000 units. When the above units of the product are sold, the selling price per unit are estimated to be Rs.50, Rs.45, Rs.40 respectively. The material and labour cost per unit are Rs.12 and Rs.10 respectively. Variable production overheads are 75% of wages. Other variable overheads are Rs.6 per unit. Fixed cost are the same for all the volumes. Determine the most profitable volume of output.

Solution**STATEMENT OF CONTRIBUTION**

	1000 Units Rs.	2000 Units Rs.	3000 Units Rs.
Selling price	50	45	40
Variable cost			
Material	12	12	12
Labour	10	10	10
Production overhead	7.5	7.50	7.5
Other variable overhead	6	6	6
	----- 35.50 -----	----- 35.50 ----	----- 35.50
Contribution	14.50	9.50	4.50
Total contribution	14,500	19,500	13,500

Comment

Contribution is the highest when output is 2,000 units. Therefore it is the most profitable level of output.

Illustration 5

In a factory the rated capacity is 30,000 units. The following data are supplied.

Output in units	upto 15,000	15,000 to 25,000	25,000 to 30,000
	Rs.	Rs.	Rs.
Fixed cost	15,000	16,000	19,500
Variable cost per unit	3	3	3.25
Sales revenue per unit	4	3.80	3.80

Use differential cost analysis and determine the most profitable level of output.

Solution**Statement of differential cost at Incremental Revenue.**

Output units	Variable cost Rs.	Fixed cost Rs.	Total cost Rs.	Differential Rs.	Sales Rs.	Incremental Revenue. Rs.
15,000	45,000	15,000	60,000	---	60,000	---
25,000	75,000	16,000	91,000	31,000	95,000	35,000
30,000	97,500	19,500	1,17,000	26,000	1,14,000	19,000

Comment

The most profitable output 25,000 units, because at this level, the incremental revenue is more than differential cost. On the other hand, if the output is beyond 25 units, the differential cost exceeds the incremental revenue and it is found no more profitable to expand production.

Illustration 6

DMC Ltd., has developed a new product of which 10,000 units are to be produced in each year. Expenditure incurred is as below.

	Machine Rs.	Manual Rs.
Purchase price of Machine	40,000	---
Direct Material	10,000	10,000
Direct Labour	1,000	6,000
Variable Overhead cost	4,000	2,000
Fixed overhead cost (Excluding depreciation)	3,000	2,000

Depreciation is to be calculated at 10% on straight line method, where necessary.

The selling price of the product has been fixed at Rs.6 per unit. If the machine is to be purchased it will have an estimated life of 10 years with a little or no residual value.

Ascertain in respect of each of the two alternative method of manufacture.

- marginal cost and contribution and
- Total cost and interest at 5% on the capital of the machine. What is your inference?

Solution**STATEMENT OF MARGINAL COST AND CONTRIBUTION**

	Machine Rs.	Manual Rs.
Sales 10,000 units @ Rs.6 each	60,000	60,000
Variable cost		
Direct Material	10,000	10,000

Direct Labour	1,000	6,000
Variable overhead	4,000	2,000
	-----	-----
	15,000	18,000
	-----	-----
Contribution (S-V)	45,000	42,000

(B) STATEMENT OF TOTAL COST AND PROFIT.

	Machine Rs.	Manual Rs.
Marginal cost	15,000	18,000
Fixed overhead	3,000	2,000
Depreciation (10% on Rs.40,000)	4,000	---
	-----	-----
	22,000	20,000
Interest on capital (5% on Rs.40,000)	2,000	--
	-----	-----
Total CFost	24,000	20,000
Profit	36,000	40,000
	-----	-----
Sales	60,000	60,000
	-----	-----

Comment

If decision is taken only on the basis of marginal cost, machine method may be preferable as it is making a larger contribution. When all the costs are taken into account, viz., decision the basis of total cost, profit by manual method will be higher than machine method. In this case, manual method is preferable, other things being equal.

Illustration 7

In the factory of X ltd, Type A and Type B machines have been designed to produce the same product, but Type A is less automatic than type B an requires some what more labour to operate. Pertinent costs are as follow.

	Type A Rs.	Type B Rs.
Set up costs	400	600
Variable cost per unit	9.90	9.40

Which type of machine can be used for processing various sized orders?

Solution

$$\begin{aligned}
 \text{Suppose size of the order} &= X \\
 \text{Type A machine may be used when} &= \\
 \text{Total cost on Type A} < \text{Total Cost on type B} &= \\
 \text{i.e. } 400 + 9.9x < 600 + 9.4x &= (9.9 - 9.4)x < 600 - 400 \\
 &= 0.5x < 200 \\
 &= \frac{200}{0.5} \\
 &= x < 400
 \end{aligned}$$

In the same way, Type B may be used when the cost on type A is greater than cost on type B symbolically.

$$\begin{aligned}
 \text{Total cost on Type A} > \text{Total cost on Type B} \\
 400 + 9.9x > 600 + 9.4x &= x > 400
 \end{aligned}$$

Comment

Type a machine may be used when the size of the order is less than 400 units. When the size of the order is for more than 400 units. Type B machine should be used. But when the size of the order is exactly for 400 units either Type A or Type B machine can be used, because at this level total cost will be equal.

$$\begin{aligned}
 \text{Cost for Type A} &= \text{Rs.}400 + (400 \times 9.90) &= & \text{Rs.}4,360 \\
 \text{Cost for Type B} &= \text{Rs.}600 + (400 \times 9.40) &= & \text{Rs.}4,360
 \end{aligned}$$

Illustration 8

X Ltd, manufactures three products R, S and T. There are no common processes and the sale on one product does not affect price or volume of sale of any other. The company's budgeted profit / loss for 1995 has been abstracted as follows:

	Total	R	S	T
	Rs.	Rs.	Rs.	Rs.
Sales	3,00,000	45,000	2,25,000	30,000
Production Cost	1,80,000	24,000	1,44,000	12,000
Variable Fixed	60,000	3,000	48,000	9,000
Factory cost	2,40,000	3,000	1,92,000	21,000
Selling and Administrative				
Cost Variable	24,000	8,100	8,100	7,800
Fixed	6,000	2,100	1,800	2,100
Total Cost	2,70,000	37,200	2,01,000	3,09,000
Profit	30,000	7,800	23,100	900

On the basis of the above information the board has almost decided to eliminate product T on which a loss has budgeted. Meanwhile they have sought your opinion. As the Company's cost accountant, what would advice? Give reasons for your suggestion.

Solution

In order to comment upon the profitability of different products, presentation of costs according to marginal costing system is relevant. We may also compare p/v ratios.

		R	S	T	Total
		Rs.	Rs.	Rs.	
Sales	(S)	45,000	2,25,000	30,000	3,00,000
Variable Cost					
production cost		24,000	1,44,000	12,000	1,80,000
Selling and Admn Cost		8,100	8,100	7,800	24,000
	(V)	32,100	1,52,100	19,800	2,04,000
	S - V = C	12,900	72,900	10,200	96,000
Less: Fixed cost					
Production		3,000	48,000	9,000	60,000
Selling and Admn		2,100	1,800	2,100	6,000
Total Cost	F	5,100	49,800	11,100	66,000
Profit	(C - F)	7,800	23,100	900	66,000
P/V. Ratio		28.7%	32.4%	34%	

Comment

Product T is making a contribution of Rs.10,200 towards fixed cost. It is were to be dropped recovery of fixed cost to this extent happens to be made by the performance of products R and S. The super capacity released from dropping T cannot also be utilised for the other products, since is no common process possibilities. P/V ratio of T is 34% which is the maximum compared to others. The portion of fixed cost apportioned to product T is about 39% of the total fixed cost apportioned to product T is about 39% of the total fixed cost burden. This fact has not been taken into consideration in the decision of the board. Under these conditions, if the production and sales of T are increased product T will prove to be most profitable.

Therefore, it would be better if T is not dropped.

Illustration 9

A company is considering expansion. Fixed cost amount to Rs.4,20,000. The current selling price is Rs.16 and is likely to continue even after the expansion with the sale possibilities

of all the products. The fixed cost will go up by Rs.1,25,000. When plant expansion is completed. The present plant capacity is 80,000 units costs and currently Rs.6.80 per unit and are expected to go down by Rs.0.40 per unit and are expected to remain the same under each alternative.

What are the break - even point under both the alternatives?

Which alternative is better and why?

Solution

STATEMENT OF BREAK - EVEN POINT

	Present Position Rs.	After Expansion Rs.
Fixed costs	4,20,000	5,45,000
Selling price per unit	16	16
Variable cost per unit	6.80	6.40
Contribution per unit (SV)	9.20	9.60
P/V. Ratio	57.50%	60%
Break-even point (in units) =	$\frac{4,20,000}{9.20}$	= 45,652
	$\frac{5,45,000}{9.20}$	= 56,771
Break-even point (in units) =	$\frac{4,20,000}{57.5\%}$	= 7,30,435
	$\frac{5,45,000}{60\%}$	= 9,08,333

STATEMENT OF PROFIT UNDER THE TWO ALTERNATIVES

	Present position Rs.	After expansion Rs.
Sales....	12,80,000	19,20,000
less variable cost	5,44,000	7,68,000
Contribution	7,36,000	11,52,000
Less fixed cost	4,20,000	5,45,000
	3,16,000	6,07,000

Comment

Judging from contribution point of view and from profit, the alternative of expansion may be preferred.

3. Price decisions and cost studies.

Price decisions are the most crucial ones which the management has to make. In some cases management may have little in the pricing decision either because the market is not going to accept product over a particular price or there may be no incentive for charging a lower price. The former case is true when a highly competition market prevails for charging a lower price. The latter is true in the case of monopoly items. In between these two extreme levels the management is confronting several divisional situations in respect of product prices. In such cases where the managerial can have control over the product prices managerial decisions re vita price decisions may be needed in the following situations.

- (i) Under normal circumstance.
- ii) In times of competition.
- iii) At times of trade depression.
- iv) In accepting additional order.
- v) In exporting and exploring new market including foreign markets.
- vi) When the product is a loss leader.

i) Under normal circumstance:

Under normal circumstances, the prices fixed should cover the total cost as otherwise there cannot be any profit. However, under special circumstances may have to be below total cost and in that case the price should be equal to the marginal cost plus a certain amount to the extent possible.

ii) In times of competition

In the firm is selling its products in highly competitive market it will have least scope for pricing discretion. The price level settled by the demand and supply will have to be adopted. Sometimes it may even be below total cost.

iii) pricing in Depression

Depression is reflected by a situation of fall in price level and reduction in demand. The products may have to be sold below total cost. In case there is a serious but temporary fall in the demand on account of depression resulting in the need for a drastic reduction in prices temporarily the minimum selling price should be equal to the marginal costs or more than marginal cost. If the selling price at which products can be sold at a price which is a little more than the marginal cost, the product should be continued. Fixed expenses will have to be incurred even if a product is discontinued during depression for a short period. If the product can be sold at a price which is more than marginal cost, loss on account of fixed expenses will reduce because the price will recover fixed expense to some extent. If the selling price is below the fixed cost. Hence, decision should be made to fix the price equal to or more than the marginal cost. Production should be discontinued if the price obtained is below the marginal cost so that the loss may not be more than the fixed costs. Selling price may be allowed to be below marginal cost

only in the following circumstances.

1. When a new product is introduced in the market till it gains penetration into the market.
2. When foreign market is to be explored to earn foreign exchange.
3. When the firm has already purchased large quantities of materials till the excess are completely uses up in the production.
4. When the business is in the process of being closed up
5. When the sales of one product at a price below marginal cost will push up the sales of other profitable products.
6. When the employer cannot be retrenched and the production has to be continued the selling price lower than the marginal cost will save the situation.
7. When competitors are to be eliminated the decision may be made to sell at a lower price.
8. When the goods are of perishable nature and the depression compels the sale at a lesser price is justifiable.

iv. Pricing to accept additional orders, exploring additional market and exporting.

When additional orders are accepted or additional markets explored at a price below normal one to utilise surplus capacity it should be very carefully seen that they will not affect the normal market and goodwill of the company. The order from a local merchant should be avoided from accepting at a price lower than the normal price since it may affect adversely the existing business relationship. In the case of foreign markets, goods may be sold at a price below normal level keeping in view the direct and indirect benefits of exporting such as import quotas, subsidies of government prestige etc.,

Besides the situational factors, product pricing methods affect pricing decisions greatly. Appropriate method for an appropriate situation is rather essential for a successful price decision. Important methods are (i) Profit maximisation method (ii) return on capital employed method. (iii) conversion cost method (iv) full cost method (v) marginal cost method (vi) differential cost method (vii) standard cost method (viii) going rate pricing and (ix) customary pricer.

i) Profit maximisation method.

The price of a product is fixed at that level which result is large amount profit to the business enterprise.

Illustration 10

Selling Price per unit Rs.	No. of Units to be sold	Total Sales value Rs.	Variable cost (Rs.7 per unit) Rs.	Fixed Cost Rs.	Net Profit Loss Rs.
20	20,000	4,00,000	1,40,000	3,00,000	40,000
18	40,000	7,20,000	2,80,000	3,00,000	1,40,000
16	60,000	9,60,000	4,20,000	3,00,000	2,40,000
14	80,000	11,20,000	5,60,000	3,00,000	2,60,000
12	1,00,000	12,00,000	7,00,000	3,00,000	2,00,000
10	1,20,000	12,00,000	8,40,000	3,00,000	60,000

The illustrative table shows that profit is the largest at a selling price of Rs.14 per unit. Hence it is the most profitable selling price because it yields the maximum profit.

ii) Return on Capital employed method.

Under this method price is fixed which yields a desired rate of return on capital employed. The following formula is useful to calculate such a price.

$$= \frac{\text{Total cost} + (\text{desired Rate} \times \text{Capital Employed})}{\text{Sell in units.}}$$

Selling price

Sell in units.

iii) Conversion cost method

The selling price under this method is based on the conversion cost which include direct expenses. direct labour and factory overhead rather than on total cost. Other things being equal. It would be advantageous to manufacture a product with comparatively lower conversion cost sinceless efforts would be necessary to earn the same or higher profits.

Illustration 11**ELEMENTS OF COST**

	Product A	Product B
Director Material	Rs.6	Rs.3
Direct labour	Rs.2	Rs.4
Factory overhead	Rs.1	Rs.2
	-----	-----
Total manufacturing costs	Rs.9	Rs.9
Gross profit	Rs.1	Rs.1
	-----	-----
Selling price	Rs.10	Rs.10
	-----	-----

The above break up of elements show that product A requires only half the labour and half the overhead as compared to product B. Product A thus, needs lower effect to manufactures compared to product B. Hence the enterprise can afford to sell product A at a lower margin of profit.

iv) Full cost method

Selling price of a product under this method is based on its total cost, both manufacturing and selling. The selling price determined by adding estimated administration, selling distribution overheads and desired profit to the total factory cost of the product.

v) Marginal cost method

According to this method selling price of a product is based on its marginal cost plus a certain percentage to cover fixed overhead and profit.

vi) Differential cost method

Under this method the selling price of each additional unit is based on the differential

cost. In other words a lower selling price is acceptable so long as the additional revenue is sufficient to meet the extra cost and also earn some profit, provided it does not affect the existing market for the product. However before making price decisions, it would be advisable that such a decision on all selling price is resorted to in times of reverse competition or under necessary conditions.

vii) Standard cost method

When this system of cost method is followed price is determined by adding the standard margin of profit to standard cost of the product. The method is particularly suitable for products which can be standardised.

viii) Going Rate Pricing

Instead of the cost the emphasis here is on the market. The firm adjusts its own price policy to the general pricing structure in the industry. Where costs are particularly difficult to measure, this may seem to be the logical first step in a rational pricing policy. It may simply be a way in which firms try to escape the haards or price rivalry in a market with a few competitors.

ix) Customary prices.

Prices of certain products become more or less fixed, not by deliberate action on the part of the selling firm, but as a result of their having prevailed for a considerable period of time. For such products, changes in costs are usually reflected in change in quality or quantity. Only when the costs change significantly the customary prices of these goods are changes.

Illustration 12

P/V ratio is 60 percent and the marginal cost of the product is Rs.50. What will be the selling price?

Solution

$$\begin{aligned}
 \text{Selling price} &= \frac{\text{Variable Cost}}{(100 - \text{P/V ratio})} \\
 &= \frac{50}{100 - 60} = \frac{50}{40} \\
 &= 50 \times \frac{100}{40} = \text{Rs.125}
 \end{aligned}$$

Illustration 13

Raviraj limited manufactures and sells electric bulbs. Variable cost is Rs.3 per bulb. It can sell 600 bulbs at Rs. Each and earn profit of Rs.2,000. Alternately, it can 3,500 bulbs at Rs.6 each and another 2,000 bulbs at Rs.4 each. Which of the alternatives is better? Why?

Solution**ALTERNATIVE I**

	Rs.
Sales (6000 Bulbs @ Rs.5 each)	30,000
Less	
Variable cost (6000 x 3)	18,000

Contribution	12,000
Less Profit	2,000

Fixed cost	10,000

ALTERNATIVE II

	Rs.	Rs.
Sales (3500 x 6)	21,000	
Sales (2008 x 4)	8,000	
	-----	29,000
less variable cost (5500 x 3)		16,500

		12,500
Less fixed cost		10,000

Profit		2,500

Comment

Alternative II is better, because the profit is more in this case by Rs.500

Illustration 14

P & Sons build custom made pleasure boats which range in price from Rs.10,000 to R.2,50,000. For the past 30 years, the firm has determined the selling price of each boat by estimating the costs of materials and labours, allocating a portion of overhead based on direct labour and adding 20% to these estimated costs.

For example, a recent price quotation was determined as follows

	Rs.
Direct materials	5,000
Direct labour	8,000
Overhead	2,000

	15,000
Plus 20% profit	3,000

Selling Price	18,000

If a customer rejected the price and business was slack, P & sons would be willing to reduce his make up to as little as 5% over the estimated costs.

Total overhead which includes selling and administration expenses for the year has been estimated at Rs.1,50,000 of which Rs.90,000 is fixed and the remainder is varying in direct proportion to direct labour.

Assuming the above customer rejected the Rs.18,000 quotation and also rejected a Rs.15,750 quotation (5% make up) during a slack period. The customer counted with a Rs.15,000 offer.

- What is the difference in net income for the year between accepting or rejected the customer's offer?
- What is the maximum price P & sons could have quoted without reducing or increasing the net income.?

Solution

	Rs.
Total overhead including selling and adms. expense	1,50,000
Less Fixed overhead	90,000

Variable overhead	60,000

	60,000				
Variable overhead as % of total overhead	-----	x	100	=	1,50,000
	=				40%
Total overhead applied to quotation	=				Rs.2,000
Total of direct labour applicable to quotation	=				Rs.8,000
	=				2000
Total overhead as % a of total overhead	=	-----	x	100	
	=	8,000			
	=	25%			
Variable overhead as % a on direct labour	=	40% x 25%	=	10%	

VARIABLE COST OF RECENT PRICE QUOTATION

	Rs.
Direct Material	5,000
Direct Labour	8,000
Variable overhead (10% Rs.8000)	800

Total variable cost	13,800

Customer's offer	15,000
Contribution towards profit (15,000 - 13,800)	1,200

Comment

- a) An increase in net income of Rs.1,200 (before tax) will result from accepting the customer's offer.
- b) The maximum price without any effect on net income would be Rs.13,800

Illustration 15

A marketing manager suggests to his managing director that if he is permitted to reduce the selling price of product by 20% he would be able to achieve 30% increase in sales volume. The managing director finding that the sales volume increase exceeds in percentage reduction in price, gives clearance. You are furnished with the following information.

Present selling price per units	Rs.7.50
Present volume of sales	2,00,000
Total variable costs	Rs.10,50,000
Total fixed cost	Rs.3,60,000

Assuming no changes in the costs pattern in the coming period.

- a) Examine the consequences of the managing director's decision assuming that 30% increase in sales is realised.
- b) At what volume of sales can present the quantum of periods be sustained after effecting the price reduction.

Solution**(a) INCREMENTAL REVENUE AND DIFFERENTIAL COST**

	Rs.
Proposed sales (2,60,000 x 6)	15,60,000
Less Present sales (2,00,000 x 7.50)	15,00,000

Incremental revenue	60,000

COST AT PROPOSED LEVEL

Variable cost	=	Rs.10,50,000 x $\frac{2,60,000}{2,00,000}$	=	13,65,000
Fixed cost		2,00,000		3,60,000

Total cost				17,25,000

Present cost				
Variable cost				10,50,000
Fixed Cost				3,60,000

Total cost				14,10,000

Differential cost (17,25,000 - 14,10,000)				3,15,000

Comment

As the different cost (Rs.3,15,000) is more than the incremental revenue (Rs.60,000) the proposal is not worth consideration since it will give rise to an additional loss of Rs.2,55,000 (Rs.15000-60,000)

B. VOLUME OF SALES TO SUSTAIN THE PRESENT PROFIT.

Sales (2,00,000 x 7.50)		1,50,000
Less Variable Cost	10,50,000	
Fixed Cost	3,60,000	
	-----	14,10,000

Profit		90,000

		F + P

$$\begin{aligned} \text{Volume of sales to sustain the profit of Rs.90,000} &= \frac{\text{Fixed Cost} + \text{Profit}}{\text{Contribution per unit}} \\ &= \frac{3,60,000 + 90,000}{0.75} \\ &= 6,00,000 \text{ Units.} \end{aligned}$$

working not

$$\begin{aligned} \text{Variable cost per unit} &= \frac{\text{Total Variable Cost}}{\text{Sales}} \\ &= \frac{10,50,000}{2,00,000} \\ &= \text{Rs.5.25} \\ \text{Contribution per unit} &= \text{Rs.6} - \text{Rs.5.25} \\ &= \text{Rs.0.75} \end{aligned}$$

4. Marketing and distribution decisions and cost studies.

Marketing and distribution decision involves decisions in respect of selling and distribution (or Marketing) costs. The main function of a manufacturing concern is to produce and sell. Similarly, the function of manufacturing concern, like a wholesale or retail business is to purchase and sell good or merchandise. In both the cases, selling and distribution in common function, and the selling and distribution costs are incurred by all concern. As most of the items of selling and distribution expenses are not identifiable with products, these are in the nature of indirect costs.

The sole aim of an undertaking is to maximise profits. This can be achieved by increasing production and, at the same time, by increasing turnover by making efforts to push sales in the existing market or through entry in new markets. Increase in production reduces costs, but this is not enough unless sales can also be increased to meet the increased volume of output. With the increased efforts for promoting sales and also due to increase in competition, considerable expenditure is incurred on selling and distribution and this sometimes exceeds even the cost of manufacture. After - sale service to special products like televisions, refrigerators and a cost of such products, and special facilities given to wholesales, retailers, and direct to consum-

ers further tend increase selling and distribution costs. Therefore the decision on these costs has assumed increasing importance in cost studies, because of:

- i) Cost are not complete and profits cannot be worked out correctly unless selling and distribution costs are included.
- ii) Control of selling and distribution costs.
- iii) Price fixation and formulation of sales price policy.
- iv) Fixation of optimum sales level.
- v) Decision - making in regard to sales such as selling under different conditions, indifferent markets and regions, and by different methods.

The term marketing costs and its two main sub - classifications. viz., pro, promotional costs and physical distribution costs are now being increasingly used to represent the costs covered under selling and distribution overhead.

Sometimes, the decision on marketing and distribution includes decision on different discounts. Discounts take different form. They are (i) distribution discounts (ii) quantity discounts, (iii) cash discounts (iv) time differentials (v) Geographical price differentials (vi) consumer category price differentials, and (vii) personal price distormination.

i) Distributor's Discounts

These are price deductions that systematically make the net price vary accordingly to buyer's position in the chain of distribution. They are so called trade channel discounts since they are allowed to wholesalers, factors, dealers and retailers and as functional discounts as these discounts create differential prices for different customers on the basis of marketing function. These discounts may take any of the following forms.

- a) Different net prices for differnt distributor levels.
- b) A uniform list price modified by a structure of discounts, each, rate applicable to a different level of distributor.
- c) A single discount combined with differing supplementary discounts different level of distributors. For example, 5 per cent to retailers, 5 +3 per cent to local distributors, and 5+3+2 per cent to regional distributors.

ii) Quantity discounts

Quantity discounts are price reduction related to the quantities purchased. They may be related to the size of the order. Where the products are homogeneous commodities, or physical units where the cost of packing is a significant factor and orders of less than standard quantities, or to cumulative purchase.

iii) Cash discounts

Cash discounts are price reductions based on prompt payment. It is a convenient device to identify and overcome bad credit risks.

iv) Time differentials.

Changing different prices on the basis of time is another kind of price discrimination. Two broad types of price differentials may be distinguished.

1. Clock-time differentials
2. Calender - time differentials

When different prices are changed for the same service or commodity at different times withing a 24 hour period , the price differentials are known as clock- time differentials. Telephone S.T.D. Changes, different rate changed for peak hour period and other period etc., provides examples to clock - time differentials.

On the other hand, when price differences are based on a period longer than 24 hours, they are calender time differentials. Seasonal price variations is an example of this kind.

v) Geographical price differentials

Geographical price differentials refer to price differentials based on buyers location. The objective here is to exploit the differences in transport costs due to varying distances between the locations of the plants and the customers.

vi) Consumer category price differentials

These differentials occur when price discrimination is practised according to consumer categories. Electricity companies quote different rates for residential consumers and industrial consumers. Railways also charges differently to children and adults. Similarly they also charge differently on different classed of goods on the basis of what the traffic will bear.

vii) Personal price discrimination

Price concessions are made to indivisionals at time out of personal considerations. For instance, special prices may be given.

You are required to find the advertising cost percent our sales for each product and territory showing how you would present the statement to management.

Solution

a) General advertising cost of Rs.5,8000 is allocated on the basis of sales value as follows.

	Sales	Value	General Advertising Cost	
	Rs.	Rs.	Rs.	Rs.
Territriory North				
Product X	50,000		1,000	
Product Y	30,000	80,000	600	1,600
Territriory Siouth				
Product X	20,000		400	
Product Y	70,000		1,400	
	-----	90,000	-----	1,800
Territriory Middle				
Product Y	80,000		1,600	
Product Z	40,000		800	
	-----	1,20,000	-----	2,400
			Total	5,800

b) Local cost allotted to territories are apportioned to products on the basis of sales value.

	Sales Rs.	Value Rs.	Local Rs.	Cost Rs.
Territory North				
Product X	50,000		2,000	
Product Y	30,000		1,200	
	-----	80,000	-----	3,200
Territory South				
Product X	20,000		1,000	
Product Y	70,000		3,500	
	-----	90,000	-----	4,500
Territory				
Product X	80,000		2,800	
Product Y	40,000		1,400	
	-----	1,20,000	-----	4,200

c) Statement of Advertisement cost for the Management

	TERRITORIES				% of Sales
	North Rs.	South Rs.	Middle Rs.	Total Rs.	
Product X	3,000	1,400	---	4,400	6.28
Product Y	1,800	---	4,400	6,200	5.64
Product Z	---	4,900	2,200	7,100	6.45
	-----	-----	-----	-----	-----
Total Rs.	4,800	6,300	6,600	17,700	6.10
	-----	-----	-----	-----	-----
% on Sales	6.00	7.00	5.50	6.10	

Illustration 16

Aruna Limited manufactures 10,000 units of a product at a costs of Rs.4 per unit and there is home market for consuming the entire volume of production at the sale price of Rs.4.25 per unit. In the year 1996 there is a fall in the demand for home market which can consume 10,000 units only at a sale price of Rs.3.72 per unit. The analysis of cost per 10,000 units is.

	Rs.
Materials	15,000
Wages	11,000
Fixed Overheads	8,000
Variable overheads	6,000

The foreign market is explored and it is found that this market can consume 20,000 units of the product if offered at a sale price of Rs.3.55 per unit. It is also discovered that for an additional 10,000 units of the product (Over initial 10,000) the fixed. Cost overhead will increases by 10 percent . Is it worthwhile to try to capture the foreign market?

Solution

STATEMENT OF SALES PATTERN AND PROFIT.

		1995		1996	
		Home	Home	Foreign	Total
		Market	market	Market	
		10,000	10,000	20,000	30,000
		Units	Units	Units	Units
		Rs.	Rs.	Rs.	Rs.
Sales	(S)	42,500	37,200	71,000	1,08,200
Materials		15,000	15,000	30,000	45,000
Wages		11,000	11,000	22,000	33,000
Variable overheads		6,000	6,000	12,000	18,000
	(V)	32,000	32,000	64,000	96,000
Contribution (S) - (V)		10,500	5,200	7,000	12,200
Fixed Costs		8,000	8,000	1,600	9,600
Profit		2,500	2,800	5,400	2,600

Comment

The table shows that it is advisable to capture the foreign market. It compensates not only the loss on account of sale in domestic market but it also results in an overall profit Rs.2,600

Illustration 18

A machine tool manufacturing company sells its lakhs at Rs.36,500 each made up as follows

	Rs.	Rs.
Direct Materials	16,000	
Direct Labour	2,000	
Variable Overheads	5,000	
Fixed Overheads	3,000	
Variable selling overheads	500	
royalty	1,000	
Profit	5,000	
	-----	32,500
Central excise duty		1,000
Sales Tax		3,000

Total		36,500

There is enough ideal capacity

a) A firm Arabian has offered to buy 10 Lakhs are Rs.28,500 each. Should the company be interested in the business?

b) It has been decided to sell 5 lakhs to an engineering company under the same management at bare cost. What price should you charge?

Solution

COST STATEMENT

	Rs.
Direct Materials	16,000
Direct labour	2,000
Variable overheads	5,000
Variable selling overheads	500
Royalty	1,000

Marginal Cost	24,500
Price offered by the Arabian firm	28,500

	4,000

a) The contribution per lakh is Rs.4,000 of which about Rs.2,500 goes to sales tax. There is a saving of about Rs.1,5000 per lakh in case the export order is surplus and enough idle capacity. It can also be hoped that the central government may exempt the firm from central excise duty on the export. Therefore the company accept the order from the Arabian Firm.

b) The company may charge a price of Rs.31,000 (i.e. Rs.36,500 - Rs.5,500 being profit and selling overhead) as the base cost, subject to any variation sales tax and central excise duty payable by the company on such sales.

5.Inventory control and cost studies

Inventory is comprised of stocks of materials, components work progress, and finished products. Inventory control is the process whereby the investment in material and parts carried in stock is regulated within predetermined limits set in accordance with the inventory policy established by the management. The main objective on inventory control is therefore the achieve maximum efficiency in production and sale with the minimum investment in inventory. Scientific control of inventories the following.

1. Fixation of the limits within which the inventories are to be held.
2. Laying down inventory policies.
3. Setting out the investment patter keeping in view the individual and collective requirements and
4. Examination of the working of the policy and effecting changes as and when needed.

And for an effective inventory control system the following principles are kept in view.

1. Sales are to be correctly forecast.
2. Production schedule should be properly forecast and laid out.
3. Suitable procedures should be laid down to guide management in performance evaluation and decision - making.

In a nutshell inventory control involves planning of (i) what to indent (ii) when to indent (iii) how much to indent and (iv) how much to stock so that purchasing and storing costs are the minimum without affecting adversely production or sales process. Material control versus Inventory control.

Although these two terms are being generally used synonymously, the following distinctions become necessary to be appreciated.

1. Materials control is an operational process, while inventory control is a managerial process being a policy matter.
2. Inventory control precedes material control and the material control process sale in later on.
3. Materials, control gives birth to inventory control and the inventory control form the basis of material control.

Techniques of Inventory Control

There are several techniques for exercising suitable control over inventories. Important among them are

1. Effective and efficient purchasing storage and issuing procedures.
2. Setting of various levels, viz., Maximum level, Minimum level, danger level, re - order level etc.,
3. Fixation of economic order quantity.
4. Establishment of inventory budgets.
5. Use of perpetual inventory system both regarding stores ledger and bin card followed by continuous stock taking.
6. Mini - Max plan.
7. Two bin system.
8. Order cycling system.
9. ABC analysis.
10. VED analysis.
11. XYZ analysis.
12. Use of inventory ratios.
13. Ageing schedule of inventories.
14. Kavder system

15. Review of slow and non - moving items.

Effective and Efficient purchasing

Reliable supplier, required quality, economic price, minimum, investment, etc., are the basic guidelines for effective and efficient purchase. In large concerns, the purchasing function is entrusted to a separate department headed by a purchase manager. The department is equipped with supervisory staff who are familiar with modern purchasing methods and conversant with prevalent commercial practices, customs and excise regulations and procedures. Thus the purchasing process is centralised. Proper indenting process, follow up of orders, receipt of materials and storage are well - planned and executed. Issue of materials is also properly recorded.

Setting up various levels

Terms used in this connection are

1. Maximum level

It is the level beyond which the stock is not permitted. It is calculated as

$$\text{Maximum level} = \text{Re-order level} + \text{reorder quantity} - (\text{Min. consumption} \times \text{Min. Reorder period})$$

2. Minimum level

It is also known as safety level. The stock level is never to fall below this level. It is arrived at by the formula.

$$\text{Minimum stock level} = \text{Re-ordering Level} - (\text{Normal consumption} \times \text{Normal Re-order period})$$

3. Reorder level

It is also known as the level at which further supplies must be ordered. The formula is

$$\text{Re-order level} = \text{Maximum Re-ordering period} \times \text{Maximum usage.}$$

4. Danger level

It is the level which should never be allowed to fall in normal circumstances. It is slightly less than the minimum level. At this level, the normal issues are stopped.

5. Average stock

It indicates the level of the average stock held by the firm. It is usually calculated by the formulas.

$$\text{i) Average stock level} = \frac{\text{Maximum level} + \text{Minimum level}}{2}$$

$$\text{ii) Average stock level} = \text{Minimum stock level} + \frac{1}{2} (\text{Re-order Quantity})$$

6. Economic Order Quantity (EOQ)

It is also known as re-ordering quantity. It is the quantity to be ordered when the stock reaches the minimum level. It is so called because it is an optimum quantity or economic lot size. It

means that the total cost is at minimum. The formula to calculate this quantity is

$$EOQ = \sqrt{\frac{2AS}{CU}}$$

Where A	=	Annual consumption quantity
A	=	Buying cost per order or also Called ordering cost.
C	=	Cost per unit.
U	=	Storage and carrying cost.

Illustration 19

Form the following data for the last twelve months compute the stock levels for a component.

Maximum usage in a month	=	300 units
Minimum usage in a month	=	200 units
Average usage in a month	=	225 units.

Time lag procurement of material 6 months Minimum 2 months. Recording quantity 750 units.

Solution

Reorder level =	Maximum usage x Maximum head time
=	300 x 6 = 1,800 units.
Minimum level=	Re-order level - (Average usage x Average head time)
=	1,800 - (225 x 4)
=	900 Units.
Average stock level =	Minimum stock + 1/2 (Reorder quantity)
=	900 + (1/2 x 750)
=	1,275 Units.

7. Ordering cost

It is the cost of placing an order and securing the supplies. It varies from time to time depending upon the number of order. The more frequently the orders are placed and fewer the quantities purchased on each order, the greater will be ordering cost.

8. Inventory carrying cost

It is the cost of keeping the item in stock. It includes interest on investment, obsolescence losses, store keeping costs, insurance premium, etc., The large the volume of inventory the higher will be the inventory cost and vice versa.

Illustration 20

Two material A and B, are use as follows

Maximum usage	=	50 units each per week
Minimum usage	=	150 units each per week
Normal wage	=	100 units each per week

Ordering quantities

A - 600 units, and B = 1,000 units.

Delivery period

A - 4 to 6 week and B -2 to 4 week calculate for each material.

- Minimum level
- Maximum level; and
- Ordering level

Solution

MATERIAL A

Ordering level	=	Maximum Rate of Consumption x Maximum period of delivery
	=	150 x 6
	=	900 units.
Minimum level	=	Ordering level - (Normal rate of consumption x Normal Peiod of delivery
	=	900 - (100 x 5)
	=	400 units.
Maximum level	=	Ordering level + Ordering Quantity - (Minimum rate of Consumption x Minimum period of delivery)
	=	900 + 600 - (50 x 4 = 1500 - 200)
	=	1,300 units.

MATERIAL B

Ordering level	=	150 x 4 = 600 units.
Minimum level	=	600 - (100 x 3) = 600 - 300
	=	300 units.
Maximum level	=	600 + 1,000 (50 x 2)
	=	1,600 - 100
	=	1,500 units.

Illustration 21

You are required to calculate the following levels for parts No. 8090, from the information given below.

- Recording level;

- b) Maximum level;
- c) Danger level and
- d) Average stock level;

The recording quantity is to be calculated from the following data.

- i) Total cost of purchase relating to the order is Rs.20
- ii) Number of units to be purchase during the year is 5,000
- iii) Purchase price per unit including transportation cost is Rs. 50
- iv) Annual cost of storage of one unit is Rs.5

Lead Times

Average	-	10days
Maximum	-	15days
Minimum	-	6days

Maximum for emergency purchase-4days.

Rate of consumption

Average	-	15 units per day
Maximum	-	20 units per day

Solution

- a) Recording level = Maximum usage x Minimum lead time
 = $20 \times 15 = 300$ units.
- b) Maximum level = Recording level + Recording quantity minimum
 = usage x Minimum lead time.
 = $300 + 200 - 10 \times 6$
 = 440 units.
- c) Minimum level = Recording level - Average consumption x
 Average lead time
 = $300 - 15 \times 10$
 = 150 units.
- d) Danger level = Average consumption x Maximum lead time for
 emergency purchase
 = $15 \times 4 = 60$ units.
- c) Average stock level = Minimum level + $\frac{1}{2}$ (Recording quantity)
 = $150 + \frac{1}{2} \times 20$
 = 250 units.
- Recorder quantity = -----
 CU
- Where A = Annual purchase

S	=	Ordering Cost
C	=	Cost per unit
U	=	Storage cost (in percentage 2p)
		2 Time 5,000 x20
	=	----- = 40,000=200 units
		50x10/100

Inventory Budgets

Right level of inventory control techniques is setting inventory in order to avoid unnecessary investment in holding stock

Perpetual Inventory System

Stores records are basically bin card and store ledger. Maintenance of continuous parity between these two records through regular inventory checking is called perpetual inventory system. It provides information on the actual availability of materials in store.

Min- Max plan

According to this technique, the minimum and maximum levels are fixed for each of inventory.

Two bin system

Under this technique two bins are maintained for each item of inventory. The first bin contains such quantity of inventory which is sufficient to meet the consumption requirement till the next order is placed. The second bin contains the safety stock and also the stock necessary to meet the consumption requirement from the date of order till the receipt of the inventory.

Illustration 19

The minimum level of stock for item A is 1,000 units.

Daily consumption is 100 units.

Time taken for obtaining a fresh is 4 Days.

Time interval between two orders is 20 days calculate the first bin quantity.

Solution

First bin card contains $20 \times 100 = 2000$ units.

Second bin card contains $4 \times 100 = 400$ units.

Order cycling system

In the case of this technique, the stock of each item of inventory is reviewed periodically say monthly or quarterly. If the review results disclose that stock level of a particular item of inventory will not be sufficient till the next scheduled date of review on the basis of probable rate of consumption an order is placed to replenish the supply. The review period

differs from firm to firm and from material to material. The order of replenishing a given item of inventory is processed to bring it to the desired level.

ABC analysis

A B C analysis is the technique of exercising selective control over inventory items. It is based on the assumption that a firm need not exercise the same amount of control on all item of inventory, It aims at greater control over such items which are more valuable and lesser degree of control on lesser value items. According to this techniques, the items of the inventory are classified into three categories viz., A,B and C

Category A include items of minimum quantity but maximum value, while category C items of maximum quantity and minimum value. All other items are include in category B. Strict control procedure are practised on A category items and the least effort of control is directed towards category C. Naturally category B items attract average control measures.

Inventory surveys in general have revealed the following the trends regarding the components of inventories manufacturing organisation.

Category	% of total value	% of total Quantity
A	70	10
B	25	35
C	5	55

VED Analysis

VED analysis is similar in nature and is used in the case of super part inventories. The parts are classifies as V (Vital) E (Essential) and D (Desirable) based on their requirement. Control measures are arranges. In accordance with the type of category. It is largely useful to capital intensive industries.

XYZ Analysis

This type of analysis is based on the value of inventory in stock, While ABC analysis is based on the value of materials consumed, and VED analysis on the important of items in stock.

The technique of XZ analysis is resorted to at the items of stock taking X items are such items of high value, While Z group of items are of low inventory value Y items fall in between in inventory value. X items attract greater attention. Y items are given better attention than Z items.

Inventory Turnover Ratios

Inventory turnover ratio is computed in order to minimise investment in inventory with-

out disturbing the flow of materials to production. It is calculated as:

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost of material consumed/ goods sold}}{\text{Average inventory.}}$$

Inventory turnover ratios regarding different items of inventory may be compared with the ratios of earlier of periods. Such a comparison may reveal the following four types of inventories.

They are (i) slow moving inventories (ii) dormant inventories (iii) obsolete inventories (iv) fast moving inventories forming the basis of FSN analysis F stands moving is for slow moving and N for non moving items of inventory. This helps the management to arrange for appropriate inventory control operations.

Ageing schedule of inventory

This techniques is characterised by the classification of the inventories to the age of the inventory in stock which helps in identifying inventories which are moving slowly into production / sales. An example is presented as follows:

AGING SCHEDULE OF INVENTORY

as on March 31,1996

Age Classification (days)	Date of purchase / manufacture	Amount Rs.	Percentage to Total
0-15	March 16	8,000	20
16-30	March 12	4,000	10
31-45	February 26	2,000	5
46-60	February 10	20,000	50
60 and above	January 25	6,000	15
		40,000	100

The above table shows that 50% of the inventory is of the age group of 46-60 days, while 15 % is older than 60 days. This sort of information may prompt action on the part of the management, last a conderable quantity may suffer deterioration in its value and become obsolete.

Kardex system

Under this system, a card is maintained for each item of the inventory. The cards ar-

ranged in an metallic tray kept in Kardex cabinets specially manufactured for the purpose. That is why the name Kardex system. Now a days computers are used for the purpose.

6. Plant location and cost studies.

Good location of plant ensures economical manufacture and effective distribution of products. The governing principle is that the location of plant should be fixed in such a manner that people interested in its success can sell goods most profitably and manufacture them with the least expense.

Although plant location does imply any direct cost which can be allocated to a product there is no area of cost not affected by the location of plant. Labour cost is reduced by proximity to large adaptive labour. Access to raw materials and transport facilities make raw materials at cheaper cost. Nearness to market reduces outward transport expenses and supply at normal rates increases the profit margin even some of the fixed assets may suffer depreciation at lower rate. Thus location of plant has an influential effect on both fixed cost and variable costs as well.

Marginal cost may be increased or decreased depending upon the nature of location of the factory plant and thereby the contribution. On the other hand profit also effected through fixed overheads. Therefore cost studies should aim at providing the cost information to the management so that the decision on locational factors are taken on sound lines to ensure that the costs influenced by locational factors are maintained at the minimum. Manufacturing efficiency increases on accounts of advantages location through making the availability of adaptive labour, nearness to source of power, ready accessibility to repair services, nearness to financial institutions, better transport and communication, adequate fire fighting facilities, and so on.

Conclusion

Decisions are the basic and creative tool of management. In the world of uncertainties, decision is the most creative event in the life of the business executive. Decision being an effort to choose the best from among the alternatives involves steps like defining the problem, identifying various alternatives, evaluating qualitative factors obtaining additional information selection of an alternative, appraisal of the results.

Cost studies bring out information required in the process of managerial decisions especially of facts relating to product and production decisions, marketing and distribution decisions and decisions relating inventory control and plant location. The effective tool which has

emanated from cost studies is the analysis of marginal costing and contribution.

Questions:

1. Define decision and decision - making.
2. Describe the steps involved in decision making.
3. Discuss any six areas requiring costing information for decision making process and how cost studies help.
4. What are the occasions when vital price distribution is needed?
5. Discuss various method of pricing the products.
6. Explain different types of discounts and price differentials.
7. Distinguish between materials control and inventory control.
8. Write brief notes on:
 - (a) Two bin system
 - (b) ABC System
 - (c) VED analysis
 - (d) XYZ analysis
 - (e) Kardex system.
9. Write short notes on
 - (a) Minimum level
 - (b) Maximum level
 - (c) Danger level
 - (d) Recording level
 - (e) Recording quantity
 - (f) Economic order quantity
 - (g) Recorder period.
10. Briefly explain location of plant involves cost studies and managerial decision making.
11. Volume of output of a product to be manufactured and sold may be 100, 2000 or 3000 units. Then the above units of the product are sold the selling price per unit are estimated to be Rs.50, Rs.45 and Rs.40 respectively variable production overheads are 75% of wages. The material and labour cost per unit. Fixed costs are the same for all volumes. Determine the most profitable volume of output.

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