STRATEGIC COST ACCOUNTING

(MCM2C08)

STUDY MATERIAL

II SEMESTER

CORE COURSE

M.Com.

(2019 Admission onwards)

UNIVERSITY OF CALICUT

SCHOOL OF DISTANCE EDUCATION

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School of Distance Education
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MCM2C08 : STRATEGIC COST ACCOUNTING

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MODULE 1:

OVERVIEW OF COST ACCOUNTING

Cost

- Benefits received for the sacrifices made.
- ICAI defines Cost as measurement, in monetary terms of the amount of resources used for the purpose of production of goods or rendering services.
- Cost is the value of economic resources expended as a result of producing or manufacturing.
- Cost represents the resources that have been or must be sacrificed to attain a particular objective. The resources may comprise tangible substances (material or machinery) or they make take the form of services (wages, rent, power or time spent).

Routinely accumulated accounting data are essential ingredients for a wide variety of managerial decisions.

- Cost Finding is the process by which a company obtains estimates of the cost for producing a product or providing a service or performing a function or operating a department.
- Cost Analysis is the process of designing cost to support strategic planning, decision making and cost reduction.
- Cost Recording is the documenting of the cost, it further allows a company for better cost management.

- Cost Reporting is the process of coding and allocating cost to track the financial efficiency and profitability.

COST vs. EXPENSE

- EXPENSES are the expired cost which has matching economic benefit. It is deductible from the resource. Expense is an expired cost resulting from productive usage of an asset.

  Example- Rent, Insurance, Tax

- COST is incurred when a resource is used for some purpose. The amount of expenditure incurred on or attributable to a given thing or to ascertain the cost of a given thing.

  Example- Raw Material, wages for labour, Production overheard.

Costing

It is a process for determining cost. In other words, a technique for ascertaining the cost of production of any product or service in the business organization.

According to Wheldon, costing is, — the classifying, recording and appropriate allocation of expenditure for the determination of the costs of products or services; the relation of these costs to sales values; and the ascertainment of profitability. In general, it is understood as process for determining cost.

Cost Accounting

It may be defined as "Accounting for costs classification and analysis of expenditure as it will enable the total cost of any particular unit of production to be ascertained with reasonable degree of accuracy and at the same time to disclose exactly how such total cost is constituted". Thus, Cost Accounting is classifying, recording an appropriate allocation of expenditure for the determination of the costs of products or services, and for the presentation of suitably arranged data for the purpose of control and guidance of management.

Furthermore, Cost Accounting can be explained as follows:

- Cost Accounting is the process of accounting for cost which begins with recording of income and expenditure and ends with the preparation of statistical data. It is the formal mechanism by means of which cost of products or services are ascertained and controlled.
- Cost Accounting provides analysis and classification of expenditure as will enable the total cost of any particular unit of product / service to be ascertained with reasonable degree of accuracy and at the same time to disclose exactly how such total cost is constituted. For example it is not sufficient to know that the cost of one pen is Rs.25/- but the management is also interested to know the cost of material used, the amount of labour and other expenses incurred so as to control and reduce its cost. It establishes budgets and standard costs and actual cost of operations,

processes, departments or products and the analysis of variances, profitability and social use of funds.

Thus Cost Accounting is a quantitative method that collects, classifies, summarizes and interprets information for product costing, operation planning and control and decision making.

ICMA, England has defined cost accounting as *"the process of accounting for cost from the point at which expenditure is incurred or committed to the establishment of its ultimate relationship with cost centres and cost units."*

Cost Accountancy

This term is over and above costing and cost Accounting. It facilitates management with cost control initiatives, ascertainment of profitability and informed decision making. It envisages application of costing and cost accounting in a business setup. It includes determination of selling price and profitability in addition to forecasting of expenses and future probable incomes. It facilitates management with cost control initiatives, ascertainment of profitability and informed decision making. Besides, costing and cost accounting, the following areas are also covered under cost accountancy:

- Cost Reduction is aimed at achieving real and permanent reduction in the unit cost of goods produced or services rendered without compromising the quality or suitability.
- Cost Control refers to search for better and more economical ways of completing the current operations. It

simply identifies and prevents waste within the existing environment.

- Cost Audit includes the verification of cost accounts and a check on their adherence to the cost accounting principles, plans, procedures and objectives.

Therefore, Cost Accountancy is defined as 'the application of Costing and Cost Accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability'. It includes the presentation of information derived there from for the purposes of managerial decision making.

Scope of Cost Accounting

Cost accounting refers to the process of determining the cost of a particular product or activity. It provides useful data both for internal and external reports reporting. Internal reporting presents details of cost data in a summarized and aggregate form. For instance, in case a company manufacturing electrical goods cost of each product. In order that cost accounting satisfies the requirements of both internal and external reporting, the following are the different activities which are undertaken under cost accounting system:

Cost Determination: This is the first step in the cost accounting system. It refers to determining the cost for a specific product or activity. This is a critical activity since the other three activities, explained below, depend on it.

Cost Recording: It is concerned with recording of costs in the

cost journal and their subsequent posting to the ledger. Cost recording may be done according to integral or non-integral system a separate set of books is maintained for costing and financial transactions.

Cost Analyzing: It is concerned with critical evaluation of cost information to assist the management in planning and controlling the business activates. Meaningful cost analysis depends largely upon the clear understanding of the cost finding methods used in cost accounting. Cost accounting determines the deviation of the actual cost as compared to the planned expense, along with the reason for such variation.

Cost Reporting: It is concerned with reporting cost data both for internal and external reporting purpose. In order to use cost information intelligently it is necessary for the managers to have good understanding of different cost accounting concepts. Cost reports are prepared from the data acquired through cost accounting to be analysed by the management for strategic decision making.

Cost Audit: To verify the cost sheets and ensure the efficient application of cost accounting principles in the industries, cost audits are done.

Cost Ascertainment: To determine the price of a product or service, it is essential to know the total cost involved in generating that product or service.

Cost Book Keeping: Similar to financial accounting; journal entries, ledger, balance sheet and profit and loss account is prepared in cost accounting too. Here, the different cost

incurred is debited, and income from the product or service is credited.

Cost System: It provides for time to time monitoring and evaluation of the cost incurred in the production of goods and services to generate cost reports for the management.

Cost Comparison: It examines the other alternative product line or activities and the cost involved in it, to seek a better opportunity for generating high revenue.

Cost Control: Sometimes, the actual cost of a product or service becomes higher than its standard cost. To eliminate the difference and control the actual cost, cost accounting is required.

Cost Computation: When the company is engaged in the production of bulk units of a particular product or commodity, the actual per-unit cost is derived through cost accounting.

Cost Reduction: It acts as a tool in the hands of management to find out if there is any scope of reducing the standard cost involved in the production of goods and services. Its purpose is to obtain additional gain.

Objectives of Cost Accounting

Cost accounting aims at eliminating the loopholes in the production process and ensures manufacturing of goods at the lowest possible cost.

- **Control and Reduce Cost**: Cost accounting continuously focuses on managing the cost of production per unit to improve profitability without compromising with the quality of the product. Another important objective of the

cost accounting system is to control the costs. It keeps a check on the expenses made by the company, against the set standards and the deviations are recorded and reported continuously. The management works to further reduce the cost to increase the profitability of the company. Cost reduction implies the actual and permanent reduction in the cost of production without compromising with the quality and the suitability of its desired use.

- **Determine Selling Price**: It provides the total cost incurred in the product or service, which is the base for fixing an appropriate selling price. As the prices of the cost object, i.e. the product is determined by the external factors such as market demand for the product, competitor's price, etc. However, the basis for ascertaining the price is the total cost of production and the cost accounting techniques helps in determining it.
- **Assist Management in Decision Making**: The reports and cost sheets generated based on cost accounting back the managerial decisions of the organization.
- **Ascertain Closing Inventory**: It determines the closing inventory value at the end of the financial year.
- **Ensure Profit from Each Activity**: Cost accounting reviews the cost and takes corrective actions at each level to ensure profitability from all business activities.
- **Budgeting**: It generates the estimated cost of products or services to assist in budget planning, implementation and control.

- **Setting Performance Standards**: It provides a standard cost of goods or services to sets a level for the future course of action.
- **Business Expansion**: It estimates the cost of production at different stages, based on this analysis, the management can plan for expansion of the business.
- **Minimizing Wastage**: Cost control and reduction so attained helps in reducing the wastage during the manufacturing process.
- **Improves Efficiency**: Cost accounting assures cost management, profit appreciation and less wastage which ultimately enhances the overall production and manufacturing process of products.
- **Determination of Cost**: To accumulate, allocate and ascertain cost for each cost object is the primary objective of the cost accounting.
- **Determination of Closing Inventory**: To ascertain the value of closing inventory at the end of the period for the preparation of financial statements of the concern.
- **Assisting Management**: To report to the management about the inefficiencies of the workers and eliminates wastes like material, expenses, equipment, tools and so forth. It also ensures optimum utilization of resources of the organization by making sure that no machines are left idle, the workers get incentives for their performance, proper utilization of by-products and so forth.

- **Economies of Production**: To reflect different sources of economies of scale, concerning the process, type of equipment, inputs used, the output generated etc.

Limitations of Cost Accounting

The limitations of cost accounting are as follows:

1. **The system is more complex:** Cost accounting needs to identify the different types of expenses and allocation of expenses is considered as a complicated system of accounting. It needs different forms and formulas to collect the data and preparing the reports. Also it requires number of steps in ascertaining such details. So it involves a more complex system. More complex and complicated system of cost accounting is one of the limitation facing by the cost accounting.
2. **It is expensive*:*** In installing and maintaining cost accounting system requires more man power and resources. More analysis, allocation and absorption of overheads requires considerable amount of additional work. If the expenses incurred in ascertaining the cost is more than what is derived from it, then the process of cost accounting is meaningless. In short, the expenses of cost accounting should not be more than the profit derived from cost accounting. Many companies does not adopt cost accounting owing the fact that it is more expensive and not economical.
3. **Inapplicability of costing method and technique.** Technique and methods of cost accounting

differ from organization to organization. One standard method is not adequate for all the requirement of different organizations. It depend on the nature of business and the type of service/product manufactured by the firm. If wrong technique or method is used, it will affect the result. So inapplicability of same costing method and technique is the one of the main limitation of cost accounting.

4. **Lacks social Accounting:** Social accounting is outside the scope of cost accounts. Cost accounting fails to take into account the social obligation of the business.
5. **Lack of cooperation of employees:** Cost accounting depends heavily on the cooperation of employees concerned. Lack of cooperation of employees will affect the overall performance of cost accounting. Non-cooperation or opposition from employees will affect the results.
6. **It serves the information need of the management:** We cannot depend on cost accounting for the financial information required by the shareholders, creditors, employees and the society at large. It only serves the requirement of information needed by the management.
7. **Not useful for determining the tax liabilities:** We cannot treat cost accounting as a basis for determining the tax liabilities of the business. Financial accounting is required for the determination of tax liabilities.

Art, Science and Practice

Cost Accountancy is the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived there from for purposes of managerial decision making. It is science because it is a body of systematic knowledge having certain principles which a cost accountant should possess for proper discharge of his responsibilities. It is an art as it requires the ability and skill with which a cost accountant is able to apply the principles of cost accountancy to various managerial problems. Practice includes continues efforts of a cost accountant. Such efforts also include the presentation of information for the purpose of managerial decision making and keeping statistical records. Thus bringing Cost Accountancy as a science, art and practice of a Cost Accountant. Moreover, Science indicates the possession and the application of relevant systematic knowledge. Art indicates the skill and ability of the Cost Accountant. Practice indicates a continuous effort on the part of the Cost Accountant.

Cost Accountancy is the science, art and practice of a cost accountant. It is a science because it is a systematic body of knowledge having certain principles that a cost accountant should follow. It is an art as it requires special skill on the part of the cost accountant to apply the costing principles. It is a practice as it involves continuous work of a cost accountant in the field of cost accountancy.

Cost Accounting System

The cost accounting system is meant for simplifying the work of the manufacturers, who need to track the flow of inventory on a continuous basis through various stages of production.

Basically, a company deploys the cost accounting system to track the raw materials even before the production process begins. Eventually, these raw materials convert into finished goods in real-time. Once the raw materials enter the production, system tracks and record the use of the materials by crediting the raw material account and debiting the goods in the process account. Since most products go through many stages before they can be called finished goods, there are often several different work in process accounts. The real time component of the system is its most valuable feature. Management can make decisions based on current data and don't have to wait for reports to get aggregated.

The following factors should be taken into consideration while designing a costing system:

1. **Size of the firm**: Size of the firm is an extremely important factor in designing a cost accounting system. As the size of the firm and its business grows, the volume and complexity of cost data also grows. In such situation, the cost accounting system should capable of supplying such information.
2. **Manufacturing process**: Process of manufacturer changes from industry to industry. In some industries,

there may be a continuous process of production while in some batch or job type of production may be in operation. A cost accounting system should be such that the manufacturing process is taken into consideration and cost data is collected accordingly.

3. **Nature and Number of Products**: If a single product is produced, all costs like material, labour and indirect expenses can be directly allocated to the product. But if more than one product is manufactured, the question of allocation and apportionment as well as absorption of indirect expenses arises and hence the cost accounting system should be designed accordingly as more complex data will be required.

4. **Management Control Needs**: The designing of a cost accounting system in a business organization is guided by the management control requirements. The costing system should supply data to persons at different levels in the organization to take suitable action in these respective areas.

5. **Raw Materials**: The designing of a cost accounting system in a business is also guided by the raw materials required for the production. The costing should be such that identification of spoilage, keeping record of materials, pricing of issues etc are taken into consideration.

6. **Organization Structure**: The structure of the organization also plays a vital role in designing a costing

system. The system should correspond to the hierarchy of the organization.

7. **External Factors**: External factors are also important in designing of a costing system. For example, Cost Accounting Record Rules have been mandatory for certain types of industries.

Importance of Cost Accounting to Management

- Its primary purpose is to facilitate **managers** in decision making.
- Adequate costing data help management in reaching certain important decisions such as, whether hand labor should replace by the machinery or not; whether a particular product line should discontinue or not etc.
- Costing checks recklessness and avoids the occurrence of mistakes.
- Costs can reduce by the proper organization of the plant and executive personnel.
- As an aid to management, it also provides important information to enable management, to maintain effective control over stores and inventory, to increase the efficiency of the business, and to check waste and losses.
- It facilitates the delegation of responsibility for important tasks and ratings of employees.

However, for all this, the management must be capable of using properly the information provided by the cost accounts.

Importance of Cost Accounting to Workers

- Sound Wage Policy – Cost accounting introduces incentive wage schemes, bonus plans etc. which bring better reward to sincere and efficient workers. Cost data aid the management in devising a suitable wage policy for the workers.
- Higher Bonus Plans – Cost accounting leads to an increase in productivity, lowering of costs and increase in profitability. Workers get their share in profits in the form of bonus. Higher profits naturally allow higher bonus distribution.
- Distinction between Efficient and Inefficient Workers – Cost accounting provides standards for the measurement of efficiency of workers. Efficient workers can be distinguished and their efficiency recognized and rewarded. Employees have been initiated and recommended for higher promotions. This means, increase in earnings, through the motion study and time study in doing jobs. Others get the encouragement to be more efficient and to earn more wages in the given time of work.
- Security of Job – Employees get better remuneration, security of job etc., due to the increasing prosperity of the industries. Monetary appreciation of the efficiency of a worker is a good tonic which leads to higher rate of productivity.

Importance of Cost Accounting to creditors

- Bankers, creditors, investors etc., can have a better

understanding of the firm, as regards the progress and prosperity, before they offer financial landings

Importance of Cost Accounting to investors

- The investors also feel secured if there is prosperity in a business as they feel that their money remains secured. Hence, more and more people are attracted to invest in the concern which further increases the prosperity of the business.

Importance of Cost Accounting to government

- A cost system provides ready figures to use for Government, wage tribunals, trade unions etc., for use in problems relating to price fixing, wage level fixation, settlement of industrial unions disputes etc. The Government can plan its policies based on the techniques and procedures of cost accounting.
- Cost accounting, therefore, promotes economic development. To reduce cost of production and sales price, the Government has introduced cost audit in most of the industries for e.g., the industries which are engaged in production, processing, manufacturing and mining activities. Such companies are now required to keep certain costing records and have to submit certain statutory returns to the Government periodically. By doing all these, the advantage to the Government is that there can be price stability in the economy.

Importance of Cost Accounting to general public

- As costing removes all the types of wastages, scraps the general public, gets the products at lower prices. Again when a unit grows in size its requirements also grow. For example, more man-power is needed, more raw material requirements arise, more sales are made etc. Hence, it leads to more employment of the local people; more suppliers of raw materials enter the markets etc.
- When the sales are more, there can be large scale production and hence the advantages of economies of scale can be achieved, which in turn reduces the prices. Due to reduction in costs, inflation in the economy can be controlled. This is because people will have to pay less price for the products and hence, can save their income.

Advantages of Cost Accounting System

i. Measurement and Improvement of Efficiency

ii. Profitable and Unprofitable Activities

iii. Fixation of Prices

iv. Guide in Reducing Prices

v. Information for Proper Planning

vi. Decision Regarding Machine vs. Labour

vii. Helps in Taking Decisions

viii. Check on Accuracy of Financial Accounts

ix. Control Over Expenditure

x. Reasons for Losses Detected

Essentials of a good Cost Accounting System

Cost Accounting System should be tailor-made, practical, simple and capable of meeting the requirements of a business concern. The data to be used by the Cost Accounting System should be accurate; otherwise it may distort the output of the system. The essentials of a good journal are:

- Informative and simple
- Flexible and adaptive
- Accurate and authentic
- Uniformity and consistency

Reports provided by Cost Accounting Department

(i) Cost sheet setting out the total cost, analysed into various elements, giving comparative figure of previous period and other plants under the same management,

(ii) Consumption of material statements.

(iii) Labour utilization statements, details about total number of hours paid for, standard hours for output, idle time and causes thereof.

(iv) Overheads incurred compared with budgets.

(v) Reconciliation of actual profit earned with estimated or budgeted profit.

(vi) Total cost of abnormally spoiled work in the factory and abnormal loss and store.

(vii) Total cost of inventory carried, number of monthly stocks would be sufficient.

(viii)Labour turnover and cost of recruitment and training of new employee.

(ix) Expenses incurred on R & D as compared to budgeted amount.

(x) Statement showing sales compared with budget.

(xi) Reconciliation statement between financial profits with costing profit.

Practical difficulty in installation of Costing System

Lack of Support from Top Management:

Effective functioning of nay system requires wholehearted support from the management. Otherwise the system will fail or may not produce the desired results. Management has all responsibility to receive the reports and feed backs and take necessary actions on the reports.

Lack of Cooperation from the Staff:

The tendency of the staff is to resist any new system at the beginning and may not extend full cooperation for the system to function effectively. If the tendency continues further and refuse to cooperate then problems may arise.

Different Authority Structure:

The costing system may be based on formal authority structure, but in reality there may exist a different authority structure. For example, if trade unions have greater influence in the decision-making process, then the system may run into difficulties.

Changing Environment:

Changing environment has greater influence on business operations. The market may change, the production process may change and the management ideas may change. If the costing system fails to take account of the changes, then the system will fail to deliver the desired results and may run into difficulties.

Lack of Overall Control on the System:

The system should be watched continuously. When some part of the system breaks down, it should be set right then and there. Otherwise the whole system will break down. For example, if inventory is not properly controlled, then the whole material control system may break down. Ultimately the whole cost accounting system may fail.

Lack of Clarity on Objectives:

The cost accounting department staff should be clear about the priorities and objectives of the system. They should know the purpose of information collected and its end use. If not, they may not collect correct information or may send wrong or inadequate information.

Few of the steps to overcome the above difficulties are-

- Arrange Meeting
- Implement training
- Proper Supervision

- Impress Top Management
- Install system according to specific requirements

Comparison of Cost Accounting with other subjects- Financial Accounting and Management Accounting.

The most important differences between the Cost Accounting and Financial Accounting. The information provided by the Cost Accounting is helpful in the decision making of the managers to control costs, but it lacks comparability. The information provided by the financial accounting is capable of making comparisons, but future forecasting cannot be done through this information. That is why they both go side by side, in fact, cost accounting data is helpful for financial accounting.

Following are the key differences between cost accounting and financial accounting:

1. Cost Accounting aims at maintaining cost records of an organization. Financial Accounting aims at maintaining all the financial data of an organization.
2. Cost Accounting Records both historical and per-determined costs. Conversely, Financial Accounting records only historical costs.
3. Users of Cost Accounting is limited to internal management of the entity, whereas users of Financial Accounting are internal as well as external parties.

4. In cost, accounting stock is valued at cost while in financial accounting, the stock is valued at the lower of the two i.e. cost or net realisable value.
5. Cost Accounting is mandatory only for the organisation which is engaged in manufacturing and production activities. On the other hand, Financial Accounting is mandatory for all the organisations, as well as compliance with the provisions of Companies Act and Income Tax Act is also a must.
6. Cost Accounting information is reported periodically at frequent intervals, but financial accounting information is reported after the completion of the financial year i.e. generally one year.
7. Cost Accounting information determines profit related to a particular product, job or process. As opposed to Financial Accounting, which determines the profit for the whole organisation made during a particular period.
8. The purpose of Cost Accounting is to control costs, but the purpose of financial accounting is to keep complete records of the financial information, on the basis of which reporting can be done at the end of the accounting period

While in the case of difference between Cost Accounting and Management Accounting are:

BASIS OF COMPARISON	COST ACCOUNTING	MANAGEMENT ACCOUNTING
Meaning	The recording, classifying and summarizing of cost data of an organization.	The accounting in which the both financial and non-financial information are provided to managers.
Information Type	Quantitative	Quantitative and Qualitative
Objective	Ascertainment of cost of production.	Providing information to managers to set goals and forecast strategies.
Scope	Concerned with ascertainment, allocation, distribution and accounting aspects of cost.	Impart and effect aspect of costs.
Specific Procedure	Yes	No
Recording	Records past and present data	It gives more stress on the analysis of future projections.
Planning	Short range planning	Short range and long range planning
Interdependency	Can be installed without management accounting.	Cannot be installed without cost accounting

To recapitulate, Cost accounting deals with the calculation and assessment of costs and expenses to purchase or produce something. It relates to calculation per unit cost using different costing techniques. Its primary purpose is to facilitate managers in decision making. Management accounting relates to the provision of appropriate information for decision-making, planning, cost control and performance evaluation. Management accounting on the other hand, turns data into information, knowledge, and wisdom about a business entity's operations. This is one step further than cost accounting. Management accounting works to know the reasons of profit or loss and studies the factors which

influence efficiency to assist in decision making. Therefore, cause and effect is an important feature of management accounting. Financial Accounting as explained above is concerned with the summary, analysis and reporting of financial transactions related to a business. This involves the preparation of financial statements available for stockholders, suppliers, banks, employees, government agencies, business owners, and other stakeholders i.e. people interested in receiving such information for decision making purposes.

MODULE II:

PERFORMANCE MEASUREMENT IN COST ACCOUNTING

COST UNIT

The Chartered Institute of Management Accountants (CIMA), London, defines a unit of cost as ―a unit of quantity of product, service or time in relation to which costs may be ascertained or expressed.

The preparation of cost accounts requires selection of a unit for identification of expenditure. The quantity upon which cost can be conveniently allocated is known as cost unit. In other words, it is the quantity upon which cost can be conveniently.

Examples

Item	**Unit**
Bricks	Per 1000 Bricks
Printing	Per 1000 Impression
Screw	Per 1000 Screw
Pencil	Per Dozen
Telephone Service	Per Minute/Calls
Petrol	Per Litter

COMPOSITE COST UNIT

The cost unit is a compound unit. A composite cost unit is more appropriate if a service is a function of two variables.

Examples of composite cost units are as follows:

Tonne-miles for haulage companies

Patient-days for hospitals

Passenger-miles for public transport companies

Guest-days for hotel services.

COST OBJECT

A cost object is anything for which a cost is to be calculated or that makes you incur a cost. It may be defined as anything for which a separate measurement of cost is desired. It could be a part of the process to come up with the pricing of a product or service or, it could be a separate task to find the cost for the cost objects.

Cost OBJECT	EXAMPLES
PRODUCT	Laptop
SERVICE	Air Fare from Kerala to Delhi
PROJECT	Construction of a two storeyed building
DEPARTMENT	HR Department of a company

CLASSIFICATION OF COSTS

An important step in computation and analysis of cost is the classification of costs into different types. Classification helps in better control of the costs and also helps considerably in decision making. Classification of costs can be made according to the following basis:

A. Classification according to elements:

Cost can be classified according to the elements. There are three elements of costing, viz. material, labour and expenses. Total cost of production/services can be divided into three elements to find out the contribution of each element in the total costs.

B. Classification according to nature:

As per this classification, costs can be classified into Direct and Indirect. Direct costs are the costs which are identifiable with the product unit or cost centre while indirect costs are not identifiable with the product unit or cost centre and hence they are to be allocated, apportioned and then absorb in the production units. All the elements of costs like material, labour and expenses are classified into direct and indirect. They are mentioned below:

- Direct and Indirect Material- Direct Material is the material which is identifiable with the product. For example, in a cup of tea, quantity of milk consumed can be identified, quantity of glass in a glass of bottles can be identified and so these are direct materials for the products.
- Direct and Indirect Labour: Direct Labour can be identified with a given unit of product, for example, when wages are paid according to the piece rate, wages per unit can be identifies. Similarly wages paid to workers who are directly engaged in the production can also be identified and hence they are direct wages. On the other hand, wages

paid workers like sweepers, gardeners, maintenance workers etc. are indirect wages as they cannot be identified with the given unit of production.

- Direct and Indirect Expenses: Direct expenses refers to expenses that are specifically incurred and charged for specific or particular job, process, service, cost centre or cost unit. These expenses are also called as chargeable expenses. Examples of these expenses are cost of drawing, design and layout, royalties payable on use of patents, copyrights etc., consultation fees paid to architects, surveyors etc. Indirect expenses on the other hand cannot be traced to specific product, job, process, service or cost centre or cost unit. Several examples of indirect expenses can be given like insurance, electricity, rent salaries, advertising etc.

It should be noted that the total of direct expenses is known as Prime Cost while the total of indirect expenses is known as Overheads.

C. Classification according to behavior:

Cost can be classified according to their behavior.

- Fixed Costs: Out of the total costs, some costs remain fixed irrespective of changes in the production volume. These costs are called as fixed costs. The feature of these costs is that the total costs remain same while per unit fixed cost is always variable. Examples of these costs are salaries, insurance, rent etc.

- Variable Costs: These costs are variable in nature, i.e. they change according to the volume of production. Their variability is in the same proportion to the production. For example, if the production units are 2,000 and the variable cost is Rs. 5 per unit, the total variable cost will be Rs.10,000, if the production units are increased to 5,000 units, the total variable costs will be Rs.25,000, i.e. the increase is exactly in the same proportion of the production.
- Semi-Variable Costs: Certain costs are partly fixed and partly variable. In other words, they contain the features of both the types. These costs are neither totally fixed nor totally variable. Maintenance costs, supervisory costs etc. are examples of semi-variable costs. They are also called as stepped costs.

D. Classification according to functions: Classification can also be done according to functions/activities.

- **Production Costs**: All costs incurred for production of goods are known as production cost.
- **Administrative Costs**: Costs incurred for administration are known as administrative costs.
- **Selling and Distribution Costs**: All costs incurred for producing an order are called selling costs while all costs incurred for execution of orders are distribution costs.
- **Research and Development Costs**: In the modern days research and development has become one of the

important functions of a business organization. Expenditure incurred for this function can be classified as Research and Development Costs.

E. Classification according to time: Cost can also be classified according to time.

- Historical Costs: These are costs which are incurred in the past, i.e. in the past year, past month or even in the last week or yesterday. The historical costs are ascertained after the period is over. In other words, it becomes a post mortem analysis of what has happened in the past.
- Predetermined Cost: These costs are relating to the product are computed in advance of production, on the basis of a specification of all the factors affecting cost and cost data.

COST CENTRE

Cost Center is defined as, 'a production or service, function, activity or time of equipment whose costs may be attributed to cost units. A cost center is the smallest organizational sub unit for which separate cost allocation is attempted. To put in simple words, a cost center is nothing but a location, person or item of equipment for which cost may be ascertained and used for the purpose of cost control. For example, a production department, sales department, stores department can be cost centers. Similarly, an item of equipment like lathe, fork-lift, truck or delivery vehicle can be cost center, a person like sales manager can be a cost center. A

cost center can be either personal or impersonal, similarly it can be a production cost center or service cost center.

PROFIT CENTRE

It is defined as, 'a segment of the business entity by which both revenues are received and expenses are incurred and controlled'. (CEMA) A profit center is any sub unit of an organization to which both revenues and costs are assigned. As explained cost center is an activity to which only costs are assigned but a profit center is one where costs and revenues are assigned so that profit can be ascertained. Such revenues and expenditures are being used to evaluate segmental performance as well as managerial performance. A division of an organization may be called as profit center. The performance of profit center is evaluated in terms of the fact whether the center has achieved its budgeted profits. Thus the profit center concept is used for evaluation of performance.

INVESTMENT CENTRE

They are to which costs, revenues, and capital are attributed. This is possibly the largest type of responsibility center, as the manager will be responsible for resource funding (capital) decisions.

The organization's reporting structure is a crucial consideration. The responsibility centers recognized as investment centers, profit centers or cost centers should be correctly understood as the performance metrics for each of them would be different.

COSTING SYSTEM

There are different costing systems used in practice. These are described below:

HISTORICAL COSTING

In this system, costs are ascertained only after they are incurred and that is why it is called as historical costing system. For example, cost incurred in the month of April, 2020 may be ascertained and collected in the month of May. Such type of costing system is extremely useful for conducting post-mortem examination of costs, i.e. analysis of the cost incurred in the past. Historical costing system may not be useful from cost control point of view but it certainly indicates a trend in the behavior of costs and is useful for estimation of costs in future.

ABSORPTION COSTING

In this type of costing system, costs are absorbed in the product unit itself irrespective of their nature. In other words, all fixed and variable costs are absorbed in the products. It is based on the principle that costs should be charged or absorbed to whatever is being costed, whether it is a cost unit, cost center.

DIRECT COSTING

It is a specialized form of cost analysis that only uses variable costs to make decisions. It does not consider fixed costs, which are assumed to be associated with the time periods in which they were incurred. The

direct costing concept is extremely useful for short-term decisions, but can lead to harmful results if used for long-term decision making, since it does not include all costs that may apply to a longer-term decision. In brief, direct costing is the analysis of incremental costs.

MARGINAL COSTING

In Marginal Costing, only variable costs are charged to the products and fixed costs are written off to the Costing Profit and Loss A/c. The principle followed in this case is that since fixed costs are largely period costs, they should enter into the production units. Naturally, the fixed costs will not enter into the inventories and they will be valued at marginal costs only.

It is defined as the accounting system in which variable costs are charged to cost units and the fixed costs of the period are written-off in full against the aggregate contribution. 'Fixed overheads are excluded on the ground that in cases where production varies, the inclusion of fixed overheads may give misleading results.

STANDARD COSTING

Standard costs are predetermined costs relating to material, labour and overheads. They are predetermined, they are worked out on scientific basis by conducting technical analysis. They are computed for all elements of costs such as material, labour and overheads. The main objective of fixation of standard cost is to have benchmark against the actual performance can be compared with the standards. The

difference is called variance. If the actual costs are more than the standard, the variance is 'adverse' while if actual costs are less than the standard, the variance is 'favorable'. Standard costing is thus an important technique for cost control and reduction.

UNIFORM COSTING

This is not a distinct method of costing but is the adoption of identical costing principles and procedures by several units of the same industry or by several undertakings by mutual agreement. Uniform costing facilitates valid comparison between organizations and helps in eliminating inefficiencies.

COST CLASSIFICATION BY NATURE OF PRODUCTION PROCESS

BATCH COST

This method of costing is used in those firms where production is made on continuous basis. Each unit coming out is uniform in all respects and production is made prior to the demand, i.e. in anticipation of demand. One batch of production consists of the units produced from the time machinery is set to the time when it will be shut down for maintenance. Firms producing, consumer goods like television, air-conditioners, washing machine etc. use batch costing.

PROCESS COST

Some of the products like sugar, chemicals etc. involves continuous production process and hence process

costing method is used to work out the cost of production. The meaning of continuous process is that the input introduced in the process I travels through continuous process before finished product is produced. The output of process I becomes input of process II and the output of process II becomes input of the process III. Industries like sugar, edible oil, chemicals are examples of continuous production process and use process costing.

OPERATION COST

It is concerned with the determination of the cost of each operation rather than process. It offers scope for computation of unit operation cost at the end of each operation by dividing the total operation cost by total output of units.

OPERATING COST

This type of costing method is used in service sector to work out the cost of services offered to consumers. For example, operating costing method is used in hospitals, power generating units, transportation sector etc. A cost sheet is prepared to compute the total cost and it is divided by cost units for working out the per unit cost.

CONTRACT COST

This method of costing is used in construction industry to work out the cost of contact undertaken. For example, cost of constructing a bridge, commercial complex, residential complex, highways etc. is worked out by use of this method of costing. In contract costing, as each contract may take a long

period for completion, the question of computing of profit is to be solved with the help of defined and accepted method.

JOINT COST

The cost of processing a production input (raw material) that would amount to joint products is known as Joint Cost. The joint cost is to be restricted to the split-off point (point after which each joint product would be incurring separate processing cost). Joint cost is not to be traced to any particular product but rather to all the joint products as a group. There are many ways of apportioning joint cost to joint products for financial accounting purposes.

CLASSIFICATION OF COST BASED ON BEHAVIOUR

Costs can also be classified according to their behavior.

VARIABLE COST

These costs are variable in nature, i.e. they change according to the volume of production. Their variability is in the same proportion to the production. For example, if the production units are 2000 and the variable cost is Rs.5 per unit, the total variable cost will be Rs.10, 000, if the production units are increased to 5,000 units, the total variable costs will be Rs.25, 000, i.e. the increase is exactly in the same proportion of the production. Another feature of the variable cost is that per unit variable cost remains same while the total variable costs will vary. Examples of variable costs are direct material, direct labour etc.

FIXED COST

Out of the total costs, some costs remain fixed irrespective of changes in the production volume. Those costs are called as fixed costs. The feature of these costs is that the total costs remain same while per unit fixed cost is always variable. Examples of these costs are salaries, insurance, rent etc.

SEMI-VARIABLE OR SEMIFIXED COST

Certain costs are partly fixed and partly variable. In other words, they contain the features of both types of cost. These costs are neither totally fixed nor totally variable. Maintenance costs, supervisory costs are examples of semi-variable costs. These costs are also called 'stepped costs'. Fixed costs which vary somewhat with the level of activity are often referred to as stepped or 'lumpy' costs. The pattern of stepped costs has a significant effect on business planning as the firm will experience major expenditure on infrastructure when it reaches one of the step points. Each step will have a major cash outflow impact and therefore planning well ahead for access to funding or saving up for the step change is an important planning task.

COMMITTED FIXED COST

Some fixed costs are committed fixed costs arising from an organization's commitment to engage in operations. These elements include such items as depreciation, rent, insurance, property taxes and the like. These costs are not easily adjusted with changes in business activity. Committed

fixed costs relate to the desired long-run positioning of the firm. Moreover, a company should be careful in incurring excessive committed fixed cost.

DISCRETIONARY FIXED COST

It originates from top management's yearly spending decisions: proper planning can result in avoidance of these costs if cutbacks become necessary or desirable. Examples of discretionary fixed cost include advertising, employee training and so forth.

ENGINEERED COST

Engineered costs result specifically from a clear cause-effect relationship between output and resources used. While many costs are associated with a production process in an organization, engineered costs are those that have a direct association to output. The cost relationships are easy to identify and measure relative to other types of costs. These costs are variable, meaning that they fluctuate proportionally to the level of production.

CAPACITY COST

Capacity costs are expenditures made to provide a certain volume of goods or services to customers. For example, a company may operate a production line on three shifts in order to provide goods to its customers in a timely manner. Each successive shift constitutes an incremental capacity cost. If the company wishes to reduce its cost structure, it can eliminate a shift, though doing so reduces

its capacity. Capacity Cost is known as the fixed expenditure faced by a company to expand its business reach and its potential to spread its operations. This does not change as the levels of production change and can only be slashed when the business is shut or is outsourced. These costs are usually fixed in nature and goes to increase the activities or premises of the operations. It comprises insurance, rental payments, lease payments, property tax, inventory costs, depreciation of machinery etc. These are the expenses which happen to keep the business going irrespective of income or profits.

PROGRAMMED COST

A cost which is incurred under any specific programme of an organization is called programmed cost. This is reflecting top management policies and decisions.

COST CONTROL

It refers to search for better and more economical ways of completing the current operations. It simply identifies and prevents waste within the existing environment. Cost control is the process of controlling costs of an activity, process, or company as a whole, by detecting variances of actual costs from budgeted costs ascertaining the causes of such variances and implementing corrective procedures to effect realignment between actual and budgeted costs.

DECISION MAKING

The management of the company requires detailed information with respect to cost of operations so as to equip

the executives with relevant information required for planning, scheduling, controlling and decision making. This is facilitated by Cost Accounting. By cost management, waste elimination, utilization of idle capacity, cost accounting helps to increase the overall productivity of an organization.

FLEXIBLE BUDGETS

The usual procedure is to set the budget at the beginning of the period for the planned level of activity. At the end of the month, the variable costs in the budget are then adjusted in line with the actual level of activity achieved. Fixed costs are not normally flexed as they should remain the same regardless of any changes in activity within the relevant range. The calculation of the flexed budget is the total budgeted sales or cost amount divided by the budgeted number of units. The resulting budgeted amount per unit is then multiplied by the actual number of units for the financial period.

CVP ANALYSIS

Cost-Volume-Profit (CVP) analysis involves the analysis of how total costs, total revenues and total profits are related to sales volume, and is, therefore, concerned with predicting the effects of changes in costs and sales volume on profit. It is an analysis that guides decision making in respect of going into a production process, expanding an existing production level or diversifying into unusual areas of operations. The analysis could be done graphically or mathematically.

CVP analysis seeks to find out answers to the following questions:

a. What would be the cost of production under different circumstances?

b. What has to be the volume of production?

c. What profit can be earned?

d. What is the difference between the selling price and cost of production?

e. If carefully used, the technique might be helpful in:

   i. budgeting process. The volume of sales required to make a profit and the "safety margin" for profits in the budget can be measured;

   ii. Pricing decision and sales volume decisions;

   iii. Sales mix decision, i.e. in deciding what proportions of each product should be sold?

   iv. Decisions affecting the cost structure and production capacity of the company.

Importance of Cost-Volume-Profit Relationship

An understanding of the inter-relationship between these three forces, and of the probable effect that any change in sales volume would have on the business, is extremely helpful to management in a broad variety of problems involving planning and control. The relationship between cost, volume and profit makes up the profit structure of an enterprise. It is only through the knowledge and intelligent use of such

information that the prediction of the probable effect of any number of contemplated actions is made possible. This makes Cost-Volume-Profit relationship analysis an important tool for budgeting and profit-planning.The data used in the review of such relationships may come from several sources and may differ considerably in adaptability and usefulness. In companies where a rather complete sales analysis is made and flexible budgets and standard costs are available, the records would provide the necessary information in readily usable form. Costs, in all probability would have been segregated into the fixed and variable elements. In case such sources are not available, the conventional historical records might be utilized. Quite detailed analysis may be necessary to isolate the effects of changes in volume, selling prices and variable cost.

However, if cost control has been weak, the relationship between volume and cost will be difficult to trace and the margin of error will be high. Thus, the accuracy of results would depend greatly on the reliability of the data and the validity of assumptions. Very often, for investment and credit purposes, published financial statements are used as source data in studying the effects of volume on the business.

MODULE III:

PROCESS COSTING

The methods of costing basically aim at finding out the cost of a product or service, which is offered by the organization. Process Costing is also a method of costing which is used in those industries where the production is in continuous process, i.e. the output of one process becomes the input of the subsequent process and so on. Examples of such industries are, paint works, chemical plants, food manufacturing, oil refining, paper mill, textile mills, sugar factories, fruit canning, dairy and so on.

In such industries, the input is put in the first process and the output of each process becomes the input of the subsequent process till the final product emerges from the last process.

Features

Process costing is employed in continuous production industries where the flow of production is in a sequence and the output of one process becomes the input of the subsequent one. The objective of process costing is to find out the cost of each process by identifying the direct costs with the particular process and apportioning the indirect costs i.e. overheads to each process on some suitable basis.

Following are the features of process costing:

1. The production is in continuous flow and is uniform. All units coming out as finished products are uniform with each other in all respect.
2. The product is manufactured in a continuous flow and hence individual units lose their identity.
3. The unit cost is obtained by dividing the total cost for a particular period by the total output. This is the average cost of the product units.
4. Cost per process is ascertained and cost of each process is transferred to the subsequent process until the finished product emerges.
5. In a particular process normal and abnormal losses emerge. Normal loss is a loss, which is inevitable in any process and thus cannot be avoided or controlled. Any loss, which is over and above the normal loss is called abnormal loss and is to be accounted for separately.
6. Sometimes each process may be treated as profit center and so while transferring, the cost from one process to another, a percentage of profit is added in the cost of that process. This is known as inter process profit and needs to be accounted for in the process cost accounts.
7. Though the cost per unit is computed by dividing the total cost by the number of units, there can be a problem on incomplete units at the end of a particular accounting period.

Applications

Generally, an industrial unit follows the process costing system where there are at least two production processes. In other words, the industrial units, which are following single production process, can apply operation-costing system instead of process costing system.

Moreover, an industrial unit can apply operation costing system instead of process costing system even though these industrial units are not able apply process costing system and having at least two production processes.

The following are the examples of industries where process costing is applied.

Chemical works, Steel, Soap making, Oil refining, Box making, Textiles, Distillation process, Rubber, Paper mills, Paints, Beer, Coke works, Ink and Varnishing, Meat products factory, Milk diary, Biscuit works, Food products, Canning factory.

Process costing deals with the flow of units and costs through several stages or operations. As such, when the homogeneous products are produced through continuous process, a process costing system is usually appropriate.

PROFORMA OF PROCESS ACCOUNT (Without normal/ abnormal loss/gain)

Debit Credit

Particulars	Qty	Rate (Rs.)	Amount (Rs.)	Particulars	Qty	Rate (Rs.)	Amount (Rs.)
Direct Materials				Output Transferred To Process II			
Direct Labour							
Durect Expenses							
Production Overheads							
Total				Total			

Note: Process II and subsequent Process Accounts will be prepared in the same fashion. In the final process. The cost and output will be transferred to the finished goods stock account.

Difference between Job Costing and Process Costing

There are various cost accounting techniques used to measure the cost of the product. When the goods are produced only against special orders, job costing is used by firms. On the other hand, when a product passes through several processes or stages, the output of one process becomes the input of next process, and to determine the cost of each process, process costing method is applied. It is generally used when like units are to be manufactured, that too in a continuous flow. In other words, the former is used to calculate the cost of jobs or contracts which are distinct in nature, while the latter used to compute the cost charged to each process.

BASIS FOR COMPARISON	JOB COSTING	PROCESS COSTING
Meaning	Job costing refers to calculating the cost of a special contract, work order where work is performed as per client's or customer's instructions.	A costing method, in which the costs which are charged to various processes and operations is ascertained, is known as Process Costing.
Nature	Customized production	Standardized production
Assignment of cost	Calculating cost of each job.	First of all, cost is determined for the process, thereafter spread over the produced units.
Cost Center	Job	Process
Scope of cost reduction	Less	High
Transfer of Cost	No transfer	Cost is transferred from one process to another
Identity	Each job is different from another.	Products are manufactured consecutively and so they lose their identity.
Cost Ascertainment	Completion of the job.	End of the cost period.
Industry type	Job costing is suitable for the industries which manufacture products as per customer's order.	Process costing is perfect for the industry where mass production is done.
Losses	Losses are usually not segregated.	Normal losses are carefully ascertained and abnormal losses are bifurcated.
Work-in-progress (WIP)	WIP may or may not exist at the beginning or at the end of the financial year.	WIP will always be present in the beginning or at the end of the accounting period

Normal loss

Normal loss means that loss which is inherent in the processing operations. It can be expected or anticipated in advance i.e. at the time of estimation. It is the loss which is inevitable in any process. Thus, if the input is 100, the output may be 95 if the normal loss is anticipated as 5%. The cost of normal loss is considered as part of the cost of production in which it occurs. If normal loss units have any realizable scrap value, the process account is credited by that amount.

Journal Entry:

(i) Normal Loss A/c …Dr.

To Process A/c

(ii) Cost Ledger Control A/c …Dr.

(Scrap value) To Normal Loss

Abnormal loss/Abnormal gain

If the actual output is less than the normal output [Normal output =Input- Normal Loss], the difference between the two is the abnormal loss. On the other hand if the actual output is more than the normal output, the difference between the two is abnormal gain. Thus in the example given above, the normal output is 95 which is 100 – 5% of 100 as the normal loss. If the actual output is 93 units, 2 units will be abnormal loss and if the actual output is 97 units, 2 units will be abnormal gain.

Process account is to be credited by abnormal loss

account with cost of material, labour and overhead equivalent to good units and the loss due to abnormal is transferred to Costing Profit and Loss Account.

Journal Entries:

(i) Abnormal Loss A/c …Dr.

To Process A/c

(ii) Cost Ledger Control A/c …Dr. (Scrap value)

Costing Profit & Loss A/c …Dr.

To Abnormal Loss

The value of abnormal gain is transferred to the debit side of the relevant process and ultimately closed by crediting it to the Costing Profit and Loss Account.

Journal Entries:

(i) Process A/c

To Abnormal Gain A/c …Dr.

(ii) Abnormal Gain A/c ..Dr.

To Normal Loss

To Costing Profit & Loss A/c

Inter process profits

Sometimes, while transferring the cost of one process to the subsequent one, some percentage of profit is added in it. This is called as inter process profits. This is done when a process is treated as profit center. In such cases, unrealized profit is to be computed and shown separately.

Equivalent production

In practice it may happen that at the end of a particular period, there are some incomplete units in the process. Further the degree of completion of the opening work in progress and closing work in progress may be different. These incomplete units will create problems in finding out the cost per unit, as all the units will not have the same degree of completion. In such cases, the equivalent units will have to be worked out for the incomplete units. The concept of equivalent units states that 2 units, each complete 50% will be treated as equivalent to 1 completed unit. This concept will have to be implemented for solving the problem of incomplete units. For this degree of completion will have to be ascertained for each element of cost, i.e. material, labour and overheads. The following methods of pricing are used for valuing the equivalent units-

FIFO

In this method, the assumption is that the incomplete units from the opening stock are completed first and then the units introduced in the process are completed. The costs added in each process during the current period is prorated to the production necessary to complete the opening work in progress, to complete the units added in the process and units in the work in progress. The objective of the first in first out method is to value the inventory at the current costs and as such the main problem is to calculate the equivalent production under this method.

Average method

Process costs are sometimes computed on the basis of average costs. Where degree of completion of opening work in progress is not given, average method is used. The average process cost is obtained by adding the cost of opening work in progress in the cost of units introduced in the process during the current period and dividing this total cost by total equivalent units obtained by adding the number of units completed and equivalent units of the closing work in progress of each element, material, labour and overheads. The main objective of average method is to even out the fluctuations in prices and hence is used when the prices fluctuate widely during a particular period.

Weighted average method

If a manufacturing unit is manufacturing two or more products, which are quite dissimilar to each other, weighted average method is used. Under this method, weighted average is computed and used in valuation of the incomplete units.

Joint and By-Products

The joint products may be defined as two or more different products that are produced simultaneously by processing one or more raw materials through a common production process or a series of production processes. The point at which these products emerge in their separately identifiable form is known as *point of separation* or *split-off point*. At this point, some of the joint products have an economic value and can be sold to customers while others

require a further processing before they can be placed in the salable condition. The common examples of businesses where the production of joint products can be found include chemical companies, refineries, coke manufacturers, flour mills, coal mines, gas companies, lumber mills, meat processors and packers, dairies and canners etc. Mostly, a quantitative relationship exists among the production of joint products; that is, if the production of one product is increased, the production of other joint products will also increase and vice versa. However, the proportion in which the output of one product impacts the output of other products may not be the same throughout the production process.

Along with main products, some manufacturing processes produce one or more products having a relatively small value or no value at all. These products are usually termed as by products **or** secondary products**.** The main products are produced in larger quantities whereas by-products are produced in relatively small quantities. Normally, the by-products are not considered as finished goods because their production is not intended in the first place. They come into existence because their production cannot be avoided because of the nature of production process or the raw materials being used in the production process. The introduction of advanced production and engineering processes, however, has made it possible to control the production of such secondary products to some extent. An example of such processes can be found in petroleum industry.

Difference between Joint products and co-products

Joint products are two or more products that are generated within a single production process; they cannot be produced separately and incur undifferentiated joint costs.

Joint products cannot be separated until a specific 'split-off point' or 'separation point'. From this point onwards, the two products can be processed individually.

Examples of join products include:

- Milk – butter, cream, cheese
- Crude oil – fuel, gas, kerosene

Co-products are a type of product produces in different varieties. Co-products may require a different type of raw material and may be processes in different ways, but they will use the same facilities. For example, a company specializing in furniture manufacturing may produce tables, chairs, desks, and benches – these would be considered co-products.

Co-products are not the same as joint products; co-products can be produces in different quantities without affecting the production of other co-products. On the other hand, joint products can only be produced together, so adjusting levels of production for a joint product will affect production for the other product.

Features of Joint Products

Joint product means the production of two or more products from the same basic raw material and separated in the

course of same processing operation usually requiring further processing, no single product can be designated as a major product. For example, in oil Industry, gasoline, duel oil, lubricants, coal tar and kerosene are all produced from crude petroleum. These are known as joint products.

The joints products are not produced or emerged incidentally. The production of joint products is the deliberate intention on the part of management.

Generally, the joint products have the following characteristics.

1. The main objective of manufacturing operation is to produce joint products.
2. The sale value of all the joint products is relatively high and none of the joint products are significantly greater in value than other joint products.
3. There is no compulsory for further processing after the point of separation. These types of joint products are sold directly after split off point.
4. Sometimes, the joint products may require further processing.
5. Joint products require simultaneous common processing.
6. The quality of joint products may not be maintained at the maximum.
7. The management has little or no control over the maintenance of quality of joint products.

Accounting for joint costs

Apportionment of joint cost among the joint products is essential for determining the share of individual joint products correctly. Ascertainment of share of cost is required for pricing the products, valuing the closing inventory and ascertaining the profit or loss on sale of different products.

Split-off point

This is the point up to which input factors are commonly used for production of multiple products which can be either joint products or by-products. After this point, the joint products or by-products gain individual identity. In other words, up to a certain stage, the manufacturing process is the same for all the products and a stage comes after which the individual processing becomes different and distinct. For example, in dairy, several products like, milk, ghee, butter, milk powder, ice-cream etc. may be produced. The common material is milk. The pasteurization of milk is common process for all the products and after which each product has to be processed separately.

Joint costs

It is the pre separation cost of commonly used input factors for the production of multiple products. In other words, all costs incurred before or up to the split off point are termed as joint costs or pre separation costs and the apportionment of these costs is the main objective of joint stock accounting.

Physical quantity method

Under this method the joint costs are apportioned among the joint products in the ratio of physical units of output produced at the point of separation.

For example, the physical base like raw material weight in physical quantity is used as the base for apportioning the joint costs. This method is very simple and easy to use. It is also technically a sound method.

However this method cannot be used when output consists of different types of units such as liquids, solids, etc. It is also illogical to assume that all joint products are equally desirable and valuable since this method assigns same unit to high quality and low quality joint products.

Average unit cost method

Under this method, the total units produced at that point divide the total cost incurred up to the split-off point to get average cost per unit of production. All joint products are valued at the average cost. This method can be used when all products are expressed in terms of same units. It cannot be used when the units are not comparable.

Meaning of by-products

A by product is a secondary unit produced in a joint production process that has little value in relation to the main product being produced. In other words, it's a unit that is created inadvertently during the process of manufacturing another product. Unfortunately not all by-products have the

same salability and value as the dairy farmers' and loggers' operations. Some by-products are simply waste that can't be used for anything. Take a nuclear power plant for example. The plant generates electricity using a nuclear process that produces nuclear waste. Not only is this material not salable, it is hazardous to store and dispose of. Companies must build highly specialized facilities to store this material and hire employees who can take caution in handling, transporting, and disposing of it.

Difference between Main product and Joint & By products

In common production process are simultaneously processed two (or more) products. If both products are of similar economic importance, they are s. But if they are not, one is considered to be MAIN and the second BY-PRODUCT. The factors to take into account to distinguish them are:

- Joint product has higher economic importance than by-product
- Joint products have similar sales value, whether by-product has much lower sales value than the main product
- By-product is not the primary aim of the production - it is manufactured "by the way" during the production of the main product
- for two (or more) joint products - common costs are allocated using selected allocation base

- For main and byproduct – the revenues obtained from selling by product are deducted from the common costs and the difference is used to value the main product

Value

It implies the utility of worth of the commodity of service for an individual. It is not calculated in terms of money and ascertained from the user's perspective.

EXAMPLE

1. Product A is a product produced after three distinct processes. The following information is obtained from the accounts of the company for a particular period.

Particulars	Total Amount Rs.	Process I Rs.	Process II Rs.	Process III Rs.
Direct Material	2,200	1,800	300	100
Direct Labour	400	100	200	100
Direct Expenses	500	300	---	200

Production overheads are incurred Rs.800 and is recovered at 200% of direct wages.

Production during the period was 100 kg. There was no opening or closing stock. Prepare Process Accounts assuming that there is no process loss.

Solution:

Process I Account Output: 100 kg

Debit Credit

Particulars	Qty Kg.	Rate Rs.	Amount Rs.	Particulars	Qty Kg.	Rate Rs.	Amount Rs.
Direct Materials	100	18.00	1,800	Output Transferred to Process II	100	24	2,400
Direct Labour		1.00	100				
Direct Expenses		3.00	300				
Production Overheads 20% of direct labour		2.00	200				
Total	100	24.00	2,400	Total	100	24	2,400

Process II Account Output: 100 kg

Debit Credit

Particulars	Qty Kg	Rate Rs.	Amount Rs.	Particulars	Qty Kg.	Rate Rs.	Amount Rs.
Transferred From Process I	100	24.00	2,400	Output Transferred to Process II	100	33	3,300
Direct Materials		3.00	300				
Direct Labours		2.00	200				
Direct Expenses		---	----				
Production Overheads 20% of direct labour		4.00	400				
Total	100	33.00	3,300	Total	100	33	3,300

Process III Account Output: 100 kg

Debit Credit

Particulars	Qty Rs.	Rate Rs.	Amount Rs.	Particulars	Qty Rs.	Rate Rs.	Amount Rs.
Transferred From Process II	100	33.00	3,300	Output Transferred to Finished Stock	100	39.00	3,900
Direct Materials		1.00	100				
Direct Labour		1.00	100				

Direct Expenses		2.00	200				
Production Overheads 20% of direct labour		2.00	200				
Total	100	39.00	3,900	Total	100	39.00	3,900

2. Product B is obtained after it passes through three distinct processes. The following information is obtained from the accounts for the week ending on 31st March 2006.

Particulars	Total Amount	Process I	Process II	Process III
Direct Materials	Rs. 7,542	Rs. 2,600	Rs. 1,980	Rs. 2,962
Direct wages	Rs. 9,000	Rs. 2,000	Rs. 3,000	Rs.4,000
Production overheads	Rs. 9,000			

1,000 units @ Rs. 3 each were introduced in Process I. There was no stock of materials or work in progress at the beginning or at the end of the period. The output of each process passes direct to next process and finally to finished store. Production overheads are recovered on 100% of direct wages. The following additional data are obtained.

Particulars	Output during the week	% of normal loss to input	Value of scrap per unit
Process I	950 units	5%	Rs. 2
Process II	840 units	10%	Rs. 4
Process III	750 units	15%	Rs. 5

Prepare Process Cost Accounts and Abnormal Loss and Abnormal Gain Account.

Solution:

Process I Account

Debit Credit

Particulars	Units	Rate per Unit (Rs.)	Amount Rs.	Particulars	Units	Rate per Unit (Rs.)	Amount Rs.
Units introduced	1,000	3	3,000	Normal Loss	50*	2	100
Direct Material	-----	----	2,600	Transferred to Process II	950	10	9,500
Direct wages	---	---	2,000				
Production Overheads	---	---	2,000				
Total	1,000		9,600	Total	1,000		9,600

*Normal loss is 5% of the units introduced i.e. 5% of 1000 units = 50 units.

The scrap value is given Rs.2 per unit and hence Rs.100 are credited to the Process I Account.

Process II

Debit Credit

Particulars	Units	Rate per Unit (Rs.)	Amount Rs.	Particulars	Units	Rate per Unit (Rs.)	Amount Rs.
Transfer from Process I	950	10	9,500	Normal Loss	95*	4	380
Direct Materials	---	---	1,980	Abnormal Loss	15**	20	300
Direct wages	---	---	3,000	Transferred to Process III	840	20	16,800
Production overheads	---	---	3,000				
Total	950		17,480	Total	950		17,480

*Normal loss is 10% of the input i.e. 950 units = 95 units. The scrap value of the same is credited to the Process II Account.

** Abnormal loss is computed in the following manner.

*Units introduced – Normal loss = 950 – 95 = 855 units = normal production.

*Actual production = 840 units, therefore abnormal loss = 15 units

*Valuation of abnormal loss = Cost – Scrap / Normal production

*Therefore Rs.17, 480 – Rs. 300/855 units = Rs.20 per unit (approx.)

Process III Account

Debit Credit

Particulars	Units	Rate Per Unit Rs.	Amount Rs.	Particulars	Units	Rate Per Unit Rs.	Amount Rs.
Transfer from Process II	840	20	16,800	Normal Loss	126*	5	630
Direct materials	---	---	2,962	Transferred to Finished Stock	750	38	28,500
Direct wages	---	---	4,000				
Production overheads	---	---	4,000				
Abnormal gain**	36	38	1,368				
Total	876		29,130		876		29,130

*Normal loss is 15% of input i.e. 15% of 840 units which is 96 units.

**Abnormal gain is computed as shown below:

- Units introduced – normal loss = normal production = 840 – 126 = 714 units
- Actual production is 750 units
- Abnormal gain is 750 units – 714 units = 36 units
- Valuation of abnormal gain = Cost – Scrap/Normal production
- Rs. 27,132 – Rs. 630/714 units = Rs. 38(approx.)

Abnormal Loss Account

Debit Credit

Particulars	Units	Rate per Unit (Rs.)	Amount Rs.	Particulars	Units	Rate per Unit (Rs.)	Amount Rs.
Process II	15	20	300	Debtor (Sale of scrap)	15	4	60
				Transferred to Costing Profit and Loss Account			240
Total	15	20	300	Total	15		30

Abnormal Gain Account

Debit Credit

Particulars	Units	Rate per Unit (Rs.)	Amount Rs.	Particulars	Units	Rate per Unit (Rs.)	Amount Rs.
Process III	36	5	180	Process III	36	38	1,368
Transferred to Costing Profit and Loss Account			1,188				
Total	36		1,368	Total	36		1,368

3. In a manufacturing unit, raw material passes through four processes I, II, III and IV and the output of each process is the input for the subsequent process. The losses in the four

processes are respectively 25%, 20%, 20% and 16 2/3% respectively for I, II, III and IV processes of the input. If the end product at the end of the IV process is 40,000 kg. What is the quantity of raw material required to be fed at the beginning of Process I and the cost of the same at Rs.5 per kg?

Solution

Suppose the output in Process I is 100 kg.

Statement of Production in Different Processes Based on Input of 100 kg in Process I

Particulars	Process I	Process II	Process III	Process IV
Input	100 kg	75 kg	60 kg	48 kg
Loss %	25	20	20	162/3
Loss in kg	25	15	12	8
Output in kg	75	60	48	40

If output in process IV is 40 kg, input in process I = 100 kg

If output in process IV is 40,000 kg, input on Process I

= (40,000 x 100)/40 = 1,00,000 kg

Cost of raw material required = 1,00,000 kg x Rs. 5 = Rs. 5,00,000

Effect: The input is 2.5 times of the final output. Therefore, for variation of every rupee in the cost of raw material the final effect will be Rs. 2.50.

4. Prepare a Statement of Equivalent Production, Cost Statements, Statements of Valuation and Process Account from the following particulars using First In First out Method.

a) Opening work in progress – 900 units @ Rs.4, 500, degree of completion, material – 100%, labour and overheads – 60%.

b) Input of materials: 9100 units @ Rs. 27, 300, expenses: Labour Rs.12, 300, overheads Rs. 8, 200.

c) Finished units transferred to next process – 7, 800

d) Normal scrap – 10% of input, scrap realization @ Rs. 3 per unit.

e) Units scrapped – 1,200 units, degree of completion: material 100%, labour and overheads: 70%

f) Closing work in progress – 100 units, degree of completion: material 100%, labour and overheads 80%.

Solution:

I) Statement of Equivalent Production (FIFO Method)

Input	Units	Output	Units	Material Units	%	Labour and Overheads	%
Op.Stock	900	Normal Loss	1,000	---	---	---	---
Newly Introduced Units	9, 100	Abnormal Loss	200	200	100	140	70
		Units Completed: From Stock Newly Introduced Units*	900 6,900	 6,900	 100	360 6,900	40 100
Total	10,000		10,000	8,100		8,200	

II) Statement of Cost

Particulars	Cost – Rs.	Equivalent Units	Cost Per Unit Rs.
Material: Rs. 27, 000 Less: Scrap 3,000	24,000	8,100	3.00
Labour	12,300	8,200	1.50
Overheads	8,200	8,200	1.00

III) Statement of Valuation/Apportionment of Cost

Particulars	Element of Cost	Equivalent Units	Cost per Unit – Rs.	Cost Rs.	Total Rs.
Cost of completing of opening stock	Material	--	--	---	
	Labour	360	1.50	540	
	Overheads	360	1.00	360	900
Units introduced and completed and transferred	Material	6,900	3.00	20,700	
	Labour	6,900	1.50	10,350	
	Overheads	6,900	1.00	6,900	37,950
Abnormal Loss	Material	200	3.00	600	
	Labour	140	1.50	210	
	Overheads	140	1.00	140	950
Closing Stock	Material	1,000	3.00	3,000	
	Labour	800	1.50	1,200	
	Overheads	800	1.00	800	5,000
Total					**44,800**

IV) Process A/c

Debit Credit

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Opening WIP	900	4,500	Normal Loss	1000	3,000
Units introduced	9,100		Transfer to next process**	7,800	43,350
Material		27,300	Abnormal Loss	200	950
Labour		12,300	Closing Stock	1000	5,000
Overheads		8,200			
Total	10,000	52,300	Total	10,000	52,300

**Cost of units transferred to next process is computed as under

- Cost already incurred on opening stock: Rs.4,500
- Costs incurred to complete opening stock: Rs.900
- Costs of units introduced, completed and transferred: Rs.37,950
- Total cost: Rs.43,350

V) Abnormal Loss A/c

Debit Credit

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Process I A/c	200	950	Bank A/c – scrap	200	600
			Profit & Loss A/c		350
Total	200	950	Total	200	950

5. Following information is available regarding Process A for the month of August 2007.

Production Record:

- Units in process as on 1st August: 4,000 (All materials used , 25% complete for labour and overheads)
- New units introduced: 16,000
- Units completed: 14,000
- Units in process as on 31st August 2007: 6,000 (All materials used, 33 1/3% complete for labour and overheads)

Cost Records:

- Work in process as on 1st August 2007
- Materials: Rs.6,000
- Labour: Rs.1,000
- Overheads: Rs.1,000

Cost during the month

- Materials: Rs.25,600
- Labour: Rs.15,000
- Overheads: Rs.15,000

Presuming that the Average Method of inventory is used. Prepare,

I) Statement of equivalent production

II) Statement showing cost for each element

III) Statement of apportionment of cost

IV) Process Account

Solution:

I) Statement of Equivalent Production (Average Cost Method)

Input Units	Particulars	Output Units	Material E.P.	% of Completion	Labour and Overheads E.P.	% of Completion
4000	Opening Stock					
160000	New units introducing					
	Units completed	14000	14000	100	14000	100
	Closing Stock	6000	6000	100	2000	33.33
20000	Total	20000	20000		16000	

II) Statement Showing Cost for each element

Elements of Cost	Cost of Opening WIP Rs.	Cost In Process Rs.	Total Cost Rs.	Equivalent Production	Cost per Unit Rs.
Material	6,000	25,600	31,600	20,000	1.58
Labour	1,000	15,000	16,000	16,000	1.00
Overheads	1,000	15,000	16,000	16,000	1.00
Total	8,000	55,600	63,600		3.58

III) Statement of Apportionment of Cost

Items	Elements	Equivalent Production	Cost Per Unit – Rs.	Cost Rs.	Total Cost Rs.
Units completed	Material	14,000	1.58	22,120	
	Labour	14,000	1.00	14,000	
	Overheads	14,000	1.00	14,000	50,120
Closing Stock	Material	6,000	1.58	9,480	
	Labour	2,000	1.00	2,000	
	Overheads	2,000	1.00	2,000	13,480
Total					63,600

IV) Process A/c

Debit Credit

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Opening Stock	4,000	8,000	Units completed and Transferred	14,000	50,120
Units introduced	16,000		Closing Stock	6,000	13,480
Material		25,600			
Labour		15,000			
Overheads		15,000			
Total	20,000	63,600	Total	20,000	63,600

MODULE 4:

DECISION MAKING TOOLS

One of the basic functions of management is to make decision. Decision making process involves selection of a course of action or alternative from among various alternatives. There are many techniques which help management in the process of decision making. One of the important techniques is marginal costing.

Absorption costing

Absorption costing also known as 'full costing' is a conventional technique of ascertaining cost. It is the practice of charging all costs both variable and fixed to operations, processes and products. It is the oldest and widely used technique of ascertaining cost. Under this technique of costing, cost is made up of direct costs plus overhead costs absorbed on some suitable basis.

Under this technique, cost per unit remains same only when the level of output remains same. But when the level of output changes the cost per unit also changes because of the presence of fixed cost which remains constant. The change in cost per unit with a change in the level of output in absorption costing technique poses a problem to the management in taking managerial decisions.

Limitations of absorption costing

Following are the important limitations of absorption costing

1. Difficulty in comparison and control of cost:

Absorption costing is dependent on level of output; so different unit costs are obtained for different levels of output. An increase in the volume of output normally results in reduced unit cost and a reduction in output results in an increased cost per unit due to the existence of fixed expenses. This makes comparison and control of cost difficult.

2. Not helpful in managerial decisions:

Absorption costing is not very helpful in taking managerial decisions such as selection of suitable product mix, whether to buy or manufacture, whether to accept the export order or not choice of alternatives, the minimum price to be fixed during the depression, number of units to be sold to earn a desired profit etc.

3. Cost vitiated because of fixed cost included in inventory valuation:

In absorption costing, a portion of fixed cost is carried forward to the next period because closing stock is valued at cost of production which is inclusive of fixed cost.

4. Fixed cost inclusion in cost not justified:

Many accountants argue that fixed manufacturing, administration and selling and distribution overheads are

period costs and do not produce future benefits and, therefore, should not be included in the cost of product.

5. Apportionment of fixed overheads by arbitrary methods:

The validity of product costs under this technique depends on correct apportionment of overhead costs. But in practice many overhead costs are apportioned by using arbitrary methods which ultimately make the product costs inaccurate and unreliable.

6. Not helpful for preparation of flexible budget:

In absorption costing no distinction is made between the fixed and variable cost. It is not possible to prepare flexible budget without making this distinction.

Marginal costing

Marginal Costing is a costing technique wherein the marginal cost, i.e. variable cost is charged to units of cost, while the fixed cost for the period is completely written off against the contribution.

The term marginal cost implies the additional cost involved in producing an extra unit of output, which can be reckoned by total variable cost assigned to one unit. It can be calculated as:

Marginal Cost = Direct Material + Direct Labor + Direct Expenses + Variable Overheads

Characteristics of marginal costing

- **Classification into Fixed and Variable Cost**: Costs are bifurcated, on the basis of variability into fixed cost and variable costs. In the same way, semi variable cost is separated.
- **Valuation of Stock**: While valuing the finished goods and work in progress, only variable cost are taken into account. However, the variable selling and distribution overheads are not included in the valuation of inventory.
- **Determination of Price**: The prices are determined on the basis of marginal cost and marginal contribution.
- **Profitability**: The ascertainment of departmental and product's profitability is based on the contribution margin.

Advantages of Marginal Costing

The advantages of marginal costing are as follows:

- Easy to operate and simple to understand.
- Marginal costing is useful in profit planning; it is helpful to determine profitability at different level of production and sale.
- It is useful in decision making about fixation of selling price, export decision and make or buy decision.
- Break even analysis and P/V ratio are useful techniques of marginal costing.
- Evaluation of different departments is possible through marginal costing.

- By avoiding arbitrary allocation of fixed cost, it provides control over variable cost.
- Fixed overhead recovery rate is easy.
- Under marginal costing, valuation of inventory done at marginal cost. Therefore, it is not possible to carry forward illogical fixed overheads from one accounting period to the next period.
- Since fixed cost is not controllable in short period, it helps to concentrate in control over variable cost.

Assumptions of marginal costing

- All Elements of cost can be segregated into fixed and variable cost.
- Variable cost remains constant per unit of output irrespective of the level of output and thus fluctuates directly in proportion to changes in the volume of output.
- The selling price remains unchanged at all levels of activity.
- Fixed costs remain unchanged for entire volume of production.
- The volume of production is the only factor which influences the costs.
- The state of technology process of production and quality of output will remain unchanged.
- There will be no significant change in the level of opening and closing inventory.

- The company manufactures a single product. In the case of a multi-product company, the sales-mix remains unchanged.
- Both revenue and cost functions are linear over the range of activity under considerations.

Advantages of Marginal costing

1. Constant in nature – Variable costs fluctuates from time to time, but in the long run, marginal costs are stable. Marginal costs remain the same, irrespective of the volume of production.
2. Effective cost control – It divides cost into fixed and variable. Fixed cost is excluded from product. As such, management can control marginal cost effectively.
3. Treatment of overheads simplified – It reduces the degree of over or under-recovery of overheads due to the separation of fixed overheads from production cost.
4. Uniform and realistic valuation – As the fixed overhead costs are excluded from product cost, the valuation of work-in-progress and finished goods become more realistic.
5. Helpful to management – It enables the management to start a new line of production which is advantageous. It is helpful in determining which is profitable whether to buy or manufacture a product. The management can take decision regarding pricing and tendering.

6. Helps in production planning – It shows the amount of profit at every level of output with the help of cost volume profit relationship. Here the break-even chart is made use of.
7. Better results – When used with standard costing, it gives better results.
8. Fixation of selling price – The differentiation between fixed costs and variable costs is very helpful in determining the selling price of the products or services. Sometimes, different prices are charged for the same article in different markets to meet varying degrees of competition.
9. Helpful in budgetary control – The classification of expenses is very helpful in budgeting and flexible budget for various levels of activities.
10. Preparing tenders – Many business enterprises have to compete in the market in quoting the lowest price. Total variable cost, when separately calculated, becomes the 'floor price'. Any price above this floor price may be quoted to increase the total contribution.
11. "Make or Buy" decision – Sometimes a decision has to be made whether to manufacture a component or a product or to buy it ready-made from the market. The decision to purchase it would be taken if the price paid recovers some of the fixed expenses.

12. Better presentation – The statements and graphs prepared under marginal costing are better understood by management executives. The break-even analysis presents the behaviour of cost, sales, contribution etc. in terms of charts and graphs. And, thus the results can easily be grasped.

Disadvantages

1. Difficulty to analyse overhead – Separation of costs into fixed and variable is a difficult problem. In marginal costing, semi-variable or semi-fixed costs are not considered.
2. Time element ignored – Fixed costs and variable costs are different in the short run; but in the long run, all costs are variable. In the long run all costs change at varying levels of operation. When new plants and equipment are introduced, fixed costs and variable costs will vary.
3. Unrealistic assumption – Assumption of sale price will remain the same at different levels of operation. In real life, they may change and give unrealistic results.
4. Difficulty in the fixation of price – Under marginal costing, selling price is fixed on the basis of contribution. In case of cost plus contract, it is very difficult to fix price.
5. Complete information not given – It does not explain the reason for increase in production or sales.
6. Significance lost – In capital-intensive industries, fixed costs occupy major portions in the total cost. But marginal

costs cover only variable costs. As such, it loses its significance in capital industries.

7. Problem of variable overheads – Marginal costing overcomes the problem of over and under-absorption of fixed overheads. Yet there is the problem in the case of variable overheads.
8. Sales-oriented – Successful business has to go in a balanced way in respect of selling production functions. But marginal costing is criticised on account of its attaching over- importance to selling function. Thus it is said to be sales-oriented. Production function is given less importance.
9. Unreliable stock valuation – Under marginal costing stock of work-in-progress and finished stock is valued at variable cost only. No portion of fixed cost is added to the value of stocks. Profit determined, under this method, is depressed.
10. Claim for loss of stock – Insurance claim for loss or damage of stock on the basis of such a valuation will be unfavorable to business.
11. Automation – Now-a-days increasing automation is leading to increase in fixed costs. If such increasing fixed costs are ignored, the costing system cannot be effective and dependable.

Difference between Marginal costing and Absorption Costing

BASIS FOR COMPARISON	MARGINAL COSTING	ABSORPTION COSTING
Meaning	A decision making technique for ascertaining the total cost of production is known as Marginal Costing.	Apportionment of total costs to the cost center in order to determine the total cost of production is known as Absorption Costing.
Cost Recognition	The variable cost is considered as product cost while fixed cost is considered as period costs.	Both fixed and variable cost is considered as product cost.
Classification of Overheads	Fixed and Variable	Production, Administration and Selling & Distribution
Profitability	Profitability is measured by Profit Volume Ratio.	Due to the inclusion of fixed cost, profitability gets affected.
Cost per unit	Variances in the opening and closing stock does not influence the cost per unit of output.	Variances in the opening and closing stock affects the cost per unit.
Highlights	Contribution per unit	Net Profit per unit
Cost data	Presented to outline total contribution of each product.	Presented in conventional way.

THROUGHPUT ACCOUNTING

Throughput Accounting is a simplified management accounting approach that provides managers with support in decision-making aimed at increasing a company's profitability. It is a relatively new method of management accounting that identifies factors that limit the company in achieving its goals and then focuses on simple measures that drive behaviour in key areas towards reaching organizational goals. This approach provides better cost data thus facilitating cost control and management, as opposed to assigning the tasks of improving business processes to workers.

Components of Throughput Accounting

- **Throughput (T)** is the rate at which the system produces "goal units." When the goalunits are money (in for-profit businesses), throughput is net sales (S) less totally variable cost (TVC), generally the cost of the raw materials (T = S – TVC). Note that T only exists when there is a sale of the product or service. Producing materials that sit in a warehouse does not form part of throughput but rather investment. ("Throughput" is sometimes referred to as "throughput contribution" and has similarities to the concept of "contribution" in marginal costing which is sales revenues less "variable" costs – "variable" being defined according to the marginal costing philosophy.)

  Throughput = Sales revenue – Totally or truly variable cost

Totally or truly variable costs are just raw materials and components purchased. Hence throughput can be translated as below.

Throughput = Sales revenue – Raw material costs

- **Investment (I)** is the money tied up in the system. This is money associated with inventory, machinery, buildings, and other assets and liabilities. In earlier Theory of Constraints (TOC) documentation, the "I" was interchanged between "inventory" and "investment." The preferred term is now only "investment." Note that TOC recommends inventory be valued strictly on totally variable cost associated with creating the inventory, not with additional cost allocations from overhead.
- **Operating expense (OE)** is the money the system spends in generating "goal units." For physical products, OE is all expenses except the cost of the raw materials. OE includes maintenance, utilities, rent, taxes and payroll.

Bottlenecks

Throughput accounting is a tool developed to deal with constrains. In throughput accounting these constraints are called bottlenecks. A bottleneck is an activity that places a restriction on a production line or factory. A typical bottleneck being the capacity of a key machine.

The management has to maximize output with a given set of available resources. In order to increase throughout, it is essential to pinpoint the bottlenecks that currently limiting expansion. Bottlenecks may include the following

- Shortage of machine capacity
- Shortage of skilled labour force
- Non availability of a particular grade of material
- Lack of product quality and reliability.

Decision making under throughput accounting

Any business decision like outsourcing, investments in new equipments, accepting a large order can impact either the throughout, or the operating expense (at organization level), or the total inventory. So it is required to analyze impact on these 3 variables.

So the three important questions to be answered are

a. What is the impact of a decision on the company's total throughout
b. What is the impact of a decision on the company's operating expenses?
c. What is the impact of a decision on the company's total investment?

I**mportance of throughput accounting**

Throughout accounting is an important tool of managerial decision making. It is the business intelligence used for maximizing profits. Throughout accounting seeks to increase the speed or rate at which throughout is generated by product and services with respect to an organization's constraints. Throughout accounting is the only management accounting methodology that considers constrains as factors limiting the performance of organizations.

Criticisms of Throughput Accounting

1. It is same as direct costing. Direct costing assumes contribution margins of products as difference between revenue of a product and direct expenses (raw material and direct labor). It considers all other costs as fixed.
2. It is only valid when there is a bottleneck in production. For any decision, regardless of the environment, the relevant costs and revenues have to be calculated and compared using the 3 questions of throughput accounting.
3. It is short term focused. The 3 questions can be analysed for any time horizon. However for long term, the risk and scenario analysis also has to be incorporated in the decision making process.

Throughput Accounting Ratio ((TPAR)

Contribution in its traditional form (ie, sales less variable cost) is not a good guide to profitability because capacity factors and the rate of production are ignored. In order to measure profitability, throughput accounting ratio (TPAR) should be calculated. It is calculated as follows.

Throughput accounting ratio = Return per factory hour or minute/cost per factory hour or minute

Return per factory hour = throughput per unit/time per unit (ie, the bottleneck)

Throughput = sales revenue – Direct material cost

Cost per factory hour = Total factory cost / Total time available for bottleneck

If TPAR is greater than 1, it means that throughput exceeds operating cost, resulting in profit (ie, the product is profitable). If it is less than 1, it would mean that throughput does not cover operating cost, resulting in a loss.

TPAR can be improved by

a. Increasing selling price per each unit sold
b. Reducing material cost per unit
c. Reducing total operating cost
d. Improving the productivity of the assemble work and reducing the time required to make each unit.

Example 1

A Company manufacture a single product A. the selling price per unit is ` 25. The material cost for each unit of product sold is ` 10. Total operating expenses are ` 100000. Labour hours available are 25000 hours each month. Each unit of product takes 3 hours to assemble. Calculate the throughput accounting ratio.

Solution

Throughput accounting ratio = return per factor hour/cost per factor hour

Throughput per unit = sales revenue – direct material cost

= 25-10= 15

Return per assembly hour = throughput per unit/time per unit

=15/3=5

Cost per factory hour = total factory cost/total time available for bottleneck

= 100000/25000 hours = `4

TPAR = 5/4 = 1.24

Application for Throughput Accounting in case of multi products

Throughput accounting can be applie3d to a multiproduct decision making problem in the same way as conventional by factor analysis in marginal costing.

Example 2

Bharath metals ltd. Manufactures four different products. But due to limited machine hour, company is no longer able to meet the demand of all four products. In order to decide which product should be preferred in production you are provided with the following data.

	Sales price	material cost	operation ex.	Time (minute)
Magnetite	300	150	90`	30
Hematite	450	320	160	45
Goethite	350	150	80	60
Limonite	750	600	400	20
Required:				

1. If machine hours are limited to 5000 hours then suggest the production supervisor which product is giving maximum throughput per limiting factor.
2. Calculate throughput accounting ratio.

Solution (1)

In case where each product is consuming different amount of limiting factor then comparing throughput of each product will not give us accurate results. To make the results more accurate we need to bring all the products at one comparison point which is same for all the products. As in the question each product takes different amount of time to complete. Therefore, first we have to bring the products to any reference point which should be same for all for example 1 hour or 1 minute.

In order to find out how much throughput each product is generating per minute, which is also called RETURN PER FACTORY HOUR, we will divide each products throughput over time it takes to finish which is limited.

Magnetite	(300-150)	150	150/30	5
Hematite	(450-320)	130	130/45	2.89
Goethite	(350-150)	200	200/60	3.33
Limonite	(750-600)	150	150/20	7.5

Limonite is generating the maximum throughput in comparison to other products for every minute spent on making it. It also means that if some other product is selected instead of limonite then organization will suffer from opportunity loss.

Solution (b)

By going through above example, now it might be easy for us to understand how different products are compared and

how their throughputs are compared. However, only throughput is not enough to make the selection of the product. As said earlier, the product with maximum throughput and the best coverage of other operating expenses will maximize the profits. This will be provided by TPAR.

But to make the comparison right against returns, even the costs will be first put against the limiting factor so that rate at which expenses are incurred can be found, which is also termed as cost per factory hour. In simple words, we are comparing the rate of net inflow against the rate of outflow.

Cost per factor hour(in this case cost per factory minute) cam be calculated as follows:

Magnetite	90/30	3
Hematite	160/45	3.56
Goethite	80/60	1.33
Limonite	400/20	20

These figures tell us the amount spent towards other expenses for each minute if a particular product is manufactured.

To calculate throughput accounting ratio now we have to divide return per factory hour(or minute) over cost per factory hour (or minute).

5/3	1.67
2.89/3.56	.81
3.33/1.33	2.5
7.5/50	.38

Above figures cleared the picture more and made the decision more easy and accurate. An important conclusion that needs attention is that limonite have maximum throughput and was apparently more attractive, but other expenses to make limonite are so high that its throughput becomes overloaded and thus is the worst product to be chosen. Therefore, goethite is the best and the only profit making product as only geothite's throughput ratio is highest which means that inflow is much more than the outflow and all the other products are not generating enough inflows to cover the outflows and thus making loss.

Bottleneck and Overhead Attribution

Sometimes there may be a 'wondering' bottleneck. This means that the identified key bottleneck is not fully utilized because of a temporary limitation elsewhere, caused by poor production planning and control. If there is a wandering bottleneck the actual time on the key resource issued, not the actual time on the wandering bottleneck. Throughput accounting suggests that overheads should be attributed to product costs according to their usage of bottleneck resources:

Throughput cost = standard minutes of throughput X budgeted TFC cost per minute of bottleneck resource.

Based on this, an efficiency percentage can be calculated thus:

$$\text{Efficiency} = \frac{\text{Throughput cost}}{\text{Actual TFC}} \times 100$$

Efficiency ratio will fall below 100% when:

a. Actual output is less than budgeted eg, if there was a wandering bottleneck in production or poor quality; or

b. Actual factory costs exceed budget Labour efficiency can be measured as

$$\text{Labor efficiency} = \frac{h \quad h}{\qquad\qquad} \quad 100$$

Example 3

A factory has a key resource of facility a which is available for 6260 minutes per period. It produces two products X and Y.X requires 1 minute and Y requires 2 minutes in facility A. during a week actual production was 4750 units of product X and 650 units of Product Y. Actual factory costs were `15650.

Calculate

a. Throughput cost for the week

b. Efficiency percentage and comment on the possible reason(s) for the efficiency percentage calculated.

Solution

$$\text{Cost per factory minute} = \frac{15650}{6260} = 2.5$$

Standard minutes of throughput for the week = (4750 x 1) + (650x2) = 6050

Throughput cost for week = 6050 x `2.5 per minutes = ` 15125

$$\text{Efficiency (\%)} = \frac{h}{h} \quad 100$$

The bottleneck resource of facility A is available for 6260 minutes per week but produced only 6050 standard minutes. This could be due to:

a. The presence of a wandering bottleneck causing facility A to be under utilised or

b. Inefficiency in facility A

Steps to improve Throughput

1. Review Your Existing Workflow

The first place to start when trying to increase your throughput is to review your existing workflow. You can't make any improvements until you actually know how your shop floor functions. There are 3 main areas that you need to evaluate:

a) Labor - Do you have enough skilled labor in the right positions? Does your staff clearly know their objectives and work plans? Do you have an effective Project Manager in place that is able to keep on top of things?

b) Equipment - Is all your equipment in good repair? Is the technology that you rely on actually suited to your current needs?

c) Processes - Do you have clearly mapped processes? Where are your pain points and bottlenecks?

2. Eliminate Bottlenecks

Now that you have reviewed your existing workflows

and identified where your problems are you can work on eliminating bottlenecks. Maybe you have some processes that have been in place for such a long time that they are now riddled with workarounds, as new equipment has been added or production methods have changed. Work on creating new streamlined processes that work with the current setup and flow of your factory. Or you may need to add extra stations to a long process so more parts can be processed at once, or you may need to find ways to make a process more efficient, or possibly even eliminate a process entirely and replace it with a different one. The right solution will depend on factors such as spare floor space, expense of equipment involved, and the nature/necessity of the process. Use the intel you discovered in step one to make informed decisions about how to improve your workflows.

3. Reduce Equipment Downtime

One of the fastest ways to slow things down is by ignoring regular maintenance. Scheduled downtime for maintenance costs much less, in terms of both time and money, than downtime due to broken or worn-out equipment. And Murphy's Law tells us that equipment breakages always come at the worst possible time.

4. Reduce Parts Rejection Rate

You may have a high output, but still fail to meet throughput goals because too many parts are being rejected. If you can produce 500 parts per hour, but have a 10% part rejection rate, you'll waste 50 parts every hour, or 400 parts a

shift. If you can cut your rejection rate in half, your throughput would increase by 200 parts per shift.

5. Improve Employee Training

When employees lack proper training, they may not have the skills and competence to find improvements that they can make at their workstations. Worse yet, employees that are poorly trained may accidentally create delays, because they don't understand the entirety of the production process and how a tweak that saves them a minute creates 5 minutes of extra work for someone else down the line. Focusing on employee training so they have the skills to make positive, well-informed changes to the production process is key to maximizing throughput.

6. Use Factory Automation

Consider automating some of your manufacturing processes. Even your most dedicated and skilled employees can get exhausted after a few hours of heavy labor, leading to reduced work consistency and increased risk of injury. The appropriate use of factory automation can dramatically increase manufacturing throughput. Automated production systems can outperform humans in terms of precision and the ability to perform repetitive tasks at a great speed. In the presence of smart machines, your staff can focus on planning, programming, and other important tasks, and leave the heavy lifting, so-to-speak, up to the machines. Modern industrial technology makes it possible for you to produce a large number of products while meeting the stringent quality control

requirements, and improve your workers' quality of life by preventing them from having to do difficult and repetitive heavy labor. Strategic use of the right automated machines on your shop floor can have a great impact on your overall productivity and throughput.

Problems in Throughput Accounting

1. Excessive budget cuts
2. Lack of focus on non bottlenecks
3. Resistance from staff
4. Conflicts
5. Requires understanding
6. Big data collection and understanding
7. Different behaviour of metrics
8. Frequent change in throughput
9. Difficulty in the determination of variable cost.

Differences between traditional product costing and throughput accounting

Following are the differences between traditional product costing and throughput accounting.

Traditional product costing		Throughput accounting
1.	Production adds to value	1. Sales of the production adds value
2.	Capacity utilization of labor and facility is taken as the measure of efficiency	2. Effective utilization is measured by adherence to schedule of production and maintenance of delivery dates

Traditional product costing		Throughput accounting	
3.	Labor and certain costs are taken as variable costs	3.	All costs except materials are treated as fixed costs
4.	Stock is valued at cost of production	4.	Stock is valued at material cost only
5.	Product costing is mainly done for short term decision	5.	It is for planning and improving profit by increasing flow of production

Throughput accounting and contribution approach

Throughput accounting and contribution approach are different. Contribution is an important concept of marginal costing. Contribution is simply refers to excess of sales revenue over variable cost. On the other hand, throughput means excess of sales revenue over direct material cost. Under contribution approach variable cost comprises of direct material cost, direct labor cost and variable overheads. All other costs are fixed which are written off against contribution. The balance represents profit. From the following statement we can understand the difference between throughput accounting and contribution approach.

Income statement

Sales	xxxx
Less direct material cost	xxx

Throughput contribution	xxxx

Less direct labor and other manufacturing expenses	xxx
Contribution as per marginal costing	xxxx
Less fixed cost	xxx

Profit (as per absorption costing/throughput accounting/ marginal costing)

Throughput costing

It is a costing approach under which only direct materials are recorded as inventory costs while all other manufacturing costs (including direct labor and variable factory overhead) are expensed as period costs. Selling and administrative costs are expensed as period costs as well.

Income statement under throughput costing

Under throughput costing, the income statement is prepared in the following manner:

Income statement

Sales revenue	xxx
Less Direct material (for the quantity of goods sold)	xxx
Throughput contribution	xxx

Less direct expenses :

Direct labour cost Direct expenses Production overhead

Administrative overhead xxx

Selling and distribution overhead	xxx	
	xxx	
Operating profit	xxx	
		xxx
	xxx	

	------	
		xxx

Example 5

The following performance statistics are extracted from the records of a company which has just completed first year of its operations.

a. Planned output: 100000 units. Actual output : 100000 units
b. Sales 90000 units at ` 80 per unit
c. Direct material cost per unit ` 15
d. Direct labor cost ` 400000
e. Variable manufacturing overhead expenses ` 600000
f. Fixed manufacturing overhead expenses ` 2000000
g. Variable administration and selling overheads ` 10 per unit
h. Fixed administration and selling overheads 1000000

Prepare income statement under absorption costing and throughput costing

Solution

Cost of opening stock	---
Add: manufacturing cost of goods produced	
Direct material (100000 units x ` 15 unit)	1500000

Direct labor cost		400000
Variable overheads		600000
Fixed overheads (at ` 20 per unit of output)		2000000

Manufacturing cost of goods available for sale		4500000
Less cost of closing stock		450000

Manufacturing cost of goods sold		4050000
Sales revenue (90000 units x ` 80 per unit)		7200000

Gross profit		3150000
Less: Administration and selling expenses		
Variable (90000 units of sales x ` 10 per unit)	900000	
Fixed	1000000	19000000

Operating profit		1250000

Income statement (under throughput costing)

Sales (90000*80)		7200000

Cost of opening stock		---
Add: Direct material cost of goods produced (100000 x `15)		1500000

		1500000

Less : Cost of closing stock (10000x15)		150000
Direct material cost of goods sold		1350000
Throughput contribution (7200000-1350000)		5850000
Less: All other costs (period costs):		
Direct labor costs	400000	
Variable manufacturing cost	600000	
Fixed manufacturing overhead	2000000	
Variable administration and selling oh	900000	
Fixed administration and selling overhead	1000000	4900000
Operating profit		950000

In this case, there is no difference between budgeted output and actual output, and between budgeted fixed manufacturing overheads and actual fixed manufacturing overheads. Therefore, actual fixed manufacturing overhead amount is equal to budgeted, hence, the overhead absorption rate is not used. As a result, there is no over or under absorption of fixed manufacturing overheads. The difference in operating profit Rs.300000 arises due to the difference in valuation of closing stock (ie, 450000-150000)

Lesson 2

ACTIVITY BASED COSTING (ABC)

Meaning of ABC

Activity Based Costing (ABC) is a method for developing cost estimates in which the project is subdivided into discrete, quantifiable activities or a work unit. ABC systems calculate the costs of individual activities and assign costs to cost objects such as products and services on the basis of the activities undertaken to produce each product on services. It accurately identifies sources of profit and loss.

Limitations of Traditional Costing System

a) The present Costing system has developed convenient overhead recovery basis and blanket overhead recovery are acceptable when valuing stocks for financial reporting, but thy are inappropriate when used for decision making and typical product strategy decisions. Such decisions have implications over 3-5 years and over this period many fixed costs become variable.

b) The traditional fixed verses variable cost split is often unrealistic since as business grows they often become more complex.

c) In case of companies manufacturing and selling multiple products usually make decisions on pricing, product-mix, and process technology etc, based on distorted cost information due to difficulties in traditional costing systems in collection, classification, allocation and recovery of overheads to individual products.

d) The cost structure is changing especially when making direct labour component to small proportion.

e) Traditional accounting was confined merely to furnishing information at product level. The new manufacturing technology demands the feedback of product level. The new manufacturing technology demands the feedback of performance while production is still in progress rather than history.

f) There is also an urgent need to integrate the activity measurement and financial measurement.

Concept of Activity Based Costing

The concepts of ABC were developed in the manufacturing sector of the United States during the 1970s and 1980s. It is a practice in which activities are identified and all related costs of performing them are calculated, providing actual costs chargeable.

The focus of activity based costing is activities. Thus identifying activities is a logical first step in designing an activity based costing. An activity is an event, task or unit of work with a specified purpose

The CIMA terminology defines ABC as "a cost attribution to cost units on the basis of benefit received from indirect activities."

Peter B.B. Turney defines ABC as "a method of measuring the cost and performance of activities and cost objects. Assigns cost to activities based on their use of resources and assigns cost to cost objects based on their use of activities. ABC recognizes the causal realtionship of cost drivers to activities."

Kaplan and Cooper's Approach to ActivityBased Costing

Kaplan and Cooper of Harvard Business School have developed a new approach in costing to calculate product costs. It claims that the cost should be classified as long term variable costs and short term varibale costs. Traditionally short term variable costs are known as variable costs and long term variable costs are known as fixed costs. Short term varibale costs are volume related and change proportionately with the volume of production. Long term variable costs vary in long term but not instantaneously.

It is also claimed that this approach related overhead costs to the forces behind them. Those forces can be referred as cost drivers. Cost drivers are those activities or transactions that are significant determinants of costs. Product cost is determined under ABC system by obtaining an understanding of cost behaviour and using new measures of quantity of resources consumed by each product. ABC system is based on the belief that activities cause costs and that a link should therefore be made between activites and products by assigning costs of activities to products based on the individual product's demand for each activity.

Features of Activity Based Costing

1. A tool for referring a costing system.

2. All overheads are apportioned on the basis of activities consumed by products or jobs.

3. Overhead costs are apportioned to different products in proportion to cost driving activities.

4. Costs in each pool have a cause and effect relationship with the cost allocation base over a period of time.

5. Helping the management to eliminate expensive activities.

Allocation of Overheads under Activity Based Costing

The volume related cost drivers like direct material cost, direct labour hours, machine hoursetc. can be used to charge the short term variable cost to the products. According to Kaplan and Cooper's approach, volume related cost rivers are inappropriate for tracing long term variable costs to products because they are driven by complexity and variety and not by volume and the key to understanding what causes (drivers) overhead costs in transactions undertaken by support departments costs and factory overheads to product lines under ABC system.

Need for Emergence of Activity Based Costing

Traditional product costing systems were designed when most of the companies manufactured a narrow range of products. Direct materials and direct labour were the dominant factors of production in this system. Overheads were relatively small and distortions due to inappropriate treatment were not significant. Today companies produce a wide range of products and overheads are of vital importance. It is inappropriate to apportion the overheads based on only direct labour. Unlike traditional systems, non-volume related activities like material handling set up etc. are important and their costs cannot be apportioned on volume basis. Hence, it arises the need for emergencies of Activity Based Costing.

Terms in Activity Based Costing

The operation of the ABC system involves the use of the following terms:

(a) Activity

An activity means an aggregate of closely related tasks having some specific functions which are used for completion of goal or objectives. For example, customer order processing is an activity. It includes receiving order from customers, interacting with production department regarding capacity to produce and giving commitment to the customer regarding delivery time. Other activities may be assembling, packaging, advertising etc.

(b) Resource

Resources are elements that are used for performing the activities or factors helping in the activities. For example, order receiver, telephone, computers etc are resources in customer order processing activity. It may include material labour, equipment, office supplies etc.

(c) **Cost**

Cost is amount paid for resource consumed by the activity. For example, salaries, printing sationary, telephone bill etc are cost of customer order processing activity. It is also known as activity cost pool.

(d)**Cost Object**

It refers to an item for which cost measurement is required. E.g. a product, a service, or a customer.

(e) **Cost Pool**

A cost pool is a term used to indicate grouping of costs incurred on a particular activity which drives them.

(f) **Cost driver**

Any element that would cause a change in the cost of activity is cost driver. Actually cost drivers are basis of charging cost of activity to cost object. Cost drivers are used to trace cost to product by using a measure of resources consumed by each activity. For example, frequency of order, number of order etc. may be cost driver of customer order processing activity. Cost driver may be involved two parts, namely, resource cost driver and activity cost driver. A resource cost driver is a measure of the quantity of resources consumed by an activity. An activity cost driver is a measure of the frequency and intensity of demand, placed on activities by cost objects.

Categories in Activity Based Costing.

1. Unit level activities – The cost of some activities, mainly primary activities are strongly correlated to the number of units produced. These activities are called as unit level activities. For example, the use of indirect materials.
2. Batch level activities – Batch level activites are those activities, mainly manufacturing support activities like material ordering, which are driven by the number of batches of units produced.
3. Product level activities – Product level activities are those activities, like designing the product which are driven by the creation of new product line and its maintenance.

(4**) Facility Level activities**- The cost of some activities like maintenance of building, cannot be related to a particular product line. These activites are called as facility level activities.

Activities and Cost Drivers

The following table gives the list of main activities and their cost drivers:

SL NO.	Activities	Cost Drivers
1	Machine set- up	No. of production runs
2	Maintenance of machine	No. of machine breakdown
3	Purchasing	No. of purchase orders
4	Material receiving	No. of receiving orders
5	Inspection	No. of inspection
6	Material handling	No.of material movements
7	Warehousing	No. of items in stock
8	Quality testing	Hours of test time
9	Packing	No. of packing orders
10	Store delivery	No. of store deliveries

Stages of Activity Based Costing

The following are the different steps or stages in ABC system:

1. **Identify the chosen cost objects**
   The cost objects of any organization are the products or services and the goal is to first calculate the total cost of manufacturing and distrubuting these products and their unit cost.
2. **Identify the different activities within the organization**
   After the identification of cost objects, the main activities, which are being performed in the organization have to be identified. Usually the number of activities over cost centres in ABC will be much more as compared to traditional overhead system. The exact number will depend on how the management subdivides the organizations activities.
3. **Identifying the direct cost of products**
   The direct cost of products or objects may comprise direct material cost, direct labour cost and direct expenses. Classification of as many of the total costs as direct costs as is economically feasible should be made. It reduces the amount of costs classified as indirect.

4. Relating the overhead to the activities

After identifying the organizations activities, the various items of overhead are related to activities both support and primary, that caused them. As a result of relating the items of overhead to various activities, cost pool or cost buckets are created.

5. Spreading the support activities across the primary activities

The spreading of support activities (i.e, activities which support or assist manufacturing) across the primary activities (correlated to the number of units produced) is done on some suitable base which reflects the use of support activity. The base is the cost driver and is measured of how the support activities are used.

6. Determining the activity cost drivers

The determination of the activity cost drivers is done in order to relate the overhead collected in cost pools to the cost objects of products. It is done on the basis of the factor that drives the consumption of the activities.

7. Calculating the activity cost driver rates

The activity cost rates for each activity are calculated in the way in which overhead absorption rates would be calculated under the traditional system. It can be presented as follows:

$$\text{Activity cost driver rate} = \frac{\text{Total Cost of activity}}{\text{Activity driver}}$$

These activity cost driver rates are to be used for ascertaining the amount of overhead chargeable to various cost objects or products.

8. Computing the total cost of products or cost objects

The total costs of the products shall be computed by adding all direct and indirect costs assigned to them. The amount of overhead chargeable to a product or cost object shall be calculated by multiplying the activity cost drivers arates by different amounts of each activity that each product or other cost object consumes

Significance of Activity Based Costing

1.**Cost reduction** – ABC measures how much activities that are costly and then take steps to reduce their costs by changing the production process or outsourcing those activities.

2.Product pricing and decisions of whether to continue producing a product or keeping a particular customer – ABC implementers generally believe that ABC provides more accurate cost information than conventional costing does. Management can use this information to negotiate price increases with customers or to drop unprofitable products.

3.Budgeting and performance measurement- Management can use more accurate cost information to improve budgets and measures of department and division performance.

Advantages of Activities Based Costing

1.It provides more accurate product costing information by reducing arbitrary cost allocations.

2.It improves the quality of information available for decision making by answering the questions such as what activities and events are driving cost and where efforts should be made to control cost.

3.It is easiest way to allocate overhead in the product.

4.It helps to identify the activities that can be eliminated.

5. It links up cause and effect relationship.

6. ABC helps to identify the value added activities (that increase the customer's satisfaction) and non- value added activites (that creates the problems in customer's satisfaction)

7.ABC translates cost into a language that people can understand and that can be linked up to business activities.

Limitations of Activity Based Costing

1.More time consuming to collect data.

2.Cost of buying, implementing and maintaing activity based system.

3.In some cases, the establishment of cause and effect relationship between cost driver and cost not is a simple affair.

4. ABC does not conform to generally accepted accounting principles in some areas.

Difference between Traditional Costing and Activity Based Costing

In the traditional system the cost analysis is done by product. In ABC managers focus attetion on activities rather than products because activities in various departments may be combined and cost of similar activities ascertained eg. quality

control, handling of machines, repairs to machines etc. if detailed costs are kept by activities, the total company costs for each activity can be obtained, analysed planned and controlled.

2. Managers manage activities and not products. Changes in activities lead to changes in costs. Therefore, if the activities are managed well, costs will fall and resulting products will be more competitive.

3. Allocating overhead cost to production based on a single cost driver (allocation base such as unit basis, percentage of material, percentage of prime cost, labour hour rate, machine hour rate etc.)can result in an unrealistic product cost because the traditional system fails to capture cause and effect relationships. To manage activities better and to make wiser economic decisions, managers need to identify the relationships of causes (activities)and effects (costs) in a more detailed and accurate manner.

4. ABC highlights problem areas that deserve management's attention and more detailed analysis. Many actions are possible on pricing, on process technology on product design, on operational movements and on product mix.

Implementation of Activity Based Costing

Numerous approaches can be taken when designing and implementing an ABC system. There is no generic approach that is universally appropriate. In order to obtain " proof of concerpt", many companies especially larger ones, initially implement ABC using a pilot project approach where a segment of the organisation is selected for implementation of ABC costing concepts.

The pilot project can be implemented using actual revenues and expenses. If the main goal is to gain buy-in for ABC, budgeted or planned revenues and expenses may be used but budgets and forecasts may be substantially different than actual results. Continuing with the pilot implementation, activities and their interrelationships, cost drivers and volumes are identified. Cost attachment points are identified and activity costs are calculated. The consumption of activities by cost objects (such as products or customers) is identified, and the drivers and volumes identified. The successes of the pilot project can also be used to validate the business case for implementing ABC company wide and provide "lessibs learned" for subsequent rollout of the methodology.

An organization can also opt to fully implement ABC from the start. In this case, the ABC rapid prototyping with literative remodelling approach is strongly recommended. The structure of the ABC rapid prototyping approach is similar to that used in the pilot approach but includes more areas (ideally the entire enterprise) more data and more analysis. By exposing managers(for which it is important to select advocates and avoid nay-sayers or those who may feel threatened) to the quickly produced preview of the reformed costs, by-in will occur.

Use of this approach enables an organization to achieve a new awareness of cost system design throughout the organization, giving it the ability to rapidly adopt these systems and use the enhanced information to improve its performance. People do not know what they do not know. As these models are iteratively scaled, managers will see more outcomes that will stimulate what they want to analyse. Seeing results accelerates this learning process.

If the initial approach is a pilot, ABC study of a single department or process, tghen the organization should be cautious in that pilots address only a subset of an organization's activities. Such an approach faces the danger of overlooking activities or costs from departments, cost centres, and functions in the organization not being studied. Activity analysis across multiple departments and ideally organization-wide, is preferred by process consultants. Also comparison of the shift in product costs of the existing costs to ABC costs cannot be done vaildly by including only a few departments or attempting to focus on only one or a few products.

Various questions need to be addressed in the design and implementation of an ABC system. They are as follows:

a) The ownership of the ABC system
b) The complexity of the system.
c) Whether to integrate the ABC system with the financial accounting system.

Benefits of Implementing Activity Based Costing

1. Cost of Management and Downsizing

ABC helps to reduce costs by providing meaningful information on the opportunities available for reducing costs. ABC helps in right decisions as it clearly defines the various activities. Thus one can focus on value adding activities and eliminating the non value adding activities.

2. Determination of Products Service Costs

Non manufacturing costs like marketing and advertising costs can no longer be neglected as they constitute a substantial portion of the total cost. Manufacturing costs only constitute a very small proportion of the total cost. These non manufacturing costs can be allocated easily using ABC because the relationship between costs and its causes is better understood.

3. Improvements in Performance

ABC involves preparing the statement of expenditure activity wise and comparing it with the corresponding value addition to know the activities which are to be eliminated or need improvement for the better performances of the organisation.

4. Product or Service Pricing

ABC enables the mangement to fix the product or service prices by formulating an effective pricing policy. ABC helps in fixation by providing information about the product or service cost.

5. Make or Buy Decision

ABC enabales the manager to decide whether he should get the activity done within the firm or subcontract the same to an outside agency. Subcontracting may be done if the firm is incurringhigher overhead cost as compared to the subcontractor.

6. Transfer Pricing

ABC helps to determine the cost for each activity. Thus, when finished goods of one department are transferred to another department, the cost of product to the transferee department can be easily known. ABC provided accurate cost information to evaluate the performance of the transferor and transferee departments.

Illustration 1: Kerala Ltd. provides the following information relating to its products P and Q

Yearly Output	3000 Units	30000 units
No. of machine hours per unit	4	4
No. of labour hours per unit	8	8
Total machine hours	12000	120000
Total labour hours	24000	240000

No. of purchase orders	240	480
No. of set up	120	180

The overhead cost of the activities has been as under:

Volume related	Rs. 495000
Purchase related	Rs. 540000
Set-up related	Rs945000
	Rs1980000

Calculate the total cost of the two products separately under traditional costing system and ABC system.

Solution:

Product	Machine Hours per unit	Labour hoursper unit	Output (Units)	Total Machine hours	Total Labour hours
P	4	8	3000	12000	24000
Q	4	8	30000	120000	240000
			33000	132000	264000

Traditional costing system:

Total costs to be allocated Rs. 1980000

Overhead rate per machine hour $= \frac{1580000}{132000} = \text{Rs. } 15$

Overhead rate per labour hour= $\frac{1930000}{264000} = \text{Rs. } 750$

Cost per unit P= Rs. 15x4 machine hours = Rs. 60

Q= Rs 15x4 machine hours = Rs. 60

Total cost allocated to products P=Rs. 60x300 units = Rs. 180000

Q= Rs. 60x30000 units =Rs. 1800000

ABC System:

	Activities		
	Volume related	Purchase related	Set-up related
Cost traced to activities	Rs.495000	Rs.540000	Rs. 945000
Consumption of activities (cost drivers)	132000 machine hours	720 purchase orders	300 set up
Cost per unit of consumption	Rs.375	Rs.750	Rs.3150
Cost traced to products P	(12000 x 3.75) Rs.45000	(240x750) Rs.180000	(120x3150) Rs. 378000
Q	(120000 x 3.75) Rs. 450000	(480x750) Rs. 360000	(180x3150) Rs. 567000

Total costs allocated to Product P= (45000+180000+318000)=Rs. 603000

Total costs allocated to product Q= (450000+360000+567000)= Rs. 1377000

Illustration 2: Calicut Ltd. manufactures two products A and B, using the same equipment and similar processes. Calculate the producion overheads to be absorbed by one unit of each of the products using traditional costing system using the direct labour hour rate to absorb overheads and the ABC system using suitable cost drivers to trace overheads.

	Product A	Product B
Units produced	10000	14000
Direct labour hours per unit	2	4
Machine hours per unit	6	2
Setups in the period	20	80
Orders handled	80	120

The overhead cost of the activities is as under:

Machine activity related Rs.528000

Production run set up related Rs. 48000

Handling of orders related Rs.108000

Rs.684000

Solution:

Taditional costing system:

Based on direct labour hours:

Product A=10000 unitsx2hours=20000

Product B= 14000 units x 4 hours = 56000

76000

Overhead absorption rate = $\frac{684000}{76000}$ =Rs. 9 per hour

Overhead absorbted per unit:

Product A=2 hoursxRs.9= Rs.18 per unit

Product B= 4 hours xRs. 9= Rs. 36 per unit

ABC System:

Activity	Activity cost pool	Cost driver	Quantity of cost driver	Recovery rate
Machine hour driver rate	Rs.528000	Machine hours	(10000x6)+ (14000x2)= 88000	(528000/88000 =Rs. 6 per machine hour
Set up driver costs	Rs.48000	Set up	(20+80)=100	(48000/100)= Rs.480 per set up
Order driver costs	Rs.108000	Orders	(30+120)= 150	(108000/150)= Rs.720 per order

Overhead costs:

	Product A	Product B
Machine driven costs	60000 hours xRs.6 =Rs.360000	28000 hours x Rs.6 =Rs.168000
Set up costs	20xRs.480=Rs.9600	80xRs.480= Rs.38400
Order handling costs	30xRs.720=Rs.21600	120xRs.720=Rs. 86400
Total	Rs.391200	Rs.292800
Overhead cost per unit	Rs.391200/10000=Rs. 39.12	Rs.292800/14000=Rs. 20.91

REVIEW QUESTIONS

A. Short Answer Type Questions

1. Define ABC
2. State the sailent features of ABC
3. Explain need for emergence of ABC
4. What is a cost driver?

B. Essay Type Questions

1. What is ABC? Describe the stages in ABC.
2. Write an essay on implementation of ABC
3. Distinguish between traditional costing and ABC.
4. Explain the limitations of traditional costing.

Practical Problems

1.Manikya Ltd. Manufactures two products, X and Y, using the same equipment and similar processes. Calculate the production overheads to be absorbed by one unit of each of the products using traditional costing system using the direct labour hour rate to absorb overheads and the ABC system using suitable cost drivers to trace overheads.

	Product X	Product Y
Units produced	10000	14000
Direct labour hours per unit	2	4
Machine hours per unit	6	2
Setups in the period	20	80
Orders handled	30	120

The Overhead cost of the activities is as under

Machine activity realted	Rs.440000
Production run set up related	Rs. 40000
Handling of orders related	Rs.90000
	Rs. 570000

(Answers: Traditional costing –overhead absorbed per unit X- Rs 15 &Y- Rs. 30:ABC-X Rs.32.60 & Y Rs. 17.43)

2. Hindustan Ltd. provides the following information relating to its products A and B:

	Product A	Product B
Yearly output	3000 units	30000 units
No. of machine hours per unit	4	4
No. of labour hours per unit	8	8
Total machine hours	12000	120000
Total labour hours	24000	240000
No. of purchase orders	240	480
No. of set up	120	180

The overhead cost of the activities has been as under:

Volume related	Rs.330000
Purchase related	Rs.360000
Set-up related	Rs.630000
	Rs.1320000

Calculate the total cost of the two products separately under traditional costing system and ABC system
(Answer: Traditional costing= Total cost A-Rs.120000&B-Rs.1200000:ABC-A Rs.402000 &B Rs. 918000).

Activity Based Budgeting

Activity –based budgeting is most often found in cost accounting. Managers prepare budgets and spending propositions based on past production activities. In other words, management examines the costs of performing certain activities , like bending a fender for a car, to budget the overall costs of producing a product.

Activity-based budgeting (ABB) is a system that records, researches, and analyzes activities that lead to costs for a company. Every activity in an organization that incurs a cost is scrutinized for potential ways to create efficiencies. Budgets are then developed based on these results.

Activity-based budgeting (ABB) is more rigorous than traditional budgeting processes, which tend to merely adjust previous budgets to account for inflation or business development.

Activity based budgeting is a budgeting method in which budgets are prepared using activity based costing after considering the overhead costs. In simple words, activity based budgeting is management accounting tool which does not consider the past year's budget to arrive at current year's budget. Instead, the activities that incur the cost are deeply analyzed and researched. Based on the outcome of the study, the resources are allocated to an activity.

Advantages of Activity Based Budgeting

1. Evaluation

Activity based budgeting method evaluates each and every cost driver. It takes into consideration all the steps involved in an activity. The irrelevant activities are eliminated and only the necessary activities form a part of the business.

2. Competitive edge:

Activity based budgeting system eliminates all sorts of unnecessary activities, which helps the business to save its costs. The saved cost results in the production of goods and

services at lower cost than that of competitors. It also helps the organization to gain a competitive edge in the market.

3. Business as a Unit

This budgeting technique helps in viewing the business as a single unit and not in the form of departments. The managers or the top management prepare the budget for the business unit as a whole and not keeping in mind any single department as done in the case of other methods of budgeting.

4. Elimination of Bottlenecks

Budgets under activity based budgeting are prepared after deep research and analysis. This study removes all the unnecessary activities of the business. By doing so, the business eliminates all sorts of bottlenecks associated with an activity and business functions are carried out more smoothly.

5. Improves Relationship

Activity based budgeting system helps in improving the relationship between the organization and its customers. The main aim of this budgeting method is to eliminate unnecessary activities and serve the customers with the best quality at best price. This enforces (indirectly) the employees of the company to serve the customers in the best way possible and ensure customer satisfaction. In turn, the relationship between the organization and the customers improves. Let us have a look at disadvantages of activity-based budgeting.

Disadvantages of Activity Based Budgeting

1. Requires Understanding

Activity-based budgeting requires a deep understanding

of various functional areas of the business. If the manager preparing the budget is incapable of understanding and evaluating the areas of business, it would lead to inaccurate budget preparation.

2. Complex

Activity-based budgeting system is complex in nature. It requires research and analysis of various factors. This budgeting method comprises of estimation of demand and based on that, it does the estimation of resources to be employed in various activities.

3. Resource Consumption

The process of budgeting in this method consumes a lot of resources of an organization. It needs to employ top officials for conducting numerous analyses. It is a very time-consuming task too. If these resources are employed in other operational activities, they can give better returns.

4. Cost Involved

Implementation of activity-based budgeting requires trained employees. An employee, who is not trained enough, cannot handle the budgeting exercise effectively. So business needs to incur extra costs to train its employees. Moreover, the process requires the involvement of top management, so proves to be costly too.

5. Short Term

Activity-based budgeting focuses on short-term goals of the business. It does not take into account the long-term scenario of the business. Focusing more on short-term goals

rather than long-term goals can prove to be very fatal for the organization.

Difference between Traditional Budgeting and Activity budgeting

Traditional budgeting	Activity budgeting
1. Focuses on the cost elements themselves	1. Focuses on output and work done.
2. Considers variable cost and fixed cost	2. Considers utilized and unutilized capacity
3. Controls performance	3. Controls activities
4. Budgets costs for functional categories	4. Determines the cost of doing activities
5. Contains last years' inefficiencies	5. Focuses on continuous improvement

Activity Based Management

Activity based management is defined as the identification and selection activities to maximize the value of the activities while minimizing their cost from perspective of the final consumer. In other words, ABM is concerned with how to efficiently and effectively manage activities and processes to provide value to the final consumer. Defining processes and identifying key activities help management better understand the business and to evaluate whether activities performed bring added value to the customer.

Difference Between ABC and ABM

ABC		ABM	
1.	It focuses on allocating costs to products based on activities	1.	It focuses on manageing activities to reduce costs and make better decisions.

2.	It uses activity analysis to improve the accuracy of cost analysis by improving the tracing of cost to cost objects.	2.	It uses activity analysis to improve operational control and management control
3.	It provides information to ABM	3.	It analyses the information provided by ABC for continuous improvement.
4.	It ascertains accurate cost of cost objects	4.	It uses the cost information for reducing costs continuously
5.	It informs what is the cost of one activity, service or a customer.	5.	It focuses its attention on whether the activities are right or adding value
6.	It does not identify value added activities or non value added activities	6.	It identifies value added activities and non value added activities

Features of ABM

ABM has the following features

1. It is the collection of cost management applications of ABC
2. It provides transparent information about the cost of undertaking all of the activities in the oraganisation.
3. It anlyses the cost on the basis of activities that cause incurrence of such cost.
4. It analyses organization into a set of linked activities that consume resource to meet customer needs.
5. It identifies non value added activities and value added activities. After analyzing this, it is possible to eliminate

the non value added activities and carry out the value added activities efficiently.

6. It is used to evaluate whether activities being performed bring added value to the final consumer.
7. It involves three type of analysis namely, activity analysis, cost driver analysis and performance analysis.

Objectives of ABM

The main objectives of ABM are outlined as below.

1. To reduce the cost continuously.
2. To improve performance
3. To enhance value to final consumers and increase the profit by providing this value
4. To help managers make better decisions
5. To help a firm compete in a competitive market.
6. To gain competitive advantage for the firm.
7. To satisfy the customer needs with minimum resources.

Advantages of ABM

ABM offers a number of benefits to a firm. Some of them are as follows.

1. It helps companies create and maintain a competitive advantage. A firm can compete effectively in a competitive market.
2. It provides transparent information about the cost of undertaking all of the activities in an organization. It may

draw management attention to certain facts, that are not highlighted by traditional technique.

3. It analyses costs on the basis of activities that cause incurrence of such cost. It helps management to understand why such costs are being incurred. Unlike traditional costing systems, which simply report on the cost centre, ABM gets down to the nuts and bolts of the cost.
4. It help to reduce the cost continuously by controlling the cost of the activities and by improving the performance of the activities.
5. It helps to provide more value to the customers by providing quality products at reduced prices.
6. It is an important tool for managerial decision making.

Illustration

Global ltd provides the following information relating to its product X and Y

	Product X	Product Y
Yearly output	3000 unit	30000 unit
No. of machine hours per unit	4	4
No. of labor hours per unit	8	8
Total machine hours	12000	120000
Total labor hours	24000	240000
No. of purchase orders	240	480
No. of set up	120	180

The overhead cost of the activities has been as under.		
Volume related	330000	
Purchased related	360000	
Set-up related	630000	

	1320000	

Calculate the total cost of the two products separately under

a. Traditional costing system and

b. Activity based costing method

Solution

Product	Machine hours per unit	Labor hours per unit	Output (unit)	Total machine hours	Total labour hours
x	4	8	3000	12000	24000
y	4	8	30000	120000	240000
			33000	132000	264000

a. Traditional method

Total costs to be allocated		1320000
Overhead rate per machine hour	`10 ie,	1320000

		132000
Overhead rate per labor hour	`5 ie,	1320000

		264000

Cost per unit	X	`40(4 machine hours per unit)
	Y	`40(8 hours per unit)
Total cost allocated to product X		`120000(3000 units x 40)
	Y	`1200000(30000 units x 40)

b. ABC System

		Activities		
		Volume related	Purchase related	Setup related
Cost traced to activities		330000	360000	630000
Consumption of activities		132000	720	
(Cost drivers)		machine hours	purchase orders	300 set up
Cost per unit of consumption		`2.5	`500	`2100
Cost traced to products	X	`30000 (12000 x 2.5)	`120000 (240x500)	`252000 (2100x120)
	Y	`300000 (12000x2.5)	`240000 (480x500)	`378000 (2100x180)

Total cost to products X : `402000 (30000+120000+252000)

Y: `918000 (300000+240000+378000)

TRANSFER PRICING

In large organizations there are a number of divisions

or departments, one division may transfer its product or service to another division. In such cases, a question arises as at what price the product/service of one department/division is transferred to another division within the same company.

Transfer price is the price that one segment, division or department charges for a product or service supplied to another segment, division or department of the same organization. Transfer price is an internal divisional charge at which one division sells goods and service to another in the same company.

Horngren defines transfer price as the amount charged by one segment of an organization for a product or service to the segment producing the product and it is a cost to the acquiring segment

Objectives of transfer pricing

1. Profitability

The transfer pricing should pay close attention to the profitability of both the divisions of the organizations. Since both, the divisions belong to the same firm. Thus the items, goods, and services can be configured at any arbitrary price.

2. Taxation

The transfer price will also have a bearing on taxation. A proper transfer pricing will help you offset the tax liability of one division with an equivalent one on the other. One of the major objectives of the transfer pricing is to maximize the overall tax profits of your organization. The transactions are not governed by open market considerations. This helps you improve upon the taxation options.

3. Goal Congruence

The transfer pricing should be configured in such a manner that the divisional earnings of each of the divisions are quite consistent with the goals of the parent company. The focus should be such that the profit margins of the subdivisions increase while it will not affect the total profitability of the parent organization.

4. Performance evaluation of individual units

Transfer pricing can be one of the best options to arrive at the best possible appraisal of the individual divisions. This can help guide efficient decision making.

Some of the areas that transfer pricing can assist the performance appraisal, and performance management includes appraising the managerial performance of the divisions, evaluation of the contributions of the individual entities for the overall profits of the company, and assessment of the worth of each division as an individual unit.

5. Taking a good look at international trade

Another prime objective that transfer pricing aims to achieve is to measure the international trade scenario. The pricing should be in tune with the import and export standards and should be accurately measured.

Too low a price can distort the international trade figures to a greater extent. The transfer pricing prices should be such that they will not distort the international trade figures.

6. Shifting of profits

Profit shifting is aimed at reducing the tax liabilities in

a particular country can be reduced. This can be achieved by reducing profits artificially. It is also aimed at decentralization of the production so that the profits are concentrated enough in the region where the production of the goods is undertaken.

Methods of transfer pricing

There are several methods to determine transfer prices. Important methods are briefly discussed as below.

1. Total cost method (full cost method)

Under this method, the selling division transfers the goods at a price equal to the total cost (variable cost plus allocated fixed cost) per unit.

2. Total cost plus profit margin method

Under this method, the transfer price is fixed by adding a profit margin to the total cost per unit, the profit margin is either as a percentage on capital employed or on cost of sales.

3. Marginal cost method

This method involves transferring goods or services at the marginal cost per unit by the selling division. Fixed costs are excluded from the total cost.

4. Standard cost method

In this method the transfer price is based on standard cost. The standard costs are determined by the management in advance on a scientific analysis.

5. Opportunity cost method

Under this method, goods and services are transferred by the selling division at opportunity cost. Opportunity cost is

the maximum price that the buying division would be willing to pay the minimum price that the selling division would be willing to accept.

6. Market price method

This is the method of using the current market price by the selling divisions for internal transfer of its goods or services. That is, the price is determined purely on the basis of market conditions.

7. Negotiated price method

Under this method, the buying department and selling department will negotiate between them and a mutually agreed price is arrived at. It is at this mutually agreed price the goods or services are transferred.

8. Arms's Length method

Under this method, the transfer of goods and services take place at arm's length price. An arm's length price is the amount or price that would be charged or would have been charged for the same product or service if independent transactions were carried out with unrelated parties under similar conditions.

9. Dual price method

Under this method, the selling division is credited at the outside selling price or with an amount calculated by adding a mark up to the full cost and the buying division charged with the variable cost.

Benefits of Transfer pricing

1. It facilitates an easy evaluation of divisional performance
2. It maximizes the efforts towards achievement of organizational goals
3. It promotes a healthy inter-divisional competitive spirit.
4. It provides sufficient information to the top management in making policy decisions pertaining to expansion, contraction, and closing down of division etc.
5. Management by exception is possible
6. It acts as a measuring rod to check suppliers price.

Illustration 1

Manama computer limited has two divisions. Beta and theta. Beta produces a computer circuit that is used in the finished product of beta. The cost of producing the circuit are variable cost of `40 per circuit and fixed cost of `10. The part is sold in the highly competitive computer market for `70 per circuit

Until now theta division bought 60% of the output of beta division at a negotiated price of Rs. 65 per circuit. But because of over emphasis on divisional welfare rather than company welfare, a new transfer pricing method must be developed. The suggestion was to add 35% to the total cost of the circuit when transferring to theta division. Another suggestion was to use the variable cost of Rs. 40 per circuit in arriving at a transfer price.

You are required, using the above information and

suggestions, to determine the gross profit per finished unit for theta division according to the negotiated, market price, cost plus, variable cost and dual pricing principles of transfer pricing. Pertinent data of theta division in addition to the transfer price of the circuit, there are additional processing and marketing costs of Rs. 100 per unit. The selling price of the finished product of theta division is Rs. 200 per unit.

Solution

Theta division	per unit
Selling price	200
Less: Processing and marketing cost	100

	100

Gross profit under various pricing methods:

1. Negotiated price : Rs. 100- 65 = Rs. 35 per unit
2. Market price Rs. 100-70 = Rs. 30 per unit
3. Cost plus Rs. 100-67.50= Rs. 32.5 per unit
4. Variable cost Rs. 100-40 = Rs. 60 per unti

5. Dual pricing : in this case, the beta division charges Rs.67.5 and Theta division charges Rs. 40 per unit. Hence the gross profit of theta division is Rs. 100-40 = 60 per unit

Illustration 2

X ltd, fixes the inter divisional transfer prices for its product on the basis of cost plus a return on investment in the division. The budget for division A for 2019-20 is as follows.

Fixed Assets	250000
Current Asset	150000
Debtors	100000
Annual fixed cost of the division	400000
Variable cost per unit of product	10
Budgeted volume	200000 units per year
Desired ROI	28% total investment

Determine the transfer price for Division A

If the volume (in units) can be increased by 10%, what will be its impact on transfer price?

Solution

Fixed asset	250000
Current Assets	150000
Stock	100000

Total investment	500000

Desired return on investment (Rs. 500000 x 28%) 140000

Calculation of transfer price

Variable cost (200000 units x `10)	2000000
Fixed cost of division A per annum	400000
Total cost	2400000
Add: desired return on investment	140000
Total amounts to be charged	2540000

Inter divisional transfer price per unit (2540000/200000) 12.7

Impact on transfer price if the volume is increased by 10%

Variable cost (220000 units x `10)	2200000
Fixed cost	400000
Total cost	2600000
Add: Desired return on investment	140000
Amount to be charged	2740000

Interdivisional transfer price `2740000/220000 units = `12.45 per unit

Due to increase in sales volume, the transfer price will be reduced by `0.25(ie, `12.70-12.45) per unit.

Treatment of Special expenses in Cost Accounts

There are certain expenses which are specially treated in cost accounts. In this chapter e study the treatment of some special expenses in cost accounts.

Research and Development Cost

The research expenditure is the cost of searching for new products, new manufacturing process, improvement of existing products, processes or equipment. The development expenditure is the cost of translation of research findings or other knowledge into a plan or design for the production of new or substantially improved materials, devices, products, processes etc. prior to the commencement of commercial production. Some of the costs relating to research and development are given below:

a. Cost of raw material used in research
b. Salaries and Wages of R & D staff
c. Subscriptions to books and journal
d. Subscriptions to research associations
e. Cost of tests conducted and trail runs
f. Depreciation, insurance, repairs and maintenance of buildings and research equipment, plant etc.
g. Patent fee
h. Upkeep and maintenance of R & D office
i. Travelling cost for survey etc..

Treatment of Survey cost

The treatment of research cost depends upon whether it is incurred for basic research or applied research.

Basic research: basic research aims at the discovery of new ideas or breaking new grounds.

Advancement of knowledge is its basic aim.

The basis research costs should be treated as factory overhead for the period during which it has been incurred and has to be absorbed into product costs.

Applied Research: Applied research is oriented towards current problems and aims to find better solutions for them. The applied research cost is treated in the following ways:

a. If applied research costs are incurred for improving existing products, it should be treated as factory overhead for the period in which it is incurred and absorbed into product cost

b. if applied research costs are incurred for searching new products and methods of production, they should be amortised (or written off) over the future periods. The whole of such expenditure should not be absorbed in the year in such expenditure has been incurred but a part of it should be carried over. In short, such costs are charged to future periods. This is because such costs are likely to benefit future periods.

c. Research costs incurred for a customer should be charged to him.

Treatment of Development Cost

Development cost should be treated in the same way as research costs.

Preliminary Expenses

Preliminary expenses are those expenses which are incurred by promoters of companies or business enterprises before incorporation of a company or the start of a business. Examples include legal or professional fees, logo designing cost, printing cost of documents, registration fees, stamp duty etc.

Treatment of Preliminary Expenses

The benefit of preliminary expenses incurred will acquire for a number of years. Hence, it is written off over a certain number of years (say 5 years). It is an example of fictitious asset. In cost accounting, the amount of preliminary expenses written off should be excluded. That is, it should not be taken in cost accounting.

Rectification Cost

During the process of manufacture, it may happen that some units are defective. Defective products are those which fail to comply with norms relating to specifications and quality. Such defective units can be reworked and made into saleable condition by applying additional materials, labour etc. Thus additional costs are incurred for rectification of defective work. Such costs are called cost of rectification.

Causes for Defectives

Defectives may arise due to the following reasons:

1. Poor quality of materials
2. Lack of skill or training

3. Lack of proper supervision
4. Careless inspection
5. Poor working conditions
6. Defective plant and equipment
7. Faulty design of products
8. Wrong tool setting

Control of Defectives

Every effort should be made to reduce the number of defectives because they increase the cost of production. Steps may be taken to eliminate the reasons for defective work. The following steps should be taken to control defectives.

a. Standards for defective work and rectification cost should be fixed. Actuals should be compared with them, reasons for deviations should be investigated and necessary corrective action should be taken.
b. The design, engineering, production and the purchase department must be involved in the design of products. This would lead to proper design of products.
c. The purchase department should select the right quality of materials with proper specifications.
d. Proper plant and machinery should be selected.
e. Only those operators who have proper qualification experience and training must be selected.
f. Reports on defective work should be prepared for each department or foreman fixing responsibility properly.

g. A suitable incentive scheme may be introduced for minimizing defective work, if defect product is due to bad workmanship.

Obsolescence

Obsolescence is the sudden loss of value of an asset due to changes in market conditions or technology. Suppose the economic life of a machine is 10 years. However, after using for 4 years, it is forced to be discarded because of change in the product, or change in the method of production, or invention of an improved model of machine. Thus the machine has become out of date. Hence it is replaced by a new machine. This is loss. Such a loss is called loss due to obsolescence.

Waste

Waste is that portion of basic raw material which is lost in processing and which has no recovery value. For example, dust, smoke, gases, unsalable residue. Gas may be visible or invisible.

Scrap

Scrap is the incidental material residue coming out of certain type of manufacturing. It is usually of small quantity and of low value, recoverable without further processing. For example, metal scrap arises due to operations like turning, boring, punching, moulding, filling etc, cut pieces in furniture industry, off cuts and cut pieces in leather and garment industries.

Spoilage

Spoilage is that part of production which has been

damaged in the manufacturing operation. It an be used again as raw materials either in the same process or in another process. It is manmade scrap. It occurs due to fault in operation. Bad workmanship, use of defective raw materials, defective machines and faulty tool setting. It may be normal or abnormal.

MODULE 5

EMERGING COSTING APPROACHES

Productivity Management

Productivity is the ratio between output and input. It is quantitative relationship between what we produce and what we have spent to produce. Productivity is nothing but reduction in wastage of resources like men, material, machine, time, space, capital etc. It can be expressed as human efforts to produce more and more with less and less inputs of resources so that there will be maximum distribution of benefits among maximum number of people. Productivity denotes relationship between output and one or all associated inputs. European Productivity Council states that „Productivity is an attitude of mind. It is a mentality of progress of the constant improvement of that which exists. It is certainty of being able to do better than yesterday and continuously. It is constant adoption of economic and social life to changing conditions. It is continual effort to apply new techniques and methods. It is faith in human progress‟. In the words of Peter Drucker productivity means a balance between all factors of production that will give the maximum output with the smallest effort. The productivity of a certain set of resources (input) is therefore the amount of goods or services (output) which is produced by them. Land and building materials, machines, manpower (labour), technology etc. are the resources at the disposal of a manufacturing company. Therefore higher (improved) productivity means that more is produced with the same

expenditure of resource i.e. at the same cost in terms of land, materials, machine, time or labour, alternatively, it means same amount is produced at less cost in terms of land, materials, machine time or labour that is utilized

Measurement of productivity

The generation and application of technological and organisational knowledge (innovation) are the main drivers of firm-level productivity growth. These determinants are broader than technology in an engineering sense. The choice of production technology and how production is organised, which are management decisions, play a crucial role in productivity performance.

Firms can improve their productive efficiency in three ways:

- Improvements in technical efficiency — increases in output can be achieved, at a given level of input, from more efficient use of the existing technologies.
- Technological progress and organizational change — as firms adopt technologies or organizational structures that are new to the firm, or develop and apply new technologies or approaches, they can expand output by more than any additional inputs that might be required.
- Increasing returns to scale — as the size of the firm expands, its unit cost of production can fall as it becomes financially advantageous to adopt existing technologies.

Measured productivity is the ratio of a measure of total outputs to a measure of inputs used in the production of goods and services. Productivity growth is estimated by subtracting the growth in inputs from the growth in output — it is the residual.

There are a number of ways to measure productivity. The most common productivity measures used are:

- multifactor productivity (MFP), which measures the growth in value added output (real gross output less intermediate inputs) per unit of labour and capital input used; and
- Labour productivity (LP), which measures the growth in value added output per unit of labour used.

❖ Unmeasured inputs

In some industries, inputs other than capital and labour (and knowledge) can have a strong influence on output. Where these inputs are not purchased in the market, as is the case with some natural resource inputs and volunteer effort, they are not included in the measure of inputs. If the availability or quality of these inputs is changing then productivity estimates, as the residual, will be affected.

- Capacity utilization

Business output responds to market demand. As demand rises or falls over time with the business cycle or other influences, firms adjust the output they produce. In

the case of cyclical downturn, many firms will reduce output volumes, but cannot easily reduce their capital and labour inputs as they need these inputs ready for when demand recovers. As a result, firms are likely to underutilize their capital and labour inputs in a downturn and productivity will be lower. When business is booming, firms will fully utilize their capital and labour. Hence, measured productivity tends to be pro-cyclical as utilization rates of inputs rise in upswings and fall in downswings.

Measured productivity growth (MFP and LP) reflects a number of influences:

- changes in the productive efficiency of the economy
- changes in unmeasured inputs (such as natural resources), which affect the real costs of production
- lags between investment (when an input is measured) and when it is utilized in production
- variations in utilisation of inputs due to economic cycles
- errors and discrepancies in the underlying estimates of inputs, outputs and prices.
- The key point is that it is important to unpack measures of productivity to understand the proximate and underlying factors affecting productivity growth.

To this end, it must be appreciated that the definition of productivity partially is purely to satisfy the demand of

theoretical curiosity. Practically, the interdependence nature of the demands for factors implies that it is impossible to say precisely and clearly how much output has been created by any one of the different inputs taken by itself. The phenomenon is like attempting to answer.

Some common misunderstandings exist about productivity. First, productivity is not only labour efficiency or labour productivity even though; labour productivity statistics are essentially useful policy-making data. Productivity is much more than just labour productivity and needs to take into account other inputs involved in the production process. Two, productivity is not the same as increase in output or performance. Sumanth (l984) described this misconception as the confusion between productivity and production. Output may be increasing without an increase in productivity if, for example, input costs have risen disproportionately. One useful way to combat this misconception is to be conscious of the trend of input costs particularly by relating output increases to price increases and inflation. This approach is often the result of being process oriented at the expense of paying attention to final results. Bureaucratic settings are more prone to this misconception of productivity.

In an attempt to draw the line between productivity and output increase, the term ‘productivity growth’ is sometimes introduced whereby it denotes the rate of growth of the level of productivity. For example, if output per worker is l000 units in 1998, and it grows to l250 units in l999, then it is said that

productivity growth was 25% per year on the assumption that prices and input costs are constant.

The third misconception about productivity is the confusion between productivity and profitability. Profitability is a function of the extent of price recovery, even when productivity has gone down. Again, high productivity may not always go with high profit if goods and services produced efficiently and effectively are not in demand. Confusing productivity with efficiency or effectiveness can equally cloud the meaning of productivity. Efficiency means producing high-quality goods in the shortest possible time. It is important to ask if goods produced efficiently are actually needed. Also, effectiveness refers more to the production of results. In the private sector for instance, effectiveness could mean making profit and preserving future market share. According to Scott

Another misconception is a mistake of believing that cost cutting always improves productivity. Whenever this is done indiscriminately, it can even bring about productivity decline in the long run. It is equally not to be believed that productivity can only be applied to production. In reality, productivity is relevant to any kind of organization or system including services, particularly information. For example, improved information technology alone can give new dimensions to productivity concepts and measurement. Recent advancement in information technology seems to be suggesting that labour productivity may actually be subordinate to the productivity of capital and other scarce resources such as energy or raw materials.

The concept of productivity is also being linked with quality of output; input and the interacting process between the two. An important element is the quality of the work force, its management and its working conditions as it has come to be noticed that rising productivity and improved quality of working life go hand in hand.

Ratios in measuring productivity index and total productivity index

The productivity ratio is a fraction of output over input. In other words, input is what a business puts in to turn a profit (output). Therefore, the most common input measured is hours and the most common output is money when business owners, CEOs, or general managers are trying to decide if their business is efficient, productive, and profitable. But input is not always measured by hours worked. And output is not always measured by money made. Input could also be measured by raw materials used, energy, amount of land, etc. It is pretty much anything that is put forth to get an output and to make a profit. Output could also be measured by amount of products produced, number of sales, etc.The productivity index is a measure of the well potential or ability to produce and is a commonly measured well property.

Distinction between productivity and profitability

Productivity is defined as the relationship between output and input needed to create a product. Meanwhile, profitability is determined by how much money is left over after a product is produced and all expenses have been paid.

Positive organizational psychology hasshown us that high-pressure, cut-throat work environments harm productivity over time and that workers respond better to environments that make them feel valued, supported and secure.

Productivity and value added

Productivity estimates are derived as a ratio of an index of output and inputs. Output can be measured in different ways and this can lead to different estimates productivity growth. Two basic measures of output are by value added and gross output. The former measure excludes intermediate inputs (materials, energy and services used up in the process of production) while the latter measure includes those inputs. Either output measure can be used to estimate labour productivity growth and multifactor productivity (MFP) growth. For example, multifactor measures can take the form of capital-labour MFP based on a value-added concept of output or a capital-labour intermediate inputs MFP based on a gross output concept. In the former measure, a value-added output measure is related to capital and labour as inputs. In the latter, gross output is related to capital, labour and intermediate inputs. The difference between the two concepts of productivity growth is less pronounced at the aggregate (or national) level than it is at the sectoral or industry level. At the aggregate level, gross output-based and value-added based measures are close, only differing to the extent that intermediate inputs are sourced from imports. In proportional terms, this tends to be low. At the industry or sector level, however, intermediate usage tends to be a much higher

proportion of gross output. This results in greater variation between the two measures.

Productivity and quality

Productivity and quality management are key factors for competitiveness and have always been a concern for the productive sectors, especially in countries with open economies. Quality can be defined as conformity to requirements. In other words, quality is the sum of features and characteristics of a product or service that bear on its ability to satisfy a given need. This includes economic need as well as availability, easy maintenance, reliability, design and all the other characteristics of need.

The basic elements of product quality are: performance, features, reliability, conformity, durability, serviceability, aesthetics and perceived quality.

Each is self-contained and distinct, for a product can be ranked high in one dimension and low in another.

The characteristics of Japanese quality control are described as follows by Yoshikazu Tsuda.

In a production process there are eight possible relationships between change in quality and change in quantity. They are:

1. Quantity increases and quality improves.
2. Quantity increases but quality is the same.
3. Quantity is the same, but quality improves.
4. Quantity increases but quality deteriorates.

5. Quantity decreases but quality improves.
6. Quantity is the same but quality deteriorates.
7. Quantity decreases but quality is the same.
8. Quantity decreases and quality deteriorates.

The relationships between productivity and quality are shown in the following formula:

$$\text{Production Cost} = \frac{\text{Total amount of effective input (valued in money)}}{\text{Total quantity of products satisfying quality level}}$$

Productivity objectives

- **Results are the best way to compare effectiveness**. Productivity is the best tool for comparing effectiveness. Your yield is directly related to the effectiveness and efficiency of your production.
- **Quality of management is a key differentiator**. The quality of management differentiates one business from another in the same field. It's a game of survival of the fittest.
- **Focus on continuous productivity improvement**. Management's most important job is continuous productivity improvement. This leads to innovations. Being productive doesn't necessarily mean making more things, it means producing more of the right results efficiently.

Causes of Low productivity

You can identify the causes at their roots and combat

them head-on. The causes for low productivity levels are, unfortunately, more often than not, internal issues that have boiled over, over time.

- The most common cause for low productivity at work can be traced back to employees' lack of proper training. Ensuring proper training of every employee is the key to eliminating this problem and increase productivity at work.
- It is important to have effective managers and team leaders to ensure workplace efficiency. Low productivity at work can result from managers who are lacking in leadership qualities and fail to motivate employees and keep them performing at peak standard.
- In some instances, a low-productivity employee is the victim of an organizational structure that doesn't maximize that person's skills and talents.
- A big contributor for low productivity is stress.
- If you want to increase productivity in your workplace, you need to start encouraging good behavior and strongly discourage the bad. These are some of the more prominent causes that become great reasons for poor productivity in a workplace.

TOTAL PRODUCTIVITY MANAGEMENT (TPM)

Total Productive Management (TPM) provides a system for coordinating all the various improvement activities for the company so that they contribute to the achievement of

corporate objective. Starting with a corporate vision and broad goals, these activities are developed into supporting objectives, or targets, throughout the organisation. The targets are specifically and quantitatively defined and emphases on how to improve the competitiveness of products and services in quality, price, cost and customer responsiveness, thereby increasing the profitability, market share, and return on investment in human, material, capital, and technology resources.

TPM is a critical adjunct to lean manufacturing. If machine uptime is not predictable and if process capability is not sustained, the process must keep extra stocks to buffer against this uncertainty and flow through the process will be interrupted. Unreliable uptime is caused by breakdowns or badly performed maintenance. Correct maintenance will allow uptime to improve and speed production.

TPM is a management process developed for improving productivity by making processes more reliable and less wasteful. TPM is an extension of TQM (Total Quality Management). The objective of TPM is to maintain the plant or equipment in good condition without interfering with the daily process. To achieve this objective, preventive and predictive maintenance is required. By following the philosophy of TPM we can minimize the unexpected failure of the equipment.

PARETO ANALYSIS

The Pareto Analysis, also known as the Pareto principle

or 80/20 rule, assumes that the large majority of problems (80%) are determined by a few important causes 20%). The founder of this analysis, Italian economist Vilfredo Pareto, discovered this when he was carrying out a study at the end of the 18th century in which he ascertained that 20% of the Italian population owned 80% of the property. This 80/20 rule or Pareto Analysis was further developed by total quality management guru Joseph Juran (after 1940) and can be applied to various matters (for instance decision-making and other complex issues).

The Pareto Principle, also known as the 80/20 Rule, The Law of the Vital Few and The Principle of Factor Sparsity, illustrates that 80% of effects arise from 20% of the causes – or in terms – 20% of your actions/activities will account for 80% of your results/outcomes.

Dr. Joseph Juran was the first to point out that what Pareto and others had observed was a "universal" principle—one that applied in an astounding variety of situations, not just economic activity, and appeared to hold without exception in problems of quality.

Essentially, the Pareto Principle states that sources of a problem can be divided into two categories:

- The vital few: A small number of sources that account for most of the problem.
- The useful many: The large number of remaining sources that individually and collectively account for a relatively small part of the entire problem.

THEORY OF CONSTRAINTS

The Theory of Constraints is an organizational change method that is focused on profit improvement. The essential concept of TOC is that every organization must have at least one constraint. A constraint is any factor that limits the organization from getting more of whatever it strives for, which is usually profit. *The Goal* focuses on constraints as bottleneck processes in a job-shop manufacturing organization. However, many non-manufacturing constraints exist, such as market demand, or a sales department's ability to translate market demand into orders.

JIT OR LEAN MANUFACTURING

Lean management has been developed with the intention of reducing process wastes and maximizing the value of the product or the service to the customer. This is achieved through unique techniques like flow charts, total productive maintenance, just in time techniques, workplace redesigning techniques, and total quality management. Lean management is an important part of lean thinking. As we implement lean in any organization the traditional way of managing does not guarantee right focus nor help sustaining lean initiatives. If no action is taken to change the way we manage process, people and products we are likely to see failure of lean implementations. Many people on lean journey fail to apply lean in a holistic manner. Without proper guidance and leadership the company cannot move to the next level. Thus a management system that specifically meets the needs of a transforming organization is very much essential. Lean is all

about customer focus. Value is defined by the customer and we develop and maintain processes to provide this value. Processes are run by people. Only support and proper leadership and guidance can drive your people to continuously improve the processes that add value to the customer. The management system that helps you to achieve this is a Lean Management system.

Lean Management system uses various tools to connect the purpose (Providing value to customer) to the process and people.

Steps

The five-step thought process for guiding the implementation of lean techniques is easy to remember, but not always easy to achieve:

1. Specify value from the standpoint of the end customer by product family.
2. Identify all the steps in the value stream for each product family, eliminating whenever possible those steps that do not create value.
3. Make the value-creating steps occur in tight sequence so the product will flow smoothly toward the customer.
4. As flow is introduced, let customers pull value from the next upstream activity.
5. As value is specified, value streams are identified, wasted steps are removed, and flow and pull are introduced, begin the process again and continue it until a state of perfection is reached in which perfect value is created with no waste.

It is a management philosophy that pursues the continuous elimination of waste in all business processes through kaizen, also known as small and incremental improvement. As a company reduces these wastes and strives for single piece flow, many other benefits will follow. Some of these benefits include (1) improved quality and fewer defects (2) reduced inventory (3) less space required to build product (4) enhancement to overall manufacturing flexibility, (5) identification of future kaizen workshops, (6) ensures a safer work environment and (7) improves employee morale.

In any organization, the following five major problems are being addressed when lean management is being implemented:

1. Low Productivity. In the general sense, productivity means volume. It may be the number of calls handled in a call center, the number of products manufactured in a factory, the number of transactions resolved in a support group. Whatever kind of productivity it is, implementing lean management will help increase yields; enabling the organization to generate more satisfied customers and higher profit.
2. Prolonged Cycle Time. A complaint resolved beyond timeline gives birth to another complaint. It is integral for the organization to manage the handling time to any problem for resolution.
3. Costly Organization. Organizational expense must be carefully allotted to where it must be. Profit and Loss

management must be clearly defined. Even if you have an increasing customer base but your company expenses are also increasing, you will not achieve a favorable cost report.

4. Rampant Wastage. Time, resources, manpower, and cost are all subject to be wasted if not managed properly. Reducing or eliminating wastes will aid an organization to focus on the critical few. Focusing on essential things will create more room for improvement.
5. Dissatisfied Customers and Employees. The heart of the organization is in the employees and the soul is the customers.

Role of JIT in elimination of waste

Philosophy of manufacturing excellence based on pursuit of the planned elimination of all waste and consistent improvement of productivity. It encompasses the successful execution of all manufacturing activities required to produce a final product from design engineering to delivery and including all stages from conversion of raw material onward. The elimination of waste using JIT foundation element '5S' principle has been:

- Seiri – clear – Sort out unnecessary items from the workplace and discard them.
- Seiton – configure – Arrange necessary items in good order so that they can be easily picked up for use.
- Seisio–clean and check – Clean the workplace completely to make it free from dust, dirt.

- Seiketsu – conformity – Maintain high standard of house keeping and workplace
- Shitsuke – custom and practice – Train and motivate people to follow good housekeeping disciplines autonomously

Elimination of all waste include:

I. Reduction in waste
II. Reduce lot size
III. Reduce lead-time
IV. Automation
V. Kanban

PROJECT LIFE CYCLE COSTING

A project life cycle is the sequence of phases that a project goes through from its initiation to its closure. The number and sequence of the cycle are determined by the management and various other factors like needs of the organization involved in the project, the nature of the project, and its area of application. The phases have a definite start, end, and control point and are constrained by time. The project lifecycle can be defined and modified as per the needs and aspects of the organization. Even though every project has a definite start and end, the particular objectives, deliverables, and activities vary widely. The lifecycle provides the basic foundation of the actions that has to be performed in the project, irrespective of the specific work involved.

Project life cycles can range from predictive or plan-driven approaches to adaptive or change-driven approaches. In

a predictive life cycle, the specifics are defined at the start of the project, and any alterations to scope are carefully addressed. In an adaptive life cycle, the product is developed over multiple iterations, and detailed scope is defined for iteration only as the iteration begins.

Although projects are unique and highly unpredictable, their standard framework consists of same generic lifecycle structure, consisting of following phases:

1. The Initiation Phase: Starting of the project
2. The Planning Phase: Organizing and Preparing
3. The Execution Phase: Carrying out the project
4. The Termination Phase**:** Closing the project

Benefits

(i) It results in earlier actions to generate revenue or to lower costs than otherwise might be considered.

(ii) It ensures better decision from a more accurate and realistic assessment of revenues and costs, at-least within a particular life cycle stage.

(iii) It promotes long-term rewarding.

(iv) It provides an overall framework for considering total incremental costs over the life span of the product.

Stages of Product Life Cycle Costing:

Following are the main stages of Product Life Cycle:

i. Market Research: It will establish what product the customer wants, how much he isprepared to pay for it and how much he will buy.

ii. Specification: It will give details such as required life, maximum permissible maintenance costs, manufacturing costs, required delivery date, expected performance of the product.

iii. Design: Proper drawings and process schedules are to be defined.

iv. Prototype Manufacture: From the drawings a small quantity of the product will be manufactured. These prototypes will be used to develop the product.

v. Development: Testing and changing to meet requirements after the initial run. This period of testing and changing is development. When a product is made for the first time, it rarely meets the requirements of the specification and changes have to be made until it meets the requirements.

vi. Tooling: Tooling up for production can mean building a production line; building jigs, buying the necessary tools and equipment's requiring a very large initial investment.

vii. Manufacture: The manufacture of a product involves the purchase of raw materialsand components, the use of labour and manufacturing expenses to make the product.

viii. Selling

ix. Distribution

x. Product support

xi. Decommissioning: When a manufacturing product comes to an end, the plant used tobuild the product must be sold or scrapped.

To accumulate the expenses incurred on all the above activities is the essence of product lifecycle costing. Thus, product life-cycle costs involve the expenses on stages from designing to development of product/service, on introduction in the market, selling & distribution and finally on its abandonment from the market.

Effects of Life-Cycle Costing

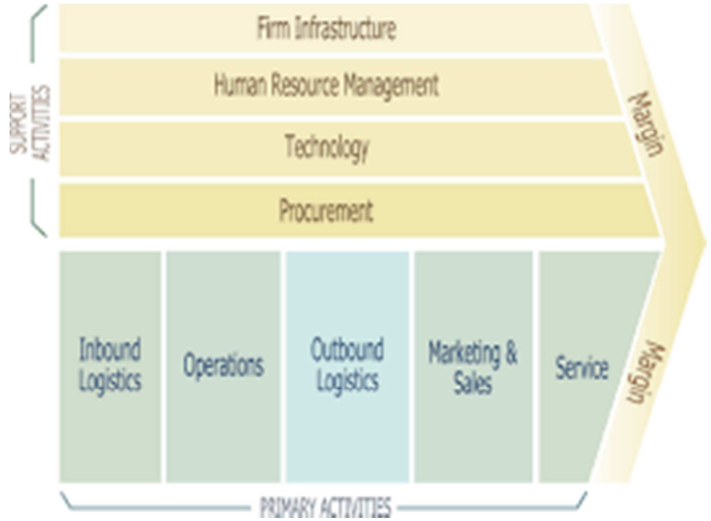
Life cycle costing helps companies to be aware of where their products are in their life cycles, because in addition to the sales effects, the life-cycle stage may have a tremendous impact on costs and profits.

VALUE CHAIN ANALYSIS

The term ‘Value Chain’ was used by Michael Porter in his book "Competitive Advantage: Creating and Sustaining superior Performance" (1985). The value chain analysis describes the activities the organization performs and links them to the organizations competitive position. Value chain analysis describes the activities within and around an organization, and relates them to an analysis of the competitive strength of the organization. Therefore, it evaluates which value each particular activity adds to the organizations products or services. This idea was built upon the insight that an organization is more than a random compilation of machinery, equipment, people and money. Only if these things are arranged into systems and systematic activates it will become possible to produce something for which customers are willing to pay a price. Porter argues that the ability to

perform particular activities and to manage the linkages between these activities is a source of competitive advantage. Porter distinguishes between primary activities and support activities. Primary activities are directly concerned with the creation or delivery of a product or service. They can be grouped into five main areas: inbound logistics, operations, outbound logistics, marketing and sales, and service. Each of these primary activities is linked to support activities which help to improve their effectiveness or efficiency. There are four main areas of support activities: procurement, technology development (including R&D), human resource management, and infrastructure (systems for planning, finance, quality, information management etc.).

The basic model of Porters Value Chain is as follows:



The term, Margin' implies that organizations realize a profit margin that depends on their ability to manage the

linkages between all activities in the value chain. In other words, the organization is able to deliver a product / service for which the customer is willing to pay more than the sum of the costs of all activities in the value chain.

A typical value chain analysis can be performed in the following steps:

a. Analysis of own value chain – which costs are related to every single activity

b. Analysis of customers value chains – how does our product fit into their value chain

c. Identification of potential cost advantages in comparison with competitors

d. Identification of potential value added for the customer – how can our product add value to the customers value chain (e.g. lower costs or higher performance) – where does the customer see such potential.

It is a useful strategic management tool. It works by breaking an organization's activities down into strategically relevant pieces, so that we can see a fuller picture of the cost drivers and sources of differentiation, and then make changes appropriately.

KAIZEN

It is a method of reducing managing costs. It's also referred to as continuous improvement costing. The method is aimed at cost reduction below standard level, but without negative effects on quality, staff, safety, etc.

Kaizen is the Japanese term for making continuous improvements in relatively small activities rather than major innovative improvement. The process of continual cost reduction that occurs after a product design has been completed and is now in production. Cost reduction techniques can include working with suppliers to reduce the costs in their processes, or implementing less costly re-designs of the product, or reducing waste costs. These reductions are needed to give the seller the option to reduce prices in the face of increased competition later in the life of a product.

Benefits

1. Focus on customers
2. Make improvements continuously
3. Create work teams
4. Promote openness
5. Create cross - functional team
6. Customer Satisfaction
7. Problem Solving

TARGET COSTING

Target costing was first introduced in Japan in the 1960s as a cost-management tool in operations. Being aware of forthcoming market changes, manufacturers have taken advantage of target costing as a proactive cost management strategy to maintain their share or to become a market leader. Target costing is introduced as a technique that aims to

manage product costs throughout the design stage. It is an important tool for sustaining manufacturers' overall efforts to remain cost competitive while meeting standards and specifications demanded by customers. It is a costing process for determining the selling price that customers are willing to pay for a specific level of product quality. Target costing is a reverse costing methodology, in which the selling price and the required profit margin are used to determine the allowable cost for manufacturing a new/existing product. Unlike the traditional costing approach, target costing uses price information in the market to determine product costs. In addition to price information, it uses customer requirements gathered from the market. In contrast to the traditional approach, target costing treats product cost as an input in, rather than an outcome of the product development. In simple terms, Target costing seeks to anticipate costs before they are incurred, continually improves product and process designs, externally focuses the organization on customer requirements and competitive threats.

Need

1. Target costing is a much more formal and systematic way to focus on cost optimization than other less-formal approaches often used by small businesses. It involves consideration of all equipment, processes, labor and materials needed to make goods, or the costs to acquire goods and get them ready to sell to your customers.
2. A primary advantage of target costing is that it allows you to analyze the best way to make or acquire products

at the lowest costs. Minimizing costs gives a small company financial flexibility to focus on achieving high profit margins or to enter the market at low price points to attract a large customer base.

3. It ultimately gives business greater profitability. It takes into account both factors in profit: the costs and the price. Many companies start by developing products and base pricing on costs. In essence, it helps to achieve the optimal price-to-cost relationship possible for your products.

4. A point of emphasis in reducing costs with target costing is minimizing product cycle time. This is the amount of time it takes from conception to market-ready product. A reduced cycle time means you eliminate unnecessary steps or waste that take time and don't add value to the end solution for the customer. A shorter cycle time is a competitive advantage as well.

Methods of establishment of target costs

Three basic methods are used for setting target costs:

(i) First, there is the subtraction method which is based on the price of competitor's product, where the target cost is worked backwards from the market price. The result may represent a very rigorous target, and it may be impossible to achieve.

(ii) The second method of settings up the target cost is the addition method which is based on the existing technology and past cost data of the company. Normally it results

achievable targets because it is basically an extension of what has already been happening with in the company. The greatest disadvantage of this method is that it is very inward looking and grossly ignores the market situation.

(iii) The third method is the integrated method, a mixture of the subtraction and addition methods. However, in practice this integrated method involves many difficult problems.

Difference between Traditional Costing and Target Costing

The traditional mindset has been that a product is developed, production cost is identified and measured, a selling price is set, and either profits or losses will result. However, in target costing, a product is developed, a selling price and desired profit are determined and maximum allowable cost is derived. This makes cost dependent on selling prices.

Moreover, traditionally manufacturers would make use of the cost-plus approach to estimate the product price. A starting point for them would be to conduct market research to determine its market segment's preferences and hence its product's characteristics that will meet the customer's needs. This will be followed by the design of the product. Next manufacturer's process is determined.

Under the target costing, allowable product cost i.e. target cost is derived by conducting market research and predict the target selling price which is willing to pay for the product with specific characteristics. This target cost is then

compared to an expected product cost and if it is higher than the expected product cost, the company has several options. First, to lower costs, the product design and/or the engineering process can be changed.

BACKFLUSH ACCOUNTING

A redefined process conducted for the modern advances in costing is much linear to the sophisticated facilities and expensive machinery. Conformance of the requirement, not mere adjustment in quality but also triangulate cost with quality and relevance. The recognition that holding inventory is a waste of resource led to the optimization of JIT (Just in Time) method. Backflush costings is a shortcut to cost, materializing only the major value added requirements. Also known as delayed costing, only the events which cause the movement to the inventories are categorized rather than the conventional method. The journey of backflush costing is much regressive to the goal oriented behavior. Work In Progress is considered as a non-value added activity which does not materialize cost.

Inventory cost which is often administered with cost absorption includes ordering and carrying cost. Remedied value in carrying and ordering cost is adjacent to JIT strategy. A makeover in the need and relevance led the priority of Backflush costing method. Enhancement of profitability with the increased levels of competition is much to an effective production decision with the complexities of modern manufacturing environment. Movements with the trigger points are noted as the means to cost. Trigger points are the

events which cause costs to be moved into inventories. Meticulously valuing Work – in – progress if the amount is negligible does increase the quantum of cost evolved. Variants with more or less in radical is the trigger value. Fretting that some products might be 25% complete and others 60% complete, and then adding carefully calculated labour and overheads to these (immaterial) items, is a complete waste of time and effort.

To recapitulate, Backflush Costing has been made in response to advances and innovations of production. Also known as Delayed or Post Deduct Costing is one of the simplest method for companies having adopted JIT strategy. The efficacy of whole value stream is underlined to eradicate the complexity. It realizes a business having immaterial amounts of business and works up on JIT Inventory Management. Backflush Costing creates a recognition that holding inventory is likely to be a waste of resource. The increased use of just-in-time manufacturing, allows inventory (particularly work-in-progress) be much reduced and its valuation is therefore less important.

Particularly attractive for organizations that have a small inventory Backflush Costing have some of the limitations and shortcomings, as follows:

1- Backflush accounting does not have full compliance with generally accepted accounting principles and external reporting.

2- Backflush accounting is not able to answer the questions of auditors.

3- Use of resources at every stage of the production process is not specified.

4- Backflush accounting is appropriate for JIT production system with minimum direct material inventory or without direct materials and such a situation occurs rarely in the real world.

Thus, the post production issuing strategy is determined over the inventory cost and the non – value added activities. Backflush Costing is employed where the business cycle is short and the inventory levels are relatively low. Perpetual inventory system is made in use through Backflush Costing and companies having the ability to scan the inventory items use this system. The pull approach is much accessible through the lean phenomenon of Just In Time to mould in concise the value added activities with the overall performance of the organization. An eventual deadlock to the conventional thoughts of accounting.