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MANAGEMENT ACCOUNTING

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LESSON 1

COST CONCEPTS IN ACCOUNTING

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STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Nature of Management Accounting
- 1.4 Scope of Management Accounting
- 1.5 Classification of Costs
- 1.6 Snapshot of Management Accounting, Financial Accounting and Cost Accounting
- 1.7 Reconciliation of Cost and Financial Accounts
- 1.8 Summary
- 1.9 In-text Questions
- 1.10 Self-Assessment Questions
- 1.11 References
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1.1 LEARNING OBJECTIVES

After having studied the first module, the student will be acquainted with the fundamentals and will be able to:

- Explain basic concept of Management accounting
- Understand various objectives of Management Accounting



- Appreciate how management accounting information can assist management in planning, monitoring performance, controlling and making decisions in, their area of responsibility
- Understand different managerial decisions in relation to Management Accounting
- Identify the information needs and produce financial analyses for a range of decisions

1.2 INTRODUCTION

In basic terms, "Management Accounting is intended for use by managers". It begins where Financial Accounting ends. Management Accounting supports the managerial tasks at all levels by equipping managers with the necessary data for efficient policy formulation, control, and decision-making. It is also considered the branch of accounting that supports managers with performance evaluation, cost management, and cost determination for financial reporting. In brief, Management Accounting is concerned with data collection from internal and external sources, analysing, processing, interpreting, and communicating the information for use within the organisation so that management can plan, make decisions, and control the organisation more efficiently. To better understand the concept, a definition may be the most useful tool. Management accounting is defined by CIMA [UK] as:

Management Accounting is an integral part of management concerned with identifying, presenting, and interpreting information utilized for formulating strategy, planning and controlling activities, decision making, optimizing the use of resources,

1. disclosure to shareholders and other external entities,
2. disclosure to employees,
3. safeguarding 'assets'



Some definitions of Management Accounting

“Management Accounting is concerned with accounting information that is useful to management.”

Robert N. Anthony

“Management accounting for profit control includes income accounting, cost accounting and budgetary, planning and control; of these, cost accounting is the keystone.”

W. Keller and Ferrara

“Management accounting is “any form of accounting which enables a business to be conducted more efficiently.”

The Institute of Chartered Accountants of England and Wales

“Management accounting is a more intimate merger of the two older professions of management and accounting, wherein the informational needs of the manager determine the accounting means for their satisfaction.”

V. Smith

“Management accountancy is the term used to describe the accounting methods, systems, and techniques which, coupled with special knowledge and ability, assist management in its task of maximizing profits or minimizing losses.”

Batty

“Accounting, which serves management by providing information as to the cost or profit associated with some portion of the firm’s total operations, is called managerial accounting.”

Shillinglaw

“Management Accounting is the process of identification, measurement, accumulation, analysis, preparation, interpretation, and communication of financial information used by the management to plan, evaluate, and control.”

Management Accounting Practices Committee (MAPC) of the United States

Thus, management accounting is accounting for decision-making. It gives data to aid management in formulating policies and administering the organization daily.

Management accounting relates to accounting primarily for management (i.e., accounting that provides the necessary information to management, enabling key personnel to discharge their functions).

Planning, organizing, directing, and controlling are these functions. Accounting for management offers the information required for management to exercise effective and efficient control over the firm.

To ensure that the decision-making process is straightforward, simple, and efficient, management accounting was developed to integrate these pieces of data.



1.3 NATURE OF MANAGEMENT ACCOUNTING

Any concept's nature or features are derived from its meaning and definitions. Consequently, the nature of management accounting may be deduced from its definition and aims.

1. **Oriented toward the future:** Although financial accounting provides historical information, that information is used to make plans and important decisions.
2. **Raising productivity:** Concepts such as responsibility accounting, cost centres, etc., are helpful in increasing productivity and regulating employee performance.
3. Management accounting investigates the **relationship between cause and effect** when assessing the rationale for a loss or profit.
4. **Flexible:** Management accounting does not adhere to specific standards or formats, such that the procedure to be followed and the way the result is assessed is left to the discretion of the data user.
5. **It gives only information, not decisions:** Management accounting provides only information, which must be studied and correctly interpreted by management to reach a conclusion.
6. **Tools and techniques:** A variety of statistical and mathematical tools and techniques are used to present the data.
7. **Utilizes accounting information:** It uses financial information in a manner that meets the needs of planning, controlling, and decision-making.

1.4 SCOPE OF MANAGEMENT ACCOUNTING

It has a broad scope as it transcends the bounds of cost and financial accounting and encompasses a variety of sectors, including:

1. A solid and well-designed financial accounting system is required for a successful and effective management accounting system.
2. Several cost accounting methods, such as marginal costing, standard costing, budgeting, etc., are utilised by management accounting systems for decision-making.
3. A management accounting system is incomplete without appropriate cost management procedures.
4. Management accounting utilises statistical tools, including tables, graphs, and charts, to provide findings and reports.
5. Management accounting provides a reliable method for reporting to top management.



6. Tax management is only possible when a solid management accounting system is in place.
7. Budgeting and budgetary control play a crucial role in the decision-making process.
8. The management accountant is required to utilise the internal audit report to evaluate performance at all levels.
9. Management accountants are expected to maintain and direct office services such as filing, copying, communication, and other auxiliary services.

1.5 CLASSIFICATION OF COSTS

The different bases of cost classification are:

1. By time (Historical, Pre-determined).
2. By nature or elements (Material, Labour and Overhead).
3. By degree of traceability to the product (Direct, Indirect).
4. Association with the product (Product, Period).
5. By Changes in activity or volume (Fixed, Variable, Semi-variable).
6. By function (Manufacturing, Administrative, Selling, Research and development, Pre-production).
7. Relationship with accounting period (Capital, Revenue).
8. Controllability (Controllable, Non-controllable).
9. Cost for analytical and decision-making purposes (Opportunity, Sunk, Differential, Joint, Common, Imputed, Out-of-pocket, Marginal, Uniform, Replacement).
10. Others (Conversion, Traceable, Normal, Avoidable, Unavoidable, Total).

1.5.1 Classification based on Time

- i. **Historical Costs:** These expenses are determined after the fact. Such expenses are only available once the production of a given item has been completed. They are objective and verifiable through reference to actual operations.
- ii. **Pre-determined Costs:** These costs are calculated in advance based on a specification of all cost-influencing factors. Such fees may include:
 - a. **Estimated costs:** Costs are estimated prior to the production of items; naturally, these are less precise than standards.
 - b. **Standard costs:** This is a specific notion and method. This strategy entails: • establishing established criteria for each element of cost and each product; • comparing actual to standard



to identify deviations; • pinpointing the causes of such deviations and taking corrective action; and • implementing corrective measures. Obviously, standard costs, though pre-determined, are arrived with much greater care than estimated costs.

1.5.2. Classification by Nature or Elements

There are three broad elements of costs:

(1) Material: The substance from which the product is made is known as material. It can be direct as well as indirect.

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

- (i) All materials specifically purchased for a particular job/process
- (ii) All material acquired, and latter requisitioned from stores
- (iii) Components purchased or produced
- (iv) Primary packing materials like cartoons and boxes
- (v) Material passing from one process to another

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

(2) Labour: Labour cost can be classified into direct labour and indirect labour.

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

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

(3) Expenses: Expenses may be direct or indirect.

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

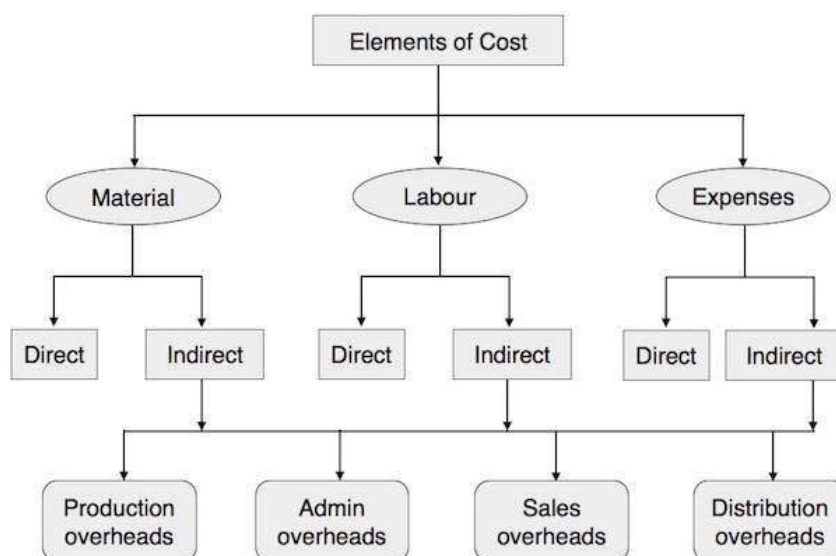


Indirect expenses: These are expenses which cannot be directly, conveniently and wholly allocated to cost centre or cost units. Examples are rent, rates and taxes, insurance, power, lighting and heating, depreciation etc.

It is to be noted that the term overheads has a wider meaning than the term indirect expenses. Overheads include the cost of indirect material, indirect labour and indirect expenses. overheads may be classified as

(a) production or manufacturing overheads, (b) administration overheads, (c) selling overheads, and (d) distribution overheads.

The various elements of cost can be illustrated by the following chart:



Total expenditure may therefore be **analysed** as follows:

Materials cost	=	Direct materials cost	+	Indirect materials cost
+		+		+
Labour cost	=	Direct labour cost	+	Indirect labour cost
+		+		+
Expenses	=	Direct expenses	+	Indirect expenses
Total cost	=	Direct cost/prime cost	+	Overhead cost
=====		=====		=====



Q. Which of the following costs would be charged to the product as a prime cost?

- A. Component parts
- B. Part-finished work
- C. Primary packing materials
- D. Supervisor wages

Answer

A, B and C

A, B and C are all examples of direct material costs. The prime cost includes direct material, direct labour and direct expenses. D is an indirect labour cost.

1.5.3 Classification by Degree of Traceability to the Products

Cost can be distinguished as direct and indirect.

Direct Costs: The direct costs are those which can be easily traceable to a product or costing unit or cost center or some specific activity, e.g. cost of wood for making furniture. It is also called traceable cost.

Indirect Costs: The indirect costs are difficult to trace to a single product or it is uneconomic to do so. They are common to several products, e.g. salary of a factory manager. It is also called common costs.

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

Direct cost can be allocated directly to costing unit or cost center. Whereas Indirect costs have to be apportioned to different products, if appropriate measurement techniques are not available. These may involve some formula or base which may not be totally correct or exact.

1.5.4 Classification by association with the Product

Cost can be classified as product costs and period costs.

Product Costs: Product costs are those which are traceable to the product and included in inventory values.

In a manufacturing concern it comprises the cost of direct materials, direct labour and manufacturing overheads. Product cost is a full factory cost. Product costs are used for valuing



inventories which are shown in the balance sheet as asset till they are sold. The product cost of goods sold is transferred to the cost of goods sold account.

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

They are charged to the period in which they are incurred and are treated as expenses.

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

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

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

Consider a retailer who acquires goods for resale without changing their basic form. The only product cost is therefore the purchase cost of the goods. Any unsold goods are held as inventory, valued at the lower of purchase cost and net realisable value and included as an asset in the statement of financial position. As the goods are sold, their cost becomes an expense in the form of 'cost of goods sold'. A retailer will also incur a variety of selling and administration expenses. Such costs are period costs because they are deducted from revenue without ever being regarded as part of the value of inventory.

Now consider a manufacturing firm in which direct materials are transformed into saleable goods with the help of direct labour and factory overheads. All these costs are product costs because they are allocated to the value of inventory until the goods are sold. As with the retailer, selling and administration expenses are regarded as period costs.

1.5.5 Classification by Changes in Activity or Volume

Costs can be classified as fixed, variable and semi-variable cost.

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



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

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

(a) **Committed Costs:** These costs are incurred to maintain certain facilities and cannot be quickly eliminated. The management has little or no discretion in this cost, e.g., rent, insurance etc.

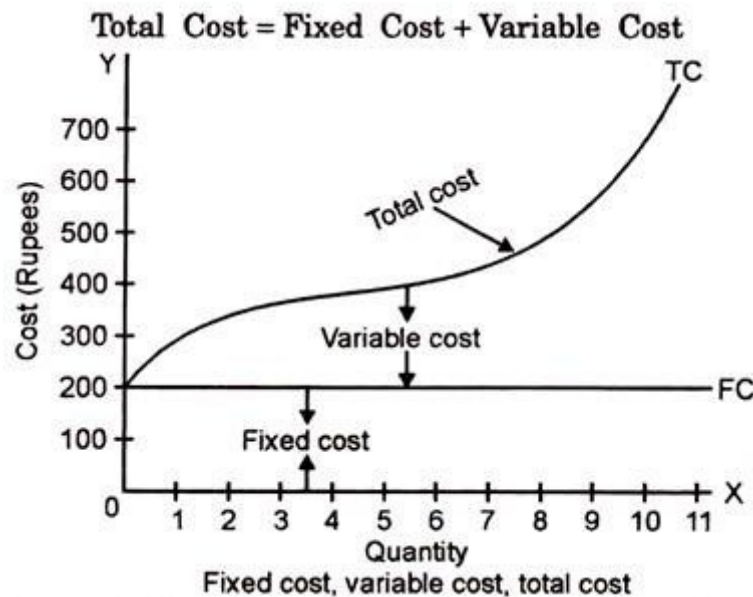
(b) **Policy and Managed Costs:** Policy costs are incurred for implementing particular management policies such as executive development, housing, etc. Such costs are often discretionary. Managed costs are incurred to ensure the operating existence of the company e.g., staff services.

(c) **Discretionary Costs:** These are not related to the operations and can be controlled by the management. These costs result from special policy decisions, new research etc., and can be eliminated or reduced to a desirable level at the discretion of the management.

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

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

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



Semi-fixed (Semi-Variable) costs: Such costs contain fixed and variable elements. Because of the variable element, they fluctuate with volume and because of the fixed element; they do not change in direct proportion to output. Semi-variable costs change in the same direction as that of the output but not in the same proportion. Depreciation is an example; for two shifts working the total depreciation may be only 50% more than that for single shift working. They may change with comparatively small changes in output but not in the same proportion.

1.5.6 Functional Classification of Costs

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

(a) Manufacturing/production Costs: It is the cost of operating the manufacturing division of an undertaking. It includes the cost of direct materials, direct labour, direct expenses, packing (primary) cost and all overhead expenses relating to production.

(b) Administration Costs: They are indirect and covers all expenditure incurred in formulating the policy, directing the organisation and controlling the operation of a concern, which is not related to research, development, production, distribution or selling functions.

(c) Selling and Distribution Cost: Selling cost is the cost of seeking to create and stimulate demand e.g. advertisements, market research etc. Distribution cost is the expenditure incurred which begins with making the package produced available for dispatch and ends with making the reconditioned packages available for re-use e.g. warehousing, cartage etc. It includes expenditure incurred in transporting articles to central or local storage. Expenditure incurred in



moving articles to and from prospective customers as in the case of goods on sale or return basis is also distribution cost.

(d) Research and Development Costs: They include the cost of discovering new ideas, process, products by experiment and implementing such results on a commercial basis.

(e) Pre-production Cost: When a new factory is started or when a new product is introduced, certain expenses are incurred. There are trial runs. Such costs are termed as pre-production costs and treated as deferred revenue expenditure. They are charged to the cost of future production.

1.6 MANAGEMENT, COST & FINANCIAL ACCOUNTING

Basis	Management Accounting	Financial Accounting	Cost Accounting
Meaning	Concerned with accounting information useful to the management for decision making	Concerned with recording, classifying and summarizing the business transactions	Concerned with the ascertainment, allocation and distribution of costs
Objective	Information is provided to formulate plans and to achieve desired objective of management	To determine the company's profitability and financial position during a financial year	It's objective is to ascertain cost, control cost, evaluate performance and take remedial measures
Nature	Futuristic in nature	Historical in Nature	Deals with historic data but also futuristic in nature
Users of information	Management	Internal as well as external users like	Majorly management



		owners, management, banks & FIs etc.	
Dependence	MA depends on both financial accounting and cost accounting	Independent	Independent but consider figures from financial accounting
Units of measurement	Can be expressed both in monetary and physical units	Expressed only in monetary units	Expressed in both monetary and physical units.
Accounting system	Not restricted to any specific accounting system	Based on double entry system and follows uniform accounting rules and regulations	Follows few principles and develop a costing system best suited to its individual needs
Emphasis	Emphasis is on planning and controlling	Emphasis is on profit/loss determination	Emphasis is on cost ascertainment, cost control and cost reduction

1.7 RECONCILIATION OF COST AND FINANCIAL ACCOUNTS

The financial accounts are maintained to ascertain profit & loss of the company as a whole entity as well as financial position for a particular financial year. The financial accounts primary objective is to record, classify and summarisation of business transactions and finished with the preparation of financial statements i.e. Trading & Profit & Loss Account and Balance Sheet.



Whereas, Cost accounting deals with the ascertainment of cost of product, absorption of overheads into product cost, ascertainment of division-wise or product – wise profitability. The accounting principles, methods, and practices applicable under these two systems of accounting are different.

The maintenance of different sets of accounts with different objectives will show different figures of profit or loss and thus it becomes necessary to reconcile the two accounts periodically and a statement of reconciliation is prepared to show the reasons for difference in profit or loss shown by cost and financial accounting. The cost and financial accounts are maintained in different forms or follow different methods, principles and approaches and it will naturally result in different profit or loss ascertained in cost and financial accounts which necessitates the reconciliation of both accounting to identify the reasons for deviation.

Reasons for necessity of Reconciliation

The important reasons necessitating the reconciliation of cost and financial accounts as follows:

1. To ascertain the reasons for the difference in profits or loss as shown by cost accounts and financial accounts
2. To ensure the accuracy of cost accounting methods and practices followed by the companies like absorption and recovery of overheads, depreciation allowance, inventory valuation and is verified with the financial accounts
3. To ensure the reliability of cost accounting data and financial accounting data
4. To promote coordination and co-operation between the financial accounting and cost accounting departments in generating accurate and reliable accounting data for meeting statutory requirements and generation of data for managerial decision-making
5. To explain the difference in profit or loss shown in cost accounting and financial accounting and any mistakes in preparation of accounts are brought out and ensures in arithmetical accuracy of both sets of accounts
6. To help in standardisation of policies like inventory valuation, overhead absorption, depreciation provision etc. for better internal control

Reasons for Disagreement

The difference in profit or loss ascertained in cost accounting and financial accounting is due to the following reasons:

Certain items only shown in Financial Accounting that are not shown in Cost Accounting:

- Profit or loss on sale of fixed assets
- Discount on issue or redemption of shares and debentures
- Capital issue expenses
- Preliminary expenses written off



- Cash discounts and bad debts
- Distribution of dividend
- Payment of income tax
- Donations
- Transfer of profits to reserves
- Goodwill written off
- Lay off wages and retrenchment compensation

Certain items only shown in Cost Accounting that are not shown in Financial Accounting

- Notional rent on premises owned
- Notional interest on capital

Disagreement due to under or over absorption of overheads items:

In financial accounting the actual overheads incurred are recorded and accounted for. But, in cost accounting for ascertainment of cost of production and profitability of cost unit, predetermined overhead absorption rates like machine hour rate, direct labour hour rate, percentage of direct material, direct labour, prime cost, factory overhead, factory cost etc. are used for absorption of overheads.

The absorption of overheads in cost accounting may be over or under recovered than the actual overheads incurred.

Difference due to use of different methods of stock valuation:

- In financial accounting, the stocks of raw materials are valued at cost or market value, whichever is lower. Whereas, in cost accounting, stock may be valued under FIFO, LIFO, weighted average price method etc.
- The finished goods are valued under absorption costing method in financial accounts. But, in preparation of cost accounting, the finished stock may be valued under absorption costing, marginal costing, standard costing etc.

Difference due to use of different rates of depreciation

In financial accounting, the amount of depreciation is charged as per rates given in the Companies Act, 2013. But, in cost accounting, appropriate and suitable method is used for calculation of the amount of depreciation

Methods of Reconciliation -

The cost accounting and financial accounting are reconciled by preparing any of the following:

- (1) Memorandum Reconciliation Account
- (2) Reconciliation statement



1. Memorandum Reconciliation Account

It is an account not being a part of double entry system of book-keeping. It is a method by which a record can be made of differences in cost accounting and financial accounting. Memorandum Reconciliation Account, basically, is the presentation of reconciliation statement in 'T' shape account form.

Steps in preparation of Memorandum Reconciliation Account

Four basic steps of preparing the Memorandum Reconciliation Account are encapsulated in the following lines:

Step 1. Profits as per cost account is placed on the credit side of the account and loss the debit side of the memorandum reconciliation account.

Step 2. All items which are to be added for reconciliation purpose will be shown on the credit side of the account. For instance, if we are starting from costing book's profits, the following items will be shown on the credit side :

- (a) Purely financial incomes included in financial accounts
- (b) Over-absorption of overheads in cost accounts
- (c) Over-valuation of opening stock in cost accounts
- (d) Under valuation of closing stock in cost accounts.

Step 3. All those items which are to be subtracted from base profit figure will be shown on the debit side of Memorandum Reconciliation Account. A list of the items to be shown on debit side in case, we start the procedure from profits as per cost accounts is given below :

- (a) Purely financial charges (as listed in the preceding section) excluded from cost accounts.
- (b) Under absorption of overheads in cost accounts
- (c) Over-Valuation of closing stock in cost accounts
- (d) Under-Valuation of opening stock in cost accounts.

Step 4. Placing the balancing figure: If sum of credit side items > sum of debit side, items, balancing figure is profit. If sum of debit side > sum of credit side items, balancing figure is loss, as per financial accounts.

DR.
CR.

Memorandum Reconciliation A/c

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)



To Loss as per cost accounts To pure financial charges • Discount on issue of shares written off • Preliminary expenses written off • Underwriter's Commission • Fines & Penalties • Donation • Bank interest To depreciation under charged in cost a/cs To under-absorption of overheads To under-valuation of opening stock in cost a/cs To over-valuation of closing stock in cost a/cs To profits as per financial a/cs (Balancing figure when sum of credit items > sum of debit items)		By profits as per cost accounts By pure financial income • Rent Received • Interest Received • Profits on sale of fixed assets • Dividend • Transfer fee received By items charged in cost accounts only. • Interest on own capital • Rent on own building By Excess of depreciation charged in cost books. By over-absorption of overheads By over-valuation of opening stock in cost a/cs. By under-valuation of closing stock in cost a/cs. By Loss as per financial a/c. (Balancing figure when sum of Debit items > sum of credit items)	

Illustration 1:

PQR Limited has closed its accounts for the year ended March 31, 2021. The profit shown in financial accounting is Rs.3,72,000 and for the same period, cost accounting showed a profit of Rs.4,10,000. On comparison of both accounts, the following stock balances appeared:



Stock Value		Cost Accounting	Financial Accounting
Raw Material	Opening Stock	1,36,000	1,45,000
	Closing Stock	1,10,000	1,03,000
Finished Goods	Opening Stock	2,66,000	2,58,000
	Closing Stock	2,29,000	2,23,000

Additional information appearing the financial accounting:

Loss on sale of machine Rs.35,000

Dividends received Rs.7,000

Interest received Rs.4,000

You are required to prepare Memorandum Reconciliation Account

Solution:

Memorandum Reconciliation A/c

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To loss on sale of machine	35,000	By Profit as per Cost Accounting	4,10,000
To undervaluation of opening stock of raw materials in cost accounting	9,000	By Dividend Received (not credited in cost accounting)	7,000
To over valuation of closing stock of raw materials in cost accounting	7,000	By Interest received (not credited in cost accounting)	4,000
To over valuation of finished goods closing stock in cost accounting	6,000	By over valuation of opening stock of finished goods in cost accounting	8,000
To Net Profit as per financial accounting	3,72,000		
	4,29,000		4,29,000



2. Reconciliation Statement:

In preparation of reconciliation statement, profit shown by one set of accounts is taken as base profit and items of difference are either added to it or deducted from it to arrive at the figure of profit shown by other set of accounts.

Procedure of Preparing reconciliation Statement

1. Start with profit shown by any one set of accounts (profit as per financial accounts or profit as per cost accounts). Take this profit as a **'base profit'**.
2. **All expenditures not taken into account in arriving at the base profit should be deducted from it**
3. **All expenditures taken into account for arriving at the base profit but not considered for profit shown by other set should be added back to base profit**
4. The amount of expenditures undercharged in arriving at the base profit should be reduced from it
5. All income taken into account for arriving at 'base profit' but not considered for profit shown by other set should be reduced from it
6. Amount of understated income for arriving at the base profit should be added back
7. Amount of overstated income for arriving at the base profit should be reduced from it
8. Income not taken into account for arriving at the base profit but considered for profit shown by other set should be added to base profit
9. Consider in isolation with the factors, the effect of differences in valuation of opening stock on base profit. If base profit has been overstated due to difference in valuation of opening stock, it should be reduced. If base profit has been understated due to difference in valuation of opening stock, the amount of difference should be added to it.

Proforma Reconciliation Statement - Suppose we start taking the profits as per cost accounts as base profits figure, the reconciliation statement can be exhibited / presented as given below.

Proforma Reconciliation Statement

(When profits as per Cost Accounts is taken as Starting point or base figure).

Particulars	Amount (Rs.)	Amount (Rs.)
A. Profits as per cost accounts		
B. Add : items having the effect of higher profits in financial accounts		



(a)	over-absorption of factory, office and selling and distribution over-heads		
(b)	Items charged in cost accounts only e.g. - Notional Rent - Notional Interest or Salaries		
(c)	Over-valuation of opening stocks in cost a/cs		
(d)	Under-valuation of closing stocks in cost a/cs		
(e)	Purely financial incomes excluded from cost a/cs - Interest & dividends received - Rent or transfer fees received		
C.	Less : items having the effect of lower profits in financial accounts		
(a)	Under absorption of factory, office and selling and distribution overheads		
(b)	Under-valuation of opening stock in cost a/cs		
(c)	Over-valuation of Closing stock in cost a/cs		
(d)	Purely financial charges excluded from cost a/cs egg Legal charges, donations, preliminary expenses written off		
(e)	Depreciation under- charged in cost accounts		
D.	Profits as per financial accounts.		

Note :

In cases we have losses in cost accounting records then the figure of loss as a starting point can be put as 'minus' or '-ive' figure. The implication of this will be that sum of '+' items (items to be added) will be deducted and sum of '-' items (items to be subtracted) will be added to the base figure of loss to arrive at the resultant figure (which is the profit/loss as per financial books).

Illustration2:

The financial accounts for ABC Limited indicate a net profit of ₹ 77,348 whereas the cost accounts indicate ₹ 102,600 for the same year. Prepare a statement of reconciliation to reconcile both the earnings from the following data:



(i)	Depreciation charged in financial accounts	₹ 6500
	while recovered in cost accounts	₹ 6520
(ii)	Works overheads under absorbed in cost accounts	₹ 1650
(iii)	Office overheads over-recovered in cost accounts	₹ 580
(iv)	Interest on loans (credit) not included in cost accounts	₹ 4000
(v)	Loss due to obsolescence charged in financial accounts	₹ 2580
(vi)	Bank interest and dividends received	₹ 573
(vii)	Income-Tax paid	₹ 15,020
(viii)	Loss due to depreciation in inventories charged in financial accounts	₹ 5733
(ix)	Stores adjustment credited in financial accounts	₹ 732

Reconciliation Statement

Solution

Particulars	Amount (₹)	Amount (₹)
Profits as per cost books		102,600
Add:		
1. Excess of depreciation charged in cost a/cs (6520 - 6500)	20	
2. Over absorption of office overheads	580	
3. Interest on loans (Credit)	4,000	
4. Bank interest and dividend received	573	
5. Stores adjustment	732	5,905
Less:		
1. Under absorption of works overheads	1,650	
2. Obsolescence charged in financial books	2,580	
3. Income tax paid	15,020	
4. Loss on depreciation of inventories (charged in financial books)	5,733	24,963
Profit as per financial books		83,542



1.8 IN-TEXT QUESTIONS

Indicate whether the following statements are true or false:

- 1. Cost and financial accounting are reconciled under non-integral accounting**
- 2. Rent on owned building is not included in cost accounts**
- 3. Costing P&L A/c includes all items of financial nature (like interest) which are not included in cost ascertainment**
- 4. Dividend received but not included in cost accounts is to be added back to costing profit in reconciling profit with financial profit**
- 5. Income tax is provided in cost accounting only**
- 6. The need of reconciliation arises only under integrated accounting system**
- 7. There is only one figure of profit under integral accounting system**
- 8. Over-absorption of production overheads in cost accounts are deducted to costing profit to reconcile it with profit as per financial book**
- 9. Loss on the sale of capital assets is not included in accounts under integral system**
- 10. No accounts of debtors and creditors are opened in integrated accounts**

[Ans: True – 1, 4, 7 False: 2, 3, 5, 6, 8, 9, 10]

1.9 SUMMARY

- The financial accounting deals with recording, classification and summarisation of business transactions and prepares financial statements i.e. Income Statement and Balance Sheet
- The cost accounting deals with ascertainment of cost and profitability of products, divisions, centres etc.



- Different accounting principles, methods, and practices are followed under financial accounting and cost accounting systems
- The two sets of accounts show different figures and financial results and it requires periodical reconciliation of both the accounts
- The reconciliation promotes the integrity of both the systems of accounting and helps in standardisation of policies
- The difference in profit as shown in cost accounting and financial accounting may relate to the reasons like some expenses are only shown in financial accounting like preliminary expenses, capital issue expenses,; certain items of expenses are shown only in cost accounting like interest on capital, notional rent, overheads absorbed in cost accounts difference in valuation of stock and WIP, difference s in rates of depreciation charged etc.
- The cost accounting and financial accounting are reconciled by preparation of either Memorandum Reconciliation Account or Reconciliation Statement

1.10 SELF-ASSESSMENT QUESTIONS

1. State the need for reconciliation of cost and financial accounts.
2. There is generally a divergence between 'financial profits' and 'cost profits'. Explain this statement and give reasons for such divergence.
3. What are the reasons for disagreement of profits as per financial accounts and cost accounts? Discuss.
4. Mention four items of expenses or incomes which will appear in one set of accounts but not the other.
5. The financial records by Modern Industries Limited reveal the following data for the year ended March 31, 2022:

Particulars		Amount (Rs. in '000)
Sales (20,000 units)		4,000
Materials		1,600
Wages		800
Factory Overheads		720



Office and Administrative Overheads		416
Selling and Distribution Overheads		
Closing Stock of finished goods (1230 units)		
Work-in-progress (Closing)		
Materials	48	
Labour	32	
Factory Overheads	32	112
Goodwill written off		320
Interest on Capital		32

In the costing records, factory overhead is charged at 100% of wages, administration overhead at 10% of works cost and selling and distribution overhead at Rs.16 per unit sold.

Prepare a statement reconciling the profit as per cost records with the profit as per financial records of the company. All workings should form part of your answer.

6. Prepare Cost Sheet Profit & Loss Account from the following information and reconcile:

Particulars	Amount (in Rs.)
Material consumed	20,000
Wages	18,000
Works Overhead Charges	15,000
Office Overhead Charges	16,000
Selling Overhead	4,000
Sales	1,00,000



In cost records, works overhead charges are recovered at 100% on direct wages, and office overhead charges are recovered at 25% on works cost. Selling expenses are charged at 10% on sales.

In financial records, debenture interest paid Rs.5,000, preliminary expenses written off Rs.3,000.

1.11 REFERENCES

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- Lal, Jawahar & Seema Srivastava. *Cost Accounting*. McGraw Hill Publishing Co., New Delhi.
- Maheshwari, S. N., & S. N. Mittal. *Cost Accounting. Theory and Problems*. Shri Mahabir Book Depot, New Delhi.

1.11 SUGGESTED READINGS

- "Cost Accounting: A Managerial Emphasis" by Charles T. Horngren, Srikant M. Datar, and George Foster
- "Cost and Management Accounting" by Colin Drury
- "Cost Accounting: Principles and Practice" by M.N. Arora
- "Cost Accounting: An Introduction to Managerial Accounting" by Eric W. Noreen and Peter C. Brewer
- "Managerial Accounting" by Ray H. Garrison and Eric W. Noreen

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**LESSON 2****MATERIAL, LABOUR AND OVERHEAD COST & CONTROL****Dr. Priyanka Ahluwalia**Email-Id ahluwalia.priyanka@gmail.com**STRUCTURE**

- 2.1 Learning Objectives
- 2.2 Introduction
- 2.3 Elements of Cost
- 2.4 Material Cost and Control
 - 2.4.1 Direct Material Costs
 - 2.4.2 Indirect Material
 - 2.4.3 Objectives of Material Control
 - 2.4.4 Material Cost control
- 2.5 Labour Cost
 - 2.5.1 Direct Labour Cost
 - 2.5.2 Indirect Labour Cost
 - 2.5.3 Labour Cost Control
- 2.6 Overhead Cost and Control
- 2.7 Summary
- 2.8 Solved Numerical Questions
- 2.9 MCQ
- 2.10 Self-Assessment Questions
- 2.11 References & Suggested Books

2.1 LEARNING OBJECTIVES

After studying this lesson, you will be able:

- To understand the major cost drivers
- To know the basis of cost identification and understand the key elements of cost.
- To effectually use the cost data for effective managerial decision and control analysis
- To enumerate the factors affecting the quality of management decisions and policies.



2.2 INTRODUCTION

As discussed in the last section, cost forms an integral part of laying the foundation for estimating the revenues and profitability of any economic activity. Commonly, the expenditure incurred on an item is termed as “cost”. However, this is a very generic meaning of the word “cost”. Cost is not as simple as being generally understood, its understanding is subjective to:

- a) The subject application
- b) The industry, sector or the business characteristics

For example, the cost of land for a manufacturing business is a substantial expense, which will support the entire manufacturing process over a very long tenure, thus will be identified as a capital expenditure. However, the same cost of land for a real estate business is a direct cost because of the nature of the business as it deals with buying and selling of real estate assets only. Thus, it can be clearly stated, that the same cost might indicate different aspects subject to varying situations.

This dynamic feature of the cost concept makes it imperative for the managers to understand the business model and use due diligence to understand and accurately identify the various cost heads. This shall give a true picture of the cost structure and lay down the significance of each cost element.

2.3 ELEMENTS OF COST

Broadly, there are three major elements of cost:

- Material
- Labour
- Overheads

2.4 MATERIAL COST AND CONTROL

Any item used to make a product to satisfy the demand in the economy can be termed as material. The material used may be raw, semi-processed or finished material, which can be further processed in the value chain for manufacturing or developing a new product. The material cost can also be classified as direct or indirect material cost.

2.4.1 Direct Material Costs



Direct material costs are those raw material and item costs which are incurred directly in the making of a product. The materials must be simply distinguishable from the ensuing product. For example, the direct materials for chocolate making are cocoa powder, sugar, oil, flavourings etc.

The direct material costs are identified and observed for various financial analysis to understand the magnitude and impact of each cost on the final product. This also supports a better understanding to establish a justified selling price. Consequently, it enables the management of the company to establish the key cost drivers.

The key elements of the direct material costs can be enumerated as under:

- **Raw material costs** – The substances that are transformed by losing their identity during the process of production, and become an integral part of the product are the raw materials. For example: Steel used in car manufacturing units, can be termed as raw material for the Original Equipment Manufacturer (OEM).
- **Packing costs:** The packing material used for the storage and safe transportation of the products to the end user is a direct material cost. Material such as bubble wrap, cardboard, cartons etc are included under this category.
- **Freight and storage expenses:** Transportation costs and storage costs are a function of the final product features such as perishability, fragility, size, geographical location gap between the manufacturer and the end customer etc. This cost must be considered while calculating the direct material cost as this function bridges the gap between the manufacturer and the end user.
- **Indirect Taxes**
With the new tax regime in the country, Value added tax (VAT) and goods and services tax (GST) is levied almost on all materials. However, the tax rates vary on the basis of the material category and the geographical location.

With the help of the following examples, we can clearly understand the direct material costs;

- Fabric is a direct material cost for a readymade clothing business
- The stitching machinery, buttons, zips etc will also be considered as components of direct material costs.
- The wood and steel used in furniture manufacturing business is a direct material cost.
- The plastic used in the toy manufacturing business is also a direct material cost.

Thus, direct material costs can be easily understood by relating it to real life examples.



2.4.2 Indirect Material

Indirect materials are goods which are part of the overall manufacturing process however, are not transformed during the process. These materials are consumed to support the manufacturing process and generally, the outgo on these materials is comparatively lesser than the direct materials. It is also tedious to allocate these costs in specific quantities to the finished product. For example, consumables such as tapes, gloves, protective gears, stationary etc. can be termed as indirect materials which are significant for the smooth production process but do not lose their original form during the production process.

The calculation of direct material cost can be understood as under:

Illustration 2.1 Intech Ltd is a pen manufacturing company. The finance manager wishes to understand the total direct costs of the company.

The cost elements of Intech Ltd for December, 2021 are as under:

Cost of raw material purchased: Rs. 1,09,000

Indirect taxes: Rs. 15,200

Wages paid to the employees: Rs. 43,000

Packing and container costs incurred: Rs. 2,000

Inward Freight charges: Rs. 950

You are required to calculate the direct material cost for the company on behalf of the finance manager.

Solution:

Particulars	Amount (Rs.)
Material Cost (a)	1,09,000
Indirect Taxes (b)	15,200
Packing and Container costs (c)	2,000
Inward Freight Charges (d)	950
Total Direct Costs (a+b+c+d)	1,27,150



Further, the total direct cost per unit can also be computed as follows:

Let us assume: Total number of pens manufactured during the month of December, 2021 is 10,000.

Therefore,

The Direct cost per unit shall be estimated as under:

Total Direct costs / No. of units manufactured

Thus, the direct cost per pen = Rs. 1,21,750 / 10,000 = Rs. 1.2175

Significance - Direct Materials cost

As discussed earlier, direct material costs are substantial costs incurred during the production process and thus must be considered by the cost accountant and the management to take well-informed decisions for the smooth and successful functioning of the business.

- The direct material costs form a significant portion of the total costs and are crucial for setting the final product pricing, thus it is worth taking the cost of each item, that is being used to develop the final product.
- The direct material cost also supports a comparative cost analysis vis a vis the realization per unit, thereby, establishing the profits generated by each product.
- It supports the managers to understand the supplier cost structure and make a market-wide analysis in terms of the quality and pricing of the raw material procured. Thus, this information can be effectively used by the managers for price negotiations with the suppliers.
- It helps managers to understand the costing and pricing bottlenecks and further helps them develop an effective cost control and review system. This shall also result in efficient utilisation of resources and better supply management.

Thus, direct material cost analysis allows the managers to take improvised business decisions backed by an in-depth understanding of the cost elements and profits generation capacity of the business.

This cost control and review system supports better product development at effective costs, thereby enhancing the product acceptability by the end consumers which in turn leads to better growth prospects for the business.

For a break down free production process, the manufacturing unit always requires an uninterrupted supply the raw materials, stores and spares and machines. The purchase



department plays a key role in procuring the required quantity and quality of raw materials. Further, the procured raw materials are stored efficiently and safely by the stores' department and released to the production department on requisition raised. This calls for well-coordinated efforts between the various departments. Thus, material control can be defined as the timely availability of the optimum quantity at the best quality possible at the least cost possible. This calls for minimum stock maintenance to avoid raw material shortage yet maintain the least possible storage cost and thereby, avoiding any cost of damage to the input materials.

Thus, in order to avoid stock-out costs, high-cost procurement of raw materials and stock damage costs, most of business organisations maintain a production planning and control department whose endeavour is to coordinate between the various organisational functions such as purchase, production, sales and marketing departments etc. It also acts to keep the costs at the minimum level while maintaining the quality and continuity of the production and sales department.

2.4.3 Objectives of Material Control

As discussed in the earlier section, it is very crucial to keep the costs under check to operate at the most efficient level. The material control system supports to achieve the following aims:

1. **To fix the reorder level of raw materials:** For efficient inventory management, it is imperative to fix the quantity of the raw material at which it should be reordered. It is also required to set a limit for minimum quantity, optimum quantity and maximum quantity of the materials to monitor the overall costs.
2. **To keep a track of the material stock levels:** Material control helps to facilitate updated information about the availability and the quantity of the materials. This facilitates the timely raising of requisitions for the purchase of the required quantity, to support the uninterrupted manufacturing process. It also helps in identifying the levels of re-purchase of stocks.
3. **Ensures availability of Quality products:** Every manufacturing organisation needs a specific quality of materials in order to keep the costs at the estimated level yet meet the customer specifications for the final product. Any change in the quality of the raw materials will either effect the cost structure adversely or product quality, thereby, making the product unsuitable either in terms of final pricing or quality of the end user. Thus, keeping a check on the quality of input materials, yet maintaining the costs within the permissible limits is of key significance.
4. **To monitor the wastage levels:** In order to keep a check on the wastage of the input due to breakage, theft, obsolescence etc, efficient storage facilities for various materials are maintained. This helps in keeping the wastage at a bare minimum level and requires an efficient controlling and monitoring system in place.



5. **Effective purchasing costs:** As material control supports maintaining the optimum levels of stocks and also provides information about the timely reorder levels, the materials can be procured at the right price as, there is no sudden requirement to procure materials. With this efficient material planning system in place, the materials can be purchased at competitive prices. This also enables management to establish long-term relationships with the suppliers, thereby ensuring quality consistency too. This cost-effectiveness percolates to better profitability for the organisation.
6. **Avoidance of Over-Stocking or Under-Stocking:** As conferred in the above discussion, understocking of materials might lead to production breakdowns and overstocking might lead to higher storage and wastage costs. Overstocking might also be impacted obsolescence. Both these situations are likely to put profitability under pressure. Thus, in order to manage the overstocking or understocking costs, efficient material control systems are necessary.

2.4.4 Material Cost Control

Requisition order of materials: The first step to effectively control the material costs is to estimate the adequate quantity of raw materials, components and other stores. Based on the best estimates, the purchases are made by the purchasing department of the organisation. The purchase requisition also mentions the quality of the material directed to be procured within the stipulated time frame.

Reliable material vendors: The purchase department on the basis of the quality and the best pricing shortlists a few vendors for each material procurement. On the basis of the purchase requisition, the vendor is selected considering the time lag between the order and supply of the materials. The vendors are continuously reviewed with a view to maintaining the quality and striking a fine balance between the price and the right time of procurement.

Issue of Letters Inviting Quotations: After a careful selection of the vendors, the quotations are invited from the vendors with clear specifications regarding the price, quantity, quality, delivery time etc. This enables the purchasing department to make a prudent decision on the basis of the comparative analysis of the quotations made by the vendors. As these quotations clearly specify the expected deal terms and conditions, any risk of future mismatch in terms of quality, quantity or timeliness is mitigated substantially.

Placing the Purchase Order: On the careful selection of the vendor on the basis of the order details, the purchase order is placed with the vendor. The purchase order indicates the quantity, quality, the delivery schedule for the materials. In some cases, the penalty clause is also inserted to avoid any delivery delays. It acts as a deterrent and the transfer of risk of loss due to stock out to an extent.



Quality checks and Approval of Invoices: Post the delivery of the materials, the quality check inspections are conducted by the quality control department. This practice helps in minimising the wastage cost due to any substandard quality as in case of any deviations from the agreed features of the material, the issue is taken up with vendor, the payments for the material are stalled.

Method of Material Pricing Issues

After the materials are issued to the production department, the companies face issues in regard to the pricing at which the materials issued need to be charged. The companies purchase the same type of material at different prices at different times in different lots. There are various methods of pricing material and they may be categorised as below:

I. Cost Price Methods

- First-in-First-out Method (FIFO)
- Last-in-First-out Method (LIFO)
- Highest-in-First-out Method (HIFO)

II. Average Price Method

- Simple Average
- Weighted Average Price Method
- Periodic Simple Average
- Moving Simple Average
- Weighted Moving Average

III. Notional Price Methods

- Standard Price
- Inflated Price
- Market Price

First-in First-out (FIFO) Method

As per FIFO, materials which are purchased first are issued first. The value of the closing stock is valued at the price of the latest purchases.

**Advantages:**

- i. Inventory Management System is effective as the oldest units are consumed first and inventory comprises the latest stock.
- ii. This method is logical.
- iii. Easy to understand and operate.
- iv. Facilitates inter-firm and intra-firm comparisons.
- v. Inventory Valuation and cost of finished goods are regular, perpetual and realistic.

Disadvantages:

- i. Involves lot of calculation work
- ii. Cost of production is not linked to the current prices.
- iii. For pricing one requisition, more than one price may have to be adopted
- iv. In a period of fluctuating prices, the cost of issues do not represent market price
- v. The pricing of material returns is not easy.
- vi. Cost comparisons among two batches of production become difficult when issues are priced differently.



Inventory Valuation Problem

The following are the details of a spare part of Sriram Mills:

1-1-22	Opening Stock	Nil
1-1	Purchases	100 units @ ₹ 30 per unit
15-1	Issued for consumption	50 units
1-2	Purchases	200 units @ ₹ 40 per unit
15-2	Issued for consumption	100 units
20-2	Issued for consumption	100 units
1-3	Purchases	150 units @ ₹ 50 per unit
15-3	Issued for consumption	100 units

Find out the value of stock as on 31 -3-22 if the company follows:

1. First in First Out basis
2. Last in First Out basis
3. Weighted Average basis

Inventory Valuation using FIFO

Date	Opening Balance			Purchase			Issue			Balance		
	Units	Rate	Total Amt.	Units	Rate	Total Amt.	Units	Rate	Total Amt.	Units	Rate	Total Amt.
01-01-2022										0	0	0
01-01-2022				100	30	3000				100	30	3000
15-01-2022							50	30	1500	50	30	1500
01-02-2022				200	40	8000				200	40	8000
15-02-2022							50	30	1500			
15-02-2022							50	40	2000	150	40	6000
20-02-2022							100	40	4000	50	40	2000
01-03-2022				150	50	7500				150	50	7500



15-03-2022							50	40	2000			
							50	50	2500	100	50	5000

So the value of closing stock is Rs.5,000

2. Last-in-First Out

This method is based on the assumption that the last items purchased are issued first. The closing stock is valued at the prices of the earliest purchase.

Advantages:

- LIFO helps company in avoiding tax
- It conforms to the principle that cost should be related to current price levels
- The cost of material is stated at current market price and thus, unrealised inventory profits are not reflected in the accounts
- Unlike FIFO method, LIFO does not result into unrealised profit due to inflationary trends

Disadvantages:

- This method is not acceptable to income tax authorities
- This method is useful if the items of materials to be priced are few in number
- Under falling prices, issues are priced at lower prices and stocks are valued at higher prices
- Cost of different batches vary greatly, making inter-firm and intra-firm comparison difficult.

Inventory Valuation using LIFO

Date	Opening Balance			Purchase			Issue			Balance		
	Units	Rate	Total Amt.	Units	Rate	Total Amt.	Units	Rate	Total Amt.	Units	Rate	Total Amt.
01-01-2022										0	0	0



01-01-2022				100	30	3000				100	30	3000
15-01-2022							50	30	1500	50	30	1500
01-02-2022				200	40	8000				200	40	8000
15-02-2022							100	40	4000	50	30	1500
15-02-2022										100	40	4000
20-02-2022							100	40	4000	50	30	1500
01-03-2022				150	50	7500				150	50	7500
15-03-2022							100	50	5000	50	30	1500
										50	50	2500

Value of Closing Stock 50 30 1500

50 50 2500
4000

Weighted Average Price Method

Under WAP, weighted average price is calculated by dividing the total cost of material purchased during an accounting period by the total quantity of material purchased during that period.

WAP = Total Cost of purchases during an accounting period / Total quantity purchased during an accounting period

Advantages:

- Simple to operate
- This method averages out the effect of price fluctuation
- Used in process industries

Disadvantages:

- Cannot be used in job order industry where each individual order must be priced



at each stage upto completion

- ii. The costing of material issues gets delayed up to the end of the period and this results in heavy burden on the staff
- iii. The closing stock does not correspond to the conventional method of valuing stock i.e. cost or market value, whichever is lower.

Inventory Valuation using Weighted Average Price

Date	Opening Balance			Purchase			Issue			Balance		
	Units	Rate	Total Amt.	Units	Rate	Total Amt.	Units	Rate	Total Amt.	Units	Rate	Total Amt.
01-01-2022										0	0	0
01-01-2022				100	30	3000				100	30	3000
15-01-2022							50	30	1500	50	30	1500
01-02-2022				200	40	8000				200	40	8000
15-02-2022							100	40	4000	50	30	1500
15-02-2022										100	40	4000
20-02-2022							100	40	4000	50	30	1500
01-03-2022				150	50	7500				150	50	7500
15-03-2022							100	50	5000	50	30	1500
										50	50	2500

Value of Closing stock = Rs.4,000

Normal Loss of Material Vs Abnormal Loss of Material

Material loss arises due to handling, storage or during manufacturing. Material loss is categorised into two i.e. normal loss and abnormal loss.

Normal loss is that loss which has necessarily incurred and thus is unavoidable. Examples:



- Loss due to evaporation
- Loss occurring due to loading and unloading
- Loss resulting from breaking the bulk, etc.

Normal loss of material cannot be completely avoided but can be controlled to a limited extent.

The term "abnormal loss" refers to losses caused by inefficiency in operations, mischief, negligence, etc. Examples –

- Theft or pilferage
- Breakage
- Fire, accident, flood, etc.
- Use of inaccurate instruments
- Improper storage, etc.

Materials losses may arise in the form of waste, scrap, spoilage or defectives.

Waste consists of invisible loss, visible loss that cannot be collected, and the percentage of recovered loss that cannot be sold. Waste is not factored into production quantity. Wastes include smoke, dust, gases, slag, etc.

Scrap is the non-usable loss that can be sold. It is a residue that can be measured and has a negligible value. It may be caused by the processing of materials, outdated stock, or defective parts. Metal scrap may consist of turnings, borings, filings, etc.; sawdust in the timber sector; and off-cuts and cut pieces in the leather business.

Spoilage refers to damaged materials or components that cannot be repaired or reconditioned during the manufacturing process. Some spoilage may be sold as seconds. If they have deteriorated significantly, they can be sold as garbage or scrap.

Defectives are the portion of process loss that can be transformed into finished goods by investing additional material and labour costs. The additional expenses are added to the manufacturing cost, and the rectified units are added to the overall number of units. Substandard materials, poor craftsmanship, inadequate inspection, a lack of blueprints, etc. can all result in flaws.



2.5 LABOUR COST

The raw material needs to process at different stages to convert the input materials into a finished product. This needs human intervention i.e. the human skills; knowledge and efforts are put in to manufacture a finished product. These human efforts are to be compensated in monetary terms and this is called the labour cost. The cost of labour comprises a variety of charges related to employees. These can be direct monetary payments to employees like basic wages, dearness allowance, bonuses, etc., deferred monetary benefits like employer contributions to provident funds, gratuities, pensions, etc., and fringe benefits like employer contributions to the Employees' State Insurance scheme, subsidized food, and housing, leave travel concessions, medical and vacation home facilities, libraries, and other welfare measures. Like material cost, labour costs might be direct or indirect in connection to the task or the final output.

2.5.1 Direct Labour Cost

Direct labour cost is the part of a factory's prime cost that is allocated to paying employees who worked there directly on the creation or manufacture of the items. The amount that is paid to labour for each unit they produce or for each hour they work on a project can also be referred to as the cost of direct labour.

Direct labour costs can be located and assigned to a particular job process or product. Examples of direct labour cost are as follows:

Wages: The amount which is paid by company to labourer for production of products. This is example of direct labour cost.

Payment of Subsidized Food: The amount which is paid by company for providing the food at subsidized rates to laborers will be the example of direct labour cost.

Subsidized Housing: If company is getting less rent from worker for providing homes, different between actual rent and taken rent will be the example of direct labour cost.

Educational Benefits to Children of Workers: All educational benefit's price which is being given to the children of workers will be the example of direct labour cost.

Other Benefits: In order to indicate the true prime cost in the cost sheet, bonus, allowances and other perks or benefits are added in the direct labour cost.

2.5.2 Indirect Labour Cost:

The amount given to employees who aren't directly involved in the manufacturing of goods is referred to as indirect labour cost. It is impossible to identify and assign the indirect labour cost to a specific cost centre or cost unit.



Indirect labour costs are typically spread evenly. Maintenance workers, managers, supervisors, sweeping crews, etc. are all examples of indirect labour costs. Nonetheless, they indirectly contribute to the manufacturing of products.

Examples of indirect labour are as follows: Production manager, Marketing, Security, and Human Resources

Direct and indirect labour costs must be distinguished for the following reasons:

- to calculate accurate labour costs and thus provide a basis for strict control;
- to facilitate calculation of labour efficiency;
- to ensure proper allocation of overheads;
- to implement incentive schemes;
- to facilitate inter-unit comparison; and
- to estimate total labour costs.

What distinguishes indirect labour from direct labour?

The price associated with the production of goods and services is direct labour. The number of hours of labour required to produce a product for a consumer is used by businesses to determine the cost of direct labour. Employees that support other departments within the company are only taxed for indirect labour, which is not used in the manufacturing process.

Direct Labour Cost forms part of PRIME COST whereas Indirect Labour Cost becomes part of OVERHEAD.

2.5.3 Labour Cost Control

Employees have a crucial part in an organization's growth and productive operations because they are its most valuable asset. The systematic and efficient use of the organization's human resources has a stronger impact on the development and advancement of the company. In the same comparison, it is certain that its manufacturing and marketing activities will be slowed down if this resource is not correctly exploited.



The management is concerned with keeping labour costs under control. Labour cost control involves such systems, procedures, techniques and tools used by the management in order to keep the labour cost of the product or job as minimum as possible. Labour cost control includes the process of developing various forms, studying and recording the activities and performance of workers, calculating the correct amount of wages and making payment in time. For planning and decision-making, it also includes the process of assessing and reporting labour costs to management.

- Provide employees with predictable work schedules.
- Reduce pay overages.
- Reduce labor costs by optimizing schedules.
- Reduce employee turnover and increase productivity.
- Incentivize performance.

Labour cost management is essential

- To employ labour in the industrial process economically.
- To produce the most output possible using the fewest materials and resources possible.
- To produce better-quality work with the least amount of time and effort from the workforce.
- To decrease the cost of production of products created or services delivered.
- By fostering a positive work atmosphere in the factory, one may guarantee the contentment of the employees.
- To implement a just system of wage payment and to reduce employee turnover.
- Controlling labour costs is useful in reducing worker waste of resources, idle time, and atypical overtime work.
- To maintain a secure workplace atmosphere.
- Controlling labour costs is crucial for maintaining accurate personnel records and providing management with data on employee availability, productivity, utilization, and absenteeism.
- To make the organisation more profitable and competitive.

Factors for labour-cost control

While planning the system, the following elements for labour-cost control should also be taken into consideration:



Production-Planning: Production should be organised to utilize labour as efficiently and effectively as possible. Production planning is made up of the engineering of the product and the process, programming, routing, and direction.

Setting up of standards: The setup of time study and motion study for industrial activities is made possible by work study. A comparison is made between the standard labour cost that has been defined and the actual labour cost, and any discrepancies are examined.

Use of labour budgets: A labour budget is created using the production budget as a guide. The Labour budget accounts for the type and quantity of workers required for the output as well as the cost of labour. This budget is a plan for labour costs and is based on historical data taken into account in the context of the future.

Analysis of the effectiveness of wage policy: How much does the compensation provided by departments under incentive plans aid in managerial control over labour and labour cost management?

Labour Performance Reports: The reports on labour usage and efficiency, which are acquired on a regular basis from the departments, are useful for managing labour and regulating labour costs.

Minimization of labour cost through control does not necessarily mean paying less to the employees. It entails getting the most out of the workers by giving them all the amenities, both financial and non-financial. The result is that the business is able to generate more profit. On the other hand, if labour costs are not adequately managed, it will negatively affect both cost savings and profit.

Illustration 2.2

From the details given below, you are required to calculate the direct labour cost to PRIM corporation for the month of October, 2022

Particulars	Amount (Rs.)
Wages paid to labourers	1,65,000
Raw material	7,00,000
Health insurance premium paid for direct labours	15,000



Wages paid to employees indirectly involved in manufacturing process	1,30,000

$$\begin{aligned}\text{Direct Labour Cost} &= \text{Wages Paid to labourers} + \\ &\quad \text{Health insurance premium paid for direct labourers.} \\ &= \text{Rs. } 1,65,000 + 15,000 \\ &= \text{Rs. } 1,80,000\end{aligned}$$

Note:

The raw material cost is the direct material cost

The wages paid to other employees is an indirect labour cost

2.6 OVERHEAD COST AND CONTROL

Overhead costs are those costs which are incurred over and above the direct material, direct labour and direct expenses. The overhead expenses are those costs which cannot be directly recognised to the final product. Thus, overhead costs are a blanket term for indirect material, indirect labour and indirect expenses.

There are mainly three functions in a manufacturing unit.

- a) Manufacturing unit
- b) Office and Administrative services
- c) Selling and Distribution function

The overheads can be categorised on the following basis:

1. Functional Analysis
 2. Behavioural Analysis
1. Functional Classification

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



- a) **Manufacturing or Production or Factory Overhead** – These overhead costs are manufacturing overhead costs such as factory rent and taxes, indirect wages etc.
- b) **Office and Administrative Overhead**– These are non-manufacturing overheads such as office staff salary, stationery etc.
- c) **Selling and Distribution Overhead** – These expenses are indirect overheads which are incurred to enhance the sales of the product such as sales performance bonus, sale promotion expenses etc.

Behavioural Classification

Based on Behavioural patterns, overhead costs can also be categorised as Variable overheads, Semi -Variable overheads and Fixed overheads.

Variable overheads are directly proportional to the manufacturing scale and thus is a dynamic cost which increases with the higher production and vice versa. For example, performance bonus is a variable cost.

Fixed overheads are not linked to the change in the output quantity and is fixed irrespective of the production scale. For example, Factory rent is a fixed cost.

Semi Variable overheads are those costs which varies with the production level but not in a linear relation. For example: Power and fuel is a semi variable overhead.

Methods of segregating semi-variable overheads

Semi-variable overheads can be segregated into variable and fixed overheads can be done by applying the following methods:

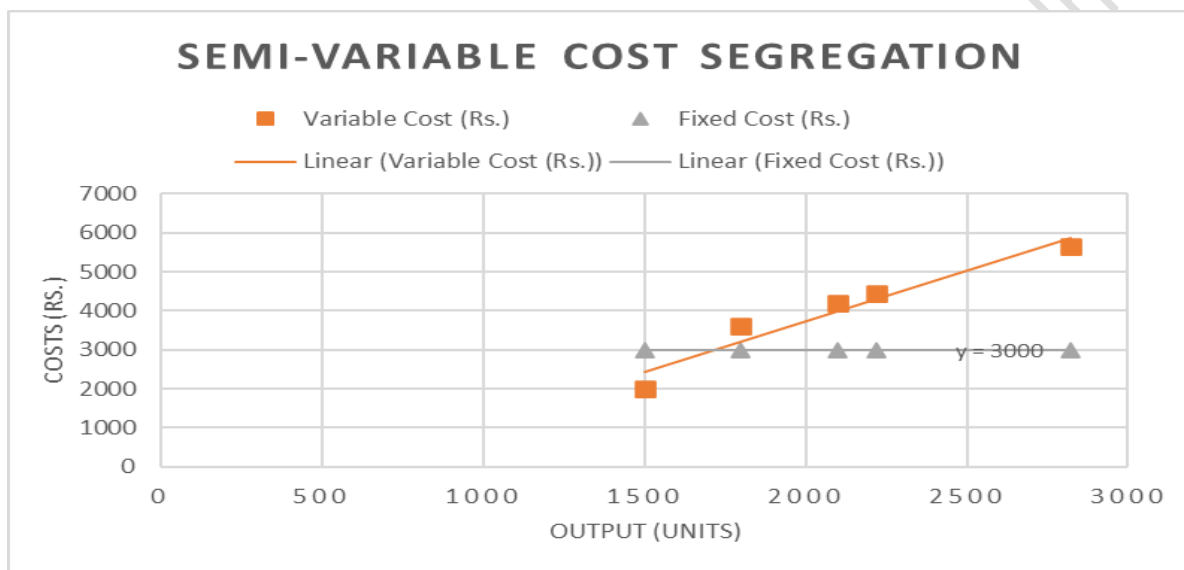
- i. **Scattergraph Method:** This is a statistical method, where a line is fitted to a series of data by observation.

Illustration 1: From the following information, draw the line of best fit

Month	Output Units	Cost (Rs.)
January	1,500	6,000
February	1,800	6,600
March	2,100	7,200
April	2,820	8,640
May	2,220	7,440



Month	Output (units)	Costs (Rs.)	Variable Cost (Rs.)	Fixed Cost (Rs.)
January	1500	6000	2000	3000
February	1800	6600	3600	3000
March	2100	7200	4200	3000
April	2820	8640	5640	3000
May	2220	7440	4440	3000



ii. High and Low Points Method

Under this method, levels of highest and lowest expenses are compared with one another and related to output attained in those periods.

Illustration 2: Considering the following information, segregate semi-variable costs into fixed cost and variable cost.

Month	Output (Rs.)	SVC (Rs.)
January	5,000	25,000
February	6,000	28,000
March	7,000	31,000
April	9,400	38,200

Considering the highest and lowest levels of output:

Highest (April)	9,400	38,200
Lowest (January)	5,000	25,000
Difference	4,400	13,200



Variable Cost per unit = Change in Costs / Change in Output = Rs.13,200 / 4,400 = Rs.3/unit

Month	Output (Rs.)	SVC (Rs.)	VC (Rs.)	FC (Rs.)
January	5,000	25,000	15,000	10,000
February	6,000	28,000	18,000	10,000
March	7,000	31,000	21,000	10,000
April	9,400	38,200	28,200	10,000

Thus, VC per unit = Rs.3 per unit and Fixed Cost is Rs.10,000 at all levels of output

Steps of Overhead Costing:

The overhead costs allocation involves the following procedure:

- Collection of factory overhead costs:** Firstly, the overhead costs are assimilated from the various documents such as the invoices issued, payrolls, distribution details etc. for the varying sources of overhead costs.
- Allocation and distribution of overhead costs:** Each overhead cost should be identified to a specific cost centre. This allocation of cumulative overhead costs to a particular cost unit is called cost allocation.

However, when the cost centre identification is tedious or impractical, the overhead cost is allocated based on relevance and rationality. This approach of cost distribution over multiple cost units is called cost apportionment. There are few generally accepted and practiced basis of distribution in the industry. The below mentioned list enumerates some of this basis of apportionment.

i) Rent, rates and taxes	i) Area occupied/Floor space
ii) Insurance of Stock	ii) Value of Stock
iii) Insurance of other fixed assets	iii) Value of fixed assets
iv) Stores overhead	iv) Value of materials
v) Indirect wages	v) Direct wages
vi) Indirect materials	vi) Direct materials
vii) Lighting/Electricity expenses	vii) wattage x working hours or No. of light points
viii) Power	viii) Kw x working hours
ix) Canteen expenses	ix) No. of workers
x) Supervisor's salary	x) No. of workers
xi) Employee welfare expenses	xi) No. of workers



xii) Workers' compensation insurance	xii) Direct wages
xiii) General expenses	xiii) Working hours or direct wages
xiv) Repair & maintenance of assets	xiv) Value of assets

- iii) **Allocation of service function cost to the manufacturing function-** This distribution of service costs to the other cost units is called secondary distribution. For example, the repairs and maintenance cost might be allocated to the various cost units on the basis of the asset's value .

Let us discuss the distribution of overheads and re-distribution of service department cost to production department with an illustration.

Illustration 2.3 PQR Ltd is a manufacturing company with three production departments P, Q and R, and two service departments A and B. The following is the forecasted budget for March, 2023:

	Total Rs					
Rent and rates	15,000					
General lighting	600					
Indirect wages	1,500					
Power	3,000					
Depreciation of machinery	2,000					
Sundry expenses	10,000					
Additional information:		P (Rs)	Q (Rs)	R (Rs)	A (Rs)	B (Rs)
Area (sq.m)		200	250	300	200	50
Value of machinery (Rs)		60,000	80,000	1,00,000	5,000	5,000
Machine hour		100	200	4000	100	100
Light points (nos)		10	15	20	10	5
Direct wages		30,000	20,000	30,000	15,000	5,000
H.P. of machines		60	30	50	10	---
Working hours		5,326	3,048	2,048	---	---



You as the cost accountant of the company are required to prepare a statement showing the apportionment of overheads.

Solution :2.3

Statement showing the distribution of overheads

Item of expenses	Basis of apportionment	Total (Rs)	Production Deptt			Service Deptt	
			P	Q	R	A	B
Rent and rates	Floor Space	15,000	3000	3750	4500	3000	750
General Lighting	Light points	600	100	150	200	100	50
Indirect wages	Direct wages	1,500	450	300	450	225	75
Power	H.P. of machine	3,000	1200	600	1000	200	--
Depreciation	Value of machine	20,000	4800	6400	8000	400	400
Sundries	Direct wages	10,000	3000	2000	3000	1500	500
	TOTAL	50,100	12550	13200	17150	6925	2275

Apportionment of the Overhead Costs

The basis for the apportionment of the overhead costs are as follows:

- **Adequacy:** The overhead rate should reflect an unbiased distribution of overhead costs
- **Suitability:** The overhead rate should be convenient and easy to comprehend and apply the same.
- **Time factor:** The time taken to complete a task should be well defined and the overhead cost should be in line with the time consumed for the specific job.
- **Manual or machine work:** The overhead should vary on the basis of the type of work such as manual or mechanised as both involves different resource. The availability and cost of each process lays the basis for the average overhead rate.
- **Diverse Overhead Rates:** In an event of varying characteristics of work done, distinguished overhead rates should be ascertained.



- **Information:** The data availability affects the overhead cost selection criteria.

Overhead cost control systems:

Similar to the overhead cost allocation and apportionment, the overhead cost control method is complex. The overhead cost control requires the management to plan the cost budget objectively. Further, for monitoring purposes, well defined yardsticks should be laid down. These yardsticks provide a foundation for the review of the check points. Thus, cost control is a continuous process and requires dedicated resources to work effectively.

With the alteration in production processes, there is a change in the overhead costs, that needs to be recognized and considered to reflect the true profitability prospects of the company.

As it has been clearly established that overhead costs are difficult to be recognised under a product or manufacturing activity, the control even is more complicated as needs to be looked for minutely, otherwise it might go unnoticed.

Steps to Control Overhead Expenses

The overhead costs can substantially be controlled by proactive cost management. The management should look for the following key areas to control and reduce the major overhead costs.

- With the effective working capital management, the overhead costs can be controlled to a great extent.
- Implementation of total quality management in order to curb the unnecessary and wasteful expenditure can also help the management in achieving the cost control goal.
- Reducing the logistics costs by optimising the transportation expenses should be carefully executed, as it is one of the major components of the overheads cost in most of the supply chain.
- By proper and regular check-ups of the machinery and the production infrastructure, the maintenance overheads can be kept under control.
- The sales expenses can be minimised by directing the sales force efforts not only to push sales, but the team should also be trained to work towards the profit maximisation. The sales incentives should be offered and linked to the profits of the business.

2.7 SUMMARY

The primary goal of a business is to generate profits for all the interested parties. In most simple terms, profits are the difference between the revenues and cost. Thus, it is very crucial for any



organisation to study the cost structure of manufacturing the final product. In order to understand the cost structure, the costs have broadly been classified as three main elements discussed in this section. The main elements of cost for any manufacturing unit are Material, Labour and Overheads. The Material and Labour can be directly recognised with the final product. However, an in-depth study is required for the allocation of overheads to various manufacturing processes. This cost identification and allocation helps the management to keep a watch on the key components of the cost structure. This follow up and review process, enhances the management efficiency in controlling costs and thereby enhancing the profitability of the organisation.

2.8 SOLVED NUMERICAL QUESTIONS

Question 1 The following is an extract from the accounting records of PAM Corporation for the 3QFY22 i.e (Oct, 1st to 31st December, 2021)

Cost of Raw Material on October 1, 2021	15,000
Raw material purchases during the quarter	2,25,000
Labour cost paid during the period	1,15,000
Factory Overheads	46,000
Cost of work- in-progress on October 1, 2021	6,000
Cost of raw materials on December 31, 2021	7,500
Cost of stock of finished goods on October 1, 2021	30,000
Cost of stock of finished goods on December 31, 2021	27,500
Selling and Distribution expenses	10,000
Administrative Overheads	15,000
Sales	4,50,000
Prepare the cost sheet	

Solution :

Statement of cost

For the period (1st Oct ,2021 – 31st Dec, 2021)



Particulars		Amount (Rs.)
Opening stock of raw materials	15,000	
Add: Purchases	2,25,000	
Less: Closing stock of raw materials	7,500	
Cost of raw materials consumed		2,32,500
Labour cost paid		1,15,000
	Direct costs	3,47,500
Factory Overheads		46,000
		3,93,500
Add: Opening stock of Work in Progress		6,000
Less: Closing stock of Work in Progress		NIL
	Factory Costs	3,99,500
Add: Administration Overhead		15,000
Cost of Goods produced		4,14,500
Add: Opening stock of finished goods		30,000
Less: Closing stock of finished goods		27,500
Cost of production of goods sold		4,17,000
Add: Selling and Distribution		10,000



Cost of sales		4,27,000
Profit (Balancing Figure)		23,000
Sales		4,50,000

Questions for Practice:

Q1. From the following you are required to prepare a statement showing the issues made under FIFO and LIFO method:

Date

- 1 Opening Balance 100 units at Rs.10 each
- 1 Received 200 units at Rs.10.50 each
- 2 Received 300 units at `10.60 each
- 4 Issued 400 units
- 6 Issued 120 units
- 7 Received 400 units at Rs.11 each
- 10 Issued 200 units
- 12 Received 300 units at Rs.11.40 each
- 13 Received 200 units at Rs.11.50 each
- 15 Issued 400 units

Q2. Myra Industries Limited is a single product organization having a manufacturing capacity of 6,000 units per week of 48 hours. The output data vis-à-vis different elements of cost for three consecutive weeks are given below:

Units	Direct Material	Direct Labour	Total Factory Overheads (Variable + Fixed)
2,400	4,800	6,000	37,200



2,800	5,600	7,000	38,400
3,600	7,200	9,000	40,800

As a cost accountant, you are asked by the company management to work out the selling price assuming an activity level of 4,000 units per week and a profit of 20% on selling price.

2.9 MCQ

- 1) The process of charging costs directly to a cost centre is called
 - i) Absorption
 - ii) Apportionment
 - iii) Allocation
 - iv) Allotment
- 2) The labour rate is used in an event when
 - i) Majority of work is done by machines
 - ii) Majority of work is done by labours
 - iii) The work is distributed amongst different labour groups
 - iv) One machine operator works on several machines
- 3) Direct labour is a
 - i) Variable Expense
 - ii) Fixed Cost
 - iii) Opportunity cost
 - iv) Sunk Cost
- 4) Basic objective of cost accounting is
 - i) Financial analysis
 - ii) Statutory audits
 - iii) Tax regulations
 - iv) Cost ascertainment
- 5) Material, labour and Overhead expenses are three vital of costs
 - i) Methods
 - ii) Segments
 - iii) Elements
 - iv) Process
- 6) The synonym for direct wages is
 - i) Direct output
 - ii) Direct Material



- iii) Indirect Labour
- iv) Direct Labour
- 7) Indirect material, indirect labour and indirect expense is collectively known as
 - i) Material expense
 - ii) Direct wages
 - iii) Total cost
 - iv) Overheads

Answers: 1(iii), 2 (ii), 3(i), 4(iv), 5(iii), 6(iv), 7(iv)

2.10 SELF-ASSESSMENT QUESTIONS

1. Cost management is futuristic in nature. Comment
2. Allocation and apportionment are interchangeable. Do u agree with the statement. Give rationales.
3. Enumerate the key elements of cost. Discuss the significance of each element.
4. Prepare a cost sheet based on the following information provided to you.

Apca Ltd is a manufacturing firm. You are required to prepare a cost sheet for the period of January ,2023.

Particulars	Amount (Rs.)
Opening stock of raw material	25,000
Raw material purchases during the month	2,72,000
Closing stock of raw material	17,000
Labour cost	108,000
Factory overheads	(50% of labour cost)
Office and administrative overhead	10% of works cost
Selling and Distribution expenses	52,000

2.11 REFERENCES & SUGGESTED BOOKS



- Moore & Jaidicke, *Managerial Accounting*, Chapter 7
- Horngren, Charles, *Cost Accounting: A Managerial Emphasis*, Chapter 2 and 3
- Maheshwari S.N. and Mittal, SN., *Cost Accounting – Theory and Problems*, Twenty – sixth Edition, chapter 2.



LESSON 3

JOB, BATCH AND CONTRACT COSTING

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STRUCTURE

- 3.1 Learning Objectives
- 3.2 Introduction
- 3.3 Job Costing
- 3.4 Advantages Of Job Costing
- 3.5 Limitations Of Job Costing
- 3.6 Batch Costing
- 3.7 Differentiate Between Job Costing And Batch Costing
- 3.8 Contract Costing
- 3.9 Differentiate Between Job Costing And Contract Costing
- 3.10 Some Special Terms Used In Contract Costing And Their Treatment
- 3.11 Treatment Of Various Financial Elements Involved In Contract Costing
- 3.12 Summary
- 3.13 Glossary
- 3.14 Answers to In-Text Questions
- 3.15 Self-Assessment Questions
- 3.16 References
- 3.17 Suggested Readings

3.1 LEARNING OBJECTIVES

- To Understand Job Costing method.
- To calculate the cost under Job Costing.



- To Understand Batch Costing methods.
- To calculate the cost for a batch
- To Differentiate between Job Costing and Batch Costing.
- Ascertain the cost of a contract
- To Understand concepts of Value of work certified, Cost of Work not certified.
- Compute Notional or Estimated profit from a contract.
- To Differentiate between Job and contract costing

3.2 INTRODUCTION

In past few chapters you have studied various elements of cost. And how cost of a product is calculated in general, now we will discuss how the cost accounting information can be presented and used according to the needs of the management. To cater to the need of the different users of the cost accounting information, different methods of costing are developed. These costing methods enable the users to have customized information of any cost object according to their need and suitability.

Different methods of costing have been developed as per the needs and nature of industries. For this purpose, industries can be broadly classified under two basic categories i.e. Industries doing job work (Customised as per needs of the particular customer) and industries engaged in mass production of a single product or identical products. For eg. If a particular Kind of a Furniture item is to be produced for a customer or may be a batch of chairs of a particular size for a customer's office then Job Costing is a suitable method to calculate their cost. But for a company producing Soaps on a mass scale Process costing may be more suitable method as all are following same production process repeatedly.

3.3 JOB COSTING

Job Costing refers to a system of costing in which costs are ascertained in terms of specific jobs or orders which are not identical or comparable with each other. This kind of Costing method is followed in industries where production is not highly repetitive and, in addition, consists of different jobs or lots so that material and labour costs can be identified by order number. Industries where this method of costing is generally applied are automobile repair shop, Printing Press, interior designing, construction, etc. In all these cases A separate cost



sheet or an account is opened for each job and all appropriate expenditure is charged thereto to calculate total cost of that particular job.

Steps in Job Costing:

- Prepare a separate cost sheet for each job
- Charge full cost of materials issued for the job
- Charge full labour costs incurred (on the basis of Job Cards or time cards)
- Charge Direct expenses of that particular job done as per customers instructions.
- When job is completed, charge proportionate overhead also to ascertain total Cost.

3.4 ADVANTAGES OF JOB COSTING

- (i) It helps management to find out cost of all resources involved in completing that particular job. As total cost of that particular job is known so management will try fix a price to customer which will cover that cost and a desired profit.
- (ii) Since overheads rates are to be predetermined for their absorption in job costing, it will necessitates the application of a system of budgetary control of overheads with all the advantages.
- (iii) Spoilage and defective work can be easily identified with specific jobs or products so that responsibility may be fixed on particular departments or individuals.
- (iv) Job costing is particularly suitable for cost plus and such other contracts where selling price is determined directly on the basis of costs and to be quoted to the customer.

3.5 LIMITATIONS OF JOB COSTING

- (i) This system of costing is too time consuming and requires detailed record keeping. This makes the method very expensive as compared to other method.
- (ii) Inefficiencies of a particular department or organization may be charged to a job making price quoted on cost plus basis to be less competitive.
- (iii) As lot of clerical process is involved the chances of error is more.

Example 1



Following information has been extracted from costing records of Khushi Industries manufacturing Chairs as per customised order in respect of particular job :

Materials	Rs. 1500 per unit
Wages:	
Department A	6 Hours @ Rs. 30 per hour
Department B	4 Hours @ Rs. 20 per hour
Department C	2 Hours @ Rs. 40 per hour
Overheads for the three departments are estimated as follows:	
Variable Overheads:	
Department A	Rs. 40, 000 for 4, 000 direct labour hours
Department B	Rs. 30, 000 for 1, 500 direct labour hours
Department C	Rs. 10, 000 for 500 direct labour hours
Fixed Overheads:	
Estimated at Rs. 1,00, 000 for 10000 normal working hours	

You are required to calculate the cost of a chair and calculate the price to be charged so as to give a profit of 20% on cost.

Solution:

Cost Sheet for a chair

Particulars	Amount	Amount
Direct Materials		1500
Direct Wages:		
Department A – 6 hrs @Rs. 30 per hour	180	
Department B – 4 hrs @Rs. 20 per hour	80	
Department C – 2 hrs @Rs. 40 per hour	80	340
Variable Overheads		
Department A – 6 hrs @Rs. 10 per hour	60	
Department B – 4 hrs @Rs. 20 per hour	80	



Department A – 2 hrs @Rs. 20 per hour	40	180
Fixed Overheads 12 normal working hours (6+4+2) @ Rs. 10 per hour		120
Total Cost		2,140
Profit @ 20% of Cost		428
Sale Price to be quoted		2,568

Working Notes

Variable Overhead rates have been arrived as follows:

Department A = Amount of Overheads / No. of direct labour hours

= Rs. 40000 / 4000 hours

= Rs. 10 per hour

Department B = Amount of Overheads / No. of direct labour hours

= Rs. 30000 / 1500 hours

= Rs. 20 per hour

Department C = Amount of Overheads / No. of direct labour hours

= Rs. 10000 / 500 hours

= Rs. 20 per hour

Fixed Overhead rate has been arrived as follows:

Amount of Fixed Overheads / Normal Working Hours

= Rs. 100000 / 10000

= Rs. 10 per hour

Example 2

Anjana Fabricators Ltd specialises in Providing customised Furniture to its clients their cost data of 2022 is given below

Cost of Raw material	6,00,000	Selling and Distribution overheads	3,64,000
Wages	5,00,000	Office and Admin Overheads	4,20,000
Factory Overheads	3,00,000	Profit 25% of cost	

They received a work order in 2023 and estimated expenses are



Material Rs. 10,000, Wages Rs, 5000, What selling price must be quoted to earn same rate of profit as in 2022, if company has a policy of absorbing Factory overheads on basis of wages, Office and admin overheads on the basis of factory cost and Selling and distribution overheads on the basis of Cost of Production. Also extra Packing & Transport cost for home delivery to customer expected to be Rs 10,000. This to be recovered from customer as part of total cost.

Solution:**Step1 Let us first prepare cost sheet of year 2022**

Particulars	Amount (Rs.)
Materials	6,00,000
Wages	5,00,000
Prime cost	11,00,000
Add Factory Overheads	3,00,000
Factory or Works cost	14,00,000
Office and admin Overheads	4,20,000
Cost Of Production	18,20,000
Selling and Distribution overheads	3,64,000
Total Cost/ Cost of Sales	21,84,000
Profit @25% of cost	5,46,000
Sales	27,30,000

Step 2: Calculate Overhead Absorption rates

$$\text{Factory overheads as a \% of Wages} = (3,00,000/5,00,000)*100 \\ = 60\%$$

$$\text{Office and Admin Overheads as a \% of Factory Cost} = (4,20,000/14,00,000)*100 \\ = 30\%$$

$$\text{Selling And Distribution overheads as a \% of Cost of production} = (3,64,000/18,20,000)*100 \\ = 20\%$$

Step 3 Cost Sheet for Work Order in 2023

Particulars	Amount (Rs.)
Materials	10,000
Wages	5,000



Prime cost	15,000
Add Factory Overheads @60% of wages	9,000
Factory or Works cost	24,000
Office and admin Overheads @30% of factory cost	7,200
Cost Of Production	31,200
Selling and Distribution overheads @20% of cost of Production	6,240
Extra Packing and Transport charges	10,000
Total Cost/ Cost of Sales	47,440
Profit @25% of cost	11,860
Selling price to be quoted	59,300

So A selling price of Rs. 59,300 to be Quoted to customer for this work order.

3.6 BATCH COSTING

Batch Costing is a type of specific job order costing where articles are manufactured in fixed predetermined lots, known as batch. Under this costing method, the cost object for cost determination is a batch rather than a single unit as in job costing method.

A batch consists of certain number of identical units which are processed simultaneously in a manufacturing operation. Since a large number of them are manufactured together and pass through the same process of manufacture, it is convenient to collect their cost of manufacture together. A separate job cost sheets are maintained for each batch of products. Material requisitions are prepared batch wise, the direct labour is engaged batch wise and the overheads are also absorbed batch wise. Cost of each unit manufactured in the batch is then determined by dividing the total cost of the batch by the number of units manufactured.

For example, in Soap manufacturing industry, it would be tough to calculate cost of one soap at a time Also it will be very costly to manufacture one particular soap to meet the demand of one customer. On the other hand, the production, of say 10,000 soaps, of the same design will reduce the cost to a sizeable extent. So the cost of a batch of whole 10,000 soaps will be calculated and then divided by no of units i.e. 10,000 to get the cost of 1 unit.

So Batch costing is suitable for industries manufacturing same product in large no which are identical in nature It is used in industries manufacturing soaps , pens and tyre & tube etc.

Steps in Batch Costing:

- One number is allotted for each batch & Prepare a separate cost sheet for each Batch
- Charge full cost of materials issued for the Batch
- Charge full labour costs incurred on basis of time devoted to produce a full batch.



- Charge Direct expenses of that particular batch as per customers instructions.
- When batch is completed, charge proportionate overhead also to ascertain total Cost.
- Calculate cost of each unit by dividing total cost of batch by no of units in batch.

$$\text{Cost per unit} = \frac{\text{Total Batch Cost}}{\text{Total Units in Batch}}$$

3.7 Differentiate between Job Costing and Batch Costing

Basis	Job Costing	Batch Costing
Suitability	It is suitable for the products which are to be customised as per customers order	It is suitable for the industries producing homogeneous products and having mass production
Cost determination	Cost is determined for each product	Cost is determined for a batch
Individuality of a product	Each job is separate and different from others.	Products are homogeneous and can't be distinguished from each other

Example 3:

VGA Limited manufactures Pens which are embossed with the customers' own logo. A customer has ordered a batch of 500 pens. The following is the cost structure for a batch of 100 pens.

Particulars	Cost per batch of 100
Direct materials	800
Direct labour	400
Machine set up	100
Design and art work	200
Total Prime cost	1500

VGA Limited absorbs production overheads at a rate of 25% of direct labour



cost. Selling and Distribution overheads absorbed @10 % of total production cost of each batch. VGA Limited requires a profit margin of 25% on cost.

Calculate the sale value of full batch of 500 as well selling price of each pen.

Solution:

Particulars	Cost of batch of 100	Cost of batch of 500
Prime cost (800+400+100+200)	1500	7500
Production Overheads (25 % of labour cost)	100	500
Production cost	1600	8000
Selling, distribution and admin overheads @10% of Production cost	160	800
Total cost	1760	8800
Profit @ 25 % of total cost	440	2200
Selling price	2200	11000

So the sales value of batch of 500 pens is Rs 11000 and cost of 1 pen can be calculated by dividing the total sales value by no of units produced in a batch

Selling price per pen = $11000/500 = \text{Rs } 22$

3.8 CONTRACT COSTING

Contract costing is a form of job order costing where job undertaken is relatively large and normally takes period longer than a year to complete. Just like in job costing, in contract costing too, each contract is treated as a cost unit and costs are ascertained separately for each contract. Contract costing is usually adopted by the contractors engaged in any type of contracts like construction of building, road, bridge, erection of tower, setting up of plant etc. Usually, there is a separate account for each contract and the contract account is debited with all direct and indirect expenditure incurred in relation to the contract. It is credited with the amount of contract price on completion of the contract. The balance represents profit or loss made on the contract and is transferred to the costing profit and loss account. In the case, the contract is not completed at the end of the accounting period, a reasonable amount of profit, out of the total profit made so far on the incomplete contract, may be transferred to profit and loss account.



So after analyzing the above definitions we can conclude that Contract costing have few distinct features which are as follows:

1. The cost unit in contract costing is the contract itself.
2. The Major expenses incurred by the contractor are considered as direct as they are incurred in relation to a particular contract
3. The few indirect expenses mostly consist of office expenses, stores and works and are absorbed proportionately on basis of some predetermined overhead absorption rates.
4. A separate account is usually maintained for each contract.
5. The major part of the work in connection with each contract is ordinarily carried out at the site of the contract.

As mentioned above a contract usually takes multiple accounting period to complete and the exact result of the contract, whether it is a profit or loss and how much is the profit or loss can be known only after the completion of the contract.

Still in order to have a better control over the contract and cost, it is necessary to have an idea of profitability of contracts at regular intervals or at least once every year. For this purpose, a contractor needs to calculate expected profit or notional profit for a contract. It also helps in comparison of profit for a period with that of another period and provide a good basis for performance measurement and evaluation of those employees or departments who are engaged in the contract. A suitable portion of expected or notional profit in respect of each contract in progress is transferred to the costing profit and loss account for the year to determine overall profitability of the contractor's business entity.

3.9 Differentiate between Job Costing and Contract Costing

Basis	Job Costing	Contract Costing
Cost Allocation	The cost is first allocated to cost centers and then to a particular jobs	In contract costing, most of the expenses are of direct nature so directly charged to that particular contract Account
Place of Production	In Job Costing generally production carried out in factory	In Contract costing Most of the work is carried out on site
Determination of Selling Price	In Job costing Price is largely influenced by Market	In contract costing Price is generally determined on basis of Cost plus



	conditions apart from cost of product	mark up or negotiation between Both Parties

3.10 Some Special Terms used in Contract Costing and their treatment

(i) Work-In-Progress:

Work-in-progress in contract costing refers to the The cost of the contract which is not complete at the reporting date. In Contract Accounts, the value of the work-in-progress consists of the cost of work completed, both certified and uncertified.

(ii) Cost Of Work Certified:

Since a contract is a continuous process, to know the periodic work done and to know the cost of work completed as on a particular date; a periodic assessment of the work is carried out by an expert, based on his assessment, the expert certifies the work completion in terms of percentage of total work. This value is known as Cost of work certified.

Value of Work Certified = Value of Contract $\times$ Work certified (%)

Cost of Work Certified = Cost of work to date – (Cost of work uncertified
+ Material in hand + Plant at site)

(iii) Cost Of Work Uncertified:

In every Contract there always will be some work which has been carried out by the contractor but has not been certified by the expert as its degree of completion cant be ascertained or too low. It is always shown at cost price. This is known as Cost of work uncertified.

Cost of Work uncertified = Cost of work to date – (Cost of work certified
+ Material in hand + Plant at site)

(iv) Progress Payment:

Since, a contract takes longer period to complete and requires large investment in working capital, hence it is desirable by the contractor to have periodic payments from the contractee against the work done to avoid working capital shortage. For this the contractor enters into an agreement with the contractee and agrees on payment on some reasonable basis, which is generally calculated as a percentage of work certified. After



every period the Contractor will get payments for work done on a contract based on work certified

Progress payment = Value of work certified – Retention money – Payment made till date

(v) Retention Money:

The Contractor will never be paid full amount as mentioned by expert to be work certified. To have a cushion against any defect or undesirable work detected in future, the contractee upholds some money payable to contractor. This security money upheld by the contractee is known as retention money.

Retention Money = Value of work certified – cash paid

(vi) Cash Received:

It is ascertained by deducting the retention money from the value of work certified

Cash received = Value of work certified – Retention money

(vii) Notional Profit:

It represents the difference between the value of work certified and cost of work certified.

Notional profit = Value of work certified – Cost of work certified

(viii) Estimated Profit:

It is the excess of the contract price over the estimated **total** cost of the contract.

Estimated profit on contract = Contract price - Total expenditure to date - Estimated Further expenditure to complete the contract (including Reserve for contingencies)

(ix) Escalation Clause:

As we know A contract generally takes longer period to complete so there is a great probability that the cost which was estimate at the start of the contract undergoes a big change and which is beyond the control of contractor to manage. For ex some items like cement, iron are integral elements of cost of any construction contract and their prices are sometimes either controlled by regulator or affected largely due to external factors too. So, to safeguard his interest contractor request for a clause in the contract which will allow him to raise contract price, by a suitable percentage, to bear this increase in cost beyond a certain limit. In other words As per this clause, the contractor



increases the contract price if the cost of materials, employees and other expenses increase beyond a certain limit.

(x) Cost-Plus Contracts

There are few contracts in which it is difficult to accurately estimate the cost of contract at the very beginning of the contract due to the nature of ingredients used in contract or the ongoing unstable economic environment. In such cases Cost Plus contract is preferred by the contractors to safeguard their economic interest.

Cost-plus contract is a contract in which the contract price is determined by adding a specified amount or percentage of profit to the costs incurred in the contract. In such contract agreements, the contractee undertakes to pay to the contractor the actual cost of contract plus a stipulated profit. It can be mutually decided that the profit to be added to cost may be either a fixed amount or a specified percentage of cost.

Cost-plus contracts are usually entered into for executing special type of work, like construction of dam, powerhouse, newly-designed ship, etc., where each project is so unique that accurate cost estimation is difficult. Government often prefers to give contracts on 'cost-plus' terms.

Cost-plus contracts are beneficial To the Contractor as he will never suffer loss on such contracts and he is protected from the risk of fluctuations in market prices of material, labour, etc. but at the same time it is disadvantageous to him as he is deprived of the advantages which would have accrued due to reduced market prices of material wages etc. Also he has no motivation for working more efficiently as profit is already fixed.

3.11 Treatment of various financial elements involved in contract costing

a. Material.

Materials may be purchased in bulk and kept in store for supply to various contract undertaken by contractor, as and when required, or these may be purchased and directly supplied to the contract on site. Whatever be the case the cost of material issued or supplied for a particular contract would be debited to the contract account. In case certain materials previously charged to contract are returned to stores, the same will be credited to the contract account. If certain Materials stolen or destroyed by fire or other



reasons, the respective cost will be transferred to profit and loss account and finally Materials in hand/ at site at the end of the year will appear on the credit side of the contract account.

b. Labour.

All labour employed at the contract site should be regarded as direct labour and charged direct to the contract concerned irrespective of the kind of work they perform. If large number of contracts are carried on and workmen are made to divide their time between two or more contracts, it would be necessary to prepare analysis sheets of labour, for charging to each contract in such case a separate job card for each workman need to be prepared to keep record of time devoted by him on a particular contract.

c. Direct expenses.

All expenses other than material and labour are charged to individual contracts as and when they are incurred e.g. design charges, setup charges, architect's fee.

d. Overhead costs:

Though minimal in nature, still some part of general and admin overheads need to be absorbed in each contract as support services are provided by the back offices too to each contract. Such costs in case of a contract will be in the nature of wages paid to storekeeper, men engaged as supervisor, lorry drivers and stationery, central administrative office lighting, heating etc. These have to be allocated over several contracts on some suitable basis e.g. as a percentage of material or labour or total cost of contract excluding such overheads.

e. Plant used in a contract:

The value of plant used on a contract may be either debited to the contract and the written down value thereof at the end of the year entered on the credit side for closing the contract account, or only a charge for use of the plant (depreciation) may be debited to the contract account.

f. Profit on incomplete contracts:

This is perhaps most debated and tricky part of contract cost accounting. Since contract takes longer period to complete so every year a notional profit is determined to judge the periodic performance. And also to transfer a suitable profit figure to Profit and loss



account from each contract. At the end of an each accounting period it may be found that certain contracts have been completed while others are still in process and will be completed in the coming years. The profit on completed contracts may be safely taken to the credit of the profit and loss account. In the case of incompleting contracts there are unforeseen contingencies which may lead to heavy fluctuations in costs and profit. At the same time it does not also seem desirable to consider the profits only on completed contracts and ignore completely incomplete ones as this may result in heavy fluctuations in the future for profit from year to year.

Therefore, profits on incomplete contracts should be considered, of course, after providing adequate sums for meeting unknown contingencies. There are no hard and fast rule regarding calculation of the figures for profit to be taken to the credit of profit and loss account.

However, the following rules may be followed in absence of any clear guidelines:

- (i) Profit should be considered in respect of work certified only, work uncertified should always be valued at cost.
- (ii) No profit should be taken into consideration if the amount of work certified is less than 1/4th of the contract price.
- (iii) If the amount of work certified is 1/4th or more of contract price but less than 1/2 of the contract price, 1/3rd of the profit disclosed as reduced by the percentage of cash received from the contractee, should be taken to the profit and loss account

$$\text{Profit to be transferred} = \frac{1}{3} * \text{Notional Profit} * (\text{Cash received} / \text{Work certified})$$

The balance be allowed to remain as a reserve.

- (iv) If the amount of work certified is 1/2 or more of the contract price but less than 90% of the contract price, 2/3rd of the profit disclosed, as reduced by the percentage of cash received from the contractee, should be taken to the profit and loss account.

$$\text{Profit to be transferred} = \frac{2}{3} * \text{Notional Profit} * (\text{Cash received} / \text{Work certified})$$

The balance should be treated as reserve.

- (v) In case the contract is very much near to completion i.e. work certified is more



than 90 % of contract price , if possible the total cost of completing the contract should be estimated. The estimated total profit on the contract then can be calculated by deducting the estimated cost from the contract price. The profit and loss account should be credited with that proportion of total estimated profit on cash basis, which the work certified bears to the total contract price.

Profit to be transferred = Estimated profit * (Work certified / Contract price) * (cash received / work certified)

The balance should be treated as reserve.

(vi) In case there is a loss the whole loss, should be transferred to the profit and loss account.

For Example: If the Notional profit on a contract for Rs.30,00,000 is Rs.600,000 and the contract is 70% complete and has been certified accordingly. The retention money is 25% of the certified value, then the amount of profit that can be prudently credited to Profit and Loss Account may be calculated as follows

Notional profit	Rs 6,00,000
2/3rd of this is ordinarily suitable for transfer to Profit and Loss Account (Since the Work certified is more than 50%)	Rs. 4,00,000
The percentage of cash received to certified value is 75% (as retention money is 25%) so The amount of profit determined on cash basis being suitable for transfer to Profit and Loss Account	$4,00,000 * 75 / 100$ $= 3,00,000$

or Alternatively it can be calculate on a different basis on basis of value of work certified

$$6,00,000 * (75/100) * (70/100) = 3,15,000$$

when contract is incomplete


Contract A/c

Particulars	Amount	Particulars	Amount
Open W/P		Material returned	
Certified		Plant returned	
add uncertified		P & L (Mat/Plant Lost) (book value)	
Less Reserve		Material in hand (net)	
Material		Plant in hand (net)	
Wages		Cost of Contract c/d (Bal. Fig)	
Direct expenses			
Overhead allocated			
Plant			
Profit			
Cost of Contract b/d		Closing w/p certified + uncertified	
Notional Profit c/d			
P & L a/c closing WIP (reserve)		Notional Profit b/d	

Contractee's A / C

To balance C/ d		By cash A/c	

When contract is complete
Contract A/C

To open w/p		By plant returned	
Material		By material returned	
Wages		By P & L (Mat/ Plant Lost) (book value)	
Overheads (o/h)		By Material in hand (net)	
Plant		By Plant in hand (net)	
P & L A/C		By Contractee's A/C (contract price)	

Contractee's A / C

Contract A / C		by balance b/d	
		by Cash	

Example 4



Homemakers Construction Company Ltd., obtained a contract for the construction of a small shopping complex. Construction started in April, 2022. The contract was Rs.90,00,000. On 31st March 2023, the end of the financial year, the cash received on account was Rs.36,00,000, being 80% of the amount on the surveyor's certificate.

	Rs.
Materials issued to contract	24,00,000
Materials in hand at site as at 31 st March, 2023	75,000
Wages	18,60,000
Plant purchased specially for the contract and to be depreciated at 10% per annum	3,00,000
	2,90,000
Direct expenses incurred	1,00,000
General overheads allocated to the contract	3,45,000
Work finished but not yet certified	

You are required to prepare contract account for period ending 31st March 2023, indicating what proportion of the profit, the company would be justified in taking to the credit of the profit and loss account.

Solution:

Homemakers Construction Co. Ltd.
Contract account for the year

Dr.	Rs.		Cr.
			Rs.
To Material issued	24,00,000	By Materials in hand c/d	75,000
To wages	18,60,000	By Plant (less deprecation) on site	2,70,000
To Direct expense	2,90,000	Cost of contract c/d	46,05,000
To Plant purchased	3,00,000		
To General overheads	1,00,000		
	49,50,000		49,50,000
Cost of contract b/d	46,05,000	By Work-in-progress c/d:	
Notional Profit c/d	2,40,000	Work certified	45,00,000
		Work not certified	3,45,000
			48,45,000
	48,45,000		48,45,000
31.3.07		by Notional profit b/d	
To profit & Loss A/c	1,28,000		2,40,000
To Work – in- progress c/d (profit in reserve)	1,12,000		
	2,40,000		2,40,000

Since cost of work certified is 50% of contract price so profit transferred will be 2/3rd



of notional profit as reduced by the proportion of cash received as against work certified

Profit to be transferred = $2,40,000 \times \frac{2}{3} \times \frac{80}{100} = 1,28,000$

Example 5:

Altitude contractors began to operate on 1st April, 2022, the following was the expenditure on a contract for Rs.4,50,000.

	Rs.
Materials issued to contract	76,500
Plant used for contract	22,500
Wages	1,21,500
Other expenses	7,500

Cash received on account 31st March, 2023 amounted to Rs.1,92,000 being 80% of the work certified.

Of the plant and material charged to the contract, plant which costed Rs.4,500 and materials costing Rs.3,750 were lost.

On 31st March 2023 plant costing Rs.3,000 was returned to stores; the cost of work done but uncertified was Rs.1,500 and materials costing Rs.3,450 were in hand. Charge 15% depreciation on plant. Prepare contract account from the above particulars.

Solution.
Contract Account for the year ending 31st Dec., 2023

	Rs.		Rs.
To Materials	76,500	By Costing profit and loss A/c	
To Wages	1,21,500	Rs.	
To Plant	22,500	Plant lost	8,250
To Expenses	7,500	Material lost	
		3,750	
		By plant and machinery A/c	2,550
		Plant returned	3,450
		3,000	12,750
		Less: Depreciation	2,01,000
		450	
		By Materials at site	
		By Plant at Site*	
		By Cost of Contract c/d	
	2,28,000		2,28,000
To cost of contract b/d	2,01,000	By Work-in-progress : Work	2,40,000
Notional Profit c/d	40,500	certified	1,500



		Work uncertified	
	2,41,500		2,41,500
To P & L A/c 21,600 (40,500 * 2/3 * 80/100) To Reserve <u>18,900</u>	40,500	Notional Profit b/d	40,500
	40,500		40,500

* Value of the plant at the end has been calculated as under Rs.

Cost of plant	22,500
Less : Plant lost	4,500
(Assume that plant was lost in the beginning of the year)	
Plant returned to stores (at cost)	<u>3,000</u>
	7,500
	15,000
Less : Depreciation @ 15% p.a.	2,250
Plant at site	<u>12,750</u>

IN-TEXT QUESTIONS

- A costing system where cost is determined for each job based on its specific requirements is known as
 - Batch costing
 - Service costing
 - Job costing
 - Operating costing
- Contract costing doesn't have following feature
 - Long duration
 - It's a type of job costing
 - Work performed at site
 - all contracts are same
- Which of the following terms are relevant in contract costing
 - Work Certified
 - Notional Profit
 - Escalation Clause
 - all Of the above



3.12 SUMMARY

Job Costing refers to a system of costing in which costs are ascertained in terms of specific jobs or orders which are not identical or comparable with each other. This kind of Costing method is followed in industries where production is not highly repetitive and, in addition, consists of different jobs or lots so that material and labour costs can be identified by order number .

Steps in Job Costing:

- Prepare a separate cost sheet for each job
- Charge full cost of materials issued for the job
- Charge full labour costs incurred (on the basis of Job Cards or time cards)
- Charge Direct expenses of that particular job done as per customers instructions.
- When job is completed, charge proportionate overhead also to ascertain total Cost.

Batch Costing is a type of specific job order costing where articles are manufactured in fixed predetermined lots, known as batch. Under this costing method, the cost object for cost determination is a batch rather than a single unit as in job costing method.

A batch consists of certain number of identical units which are processed simultaneously in a manufacturing operation. Since a large number of them are manufactured together and pass through the same process of manufacture, it is convenient to collect their cost of manufacture together.

Steps in Batch Costing:

- One number is allotted for each batch & Prepare a separate cost sheet for each Batch
- Charge full cost of materials issued for the Batch
- Charge full labour costs incurred on basis of time devoted to produce a full batch.
- Charge Direct expenses of that particular batch as per customers instructions.
- When batch is completed, charge proportionate overhead also to ascertain total Cost.
- Calculate cost of each unit by dividing total cost of batch by no of units in batch.

$$\text{Cost per unit} = \frac{\text{Total Batch Cost}}{\text{Total Units in Batch}}$$



Contract costing is a form of job order costing where job undertaken is relatively large and normally takes period longer than a year to complete. Just like in job costing, in contract costing too, each contract is treated as a cost unit and costs are ascertained separately for each contract. Contract costing is usually adopted by the contractors engaged in any type of contracts like construction of building, road, bridge, erection of tower, setting up of plant etc.

Contract costing have few distinct features which are as follows:

1. The cost unit in contract costing is the contract itself.
2. The Major expenses incurred by the contractor are considered as direct as they are incurred in relation to a particular contract
3. The few indirect expenses mostly consist of office expenses, stores and works and are absorbed proportionately on basis of some predetermined overhead absorption rates.
4. A separate account is usually maintained for each contract.
5. The major part of the work in connection with each contract is ordinarily carried out at the site of the contract.

Cost-Plus Contracts

There are few contracts in which its difficult to accurately estimate the cost of contract at the very beginning of the contract due to the nature of ingredients used in contract or the ongoing unstable economic environment. In such cases Cost Plus contract is preferred by the contractors to safeguard their economic interest.

3.13 GLOSSARY

Job Costing refers to a system of costing in which costs are ascertained in terms of specific jobs or orders which are not identical or comparable with each other.

Batch Costing is a type of specific job order costing where articles are manufactured in fixed predetermined lots, known as batch.

Contract costing is a form of job order costing where job undertaken is relatively large and normally takes period longer than a year to complete.

Work-in-progress in contract costing refers to the The cost of the contract which is not complete at the reporting date.

Cost Of Work Certified: the expert certifies the work completion in terms of percentage of total work. This value is known as Cost of work certified.

Cost Of Work Uncertified: In every Contract there always will be some work which has been carried out by the contractor but has not been certified by the expert as its



degree of completion can't be ascertained or too low. It is always shown at cost price. This is known as Cost of work uncertified.

Progress Payment: the contractor enters into an agreement with the contractee and agrees on payment on some reasonable basis, which is generally calculated as a percentage of work certified.

Retention Money: This security money upheld by the contractee is known as retention money.

Cash Received: It is ascertained by deducting the retention money from the value of work certified

Notional Profit: It represents the difference between the value of work certified and cost of work certified.

Estimated Profit: It is the excess of the contract price over the estimated **total** cost of the contract.

Escalation Clause: As per this clause, the contractor increases the contract price if the cost of materials, employees and other expenses increase beyond a certain limit.

Cost-plus contract is a contract in which the contract price is determined by adding a specified amount or percentage of profit to the costs incurred in the contract. In such contract agreements, the contractee undertakes to pay to the contractor the actual cost of contract plus a stipulated profit.

3.14 Answer to in-text questions

1. c) Job costing
2. d) all contracts are same
3. d) all Of the above



3.15 SELF-ASSESSMENT QUESTIONS

1. Differentiate between Job Costing and Contract Costing
2. What is cost plus contract? What are its advantages and limitations for the contractor?
3. What is an escalation clause?
4. How is Profit transferred from an incomplete contracts?

3.16 REFERENCES

- Study Material of Institute of Chartered Accountants of India
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3.17 SUGGESTED READINGS

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LESSON 4

PROCESS COSTING

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STRUCTURE

- 4.1 Learning Objectives
- 4.2 Introduction – Meaning, Concept and Accounting
- 4.3 Wastages: Normal Loss and Abnormal Loss/Gain
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4.1 LEARNING OBJECTIVES

- To understand the meaning, concept and accounting of process costing
- Calculation and treatment of normal loss, abnormal loss/gain.
- Understanding the calculation/valuation of work in progress (WIP) using the concept of equivalent production
- Understand the concept and valuation of Joint Product and By Product

4.2 INTRODUCTION



In a manufacturing business, products that are homogeneous can be produced in bulk by undergoing series of steps known as processes. As the goods are identical and standard, bulk units are passed through different processes. For example, cement can be manufactured in four stages or processes, crushing and grinding, blending, burning and grinding. Likewise, industries like pharmaceuticals, chemicals, FMCG, bottling and canning companies etc. are using process costing. When each of the process is clearly identified, costs attributable to each process are calculated using the concept of 'process costing'.

4.2.1 Meaning of Process Costing:

According to CIMA, "Process costing is defined as the costing method which is applicable on goods or services that result from a sequence of continuous or repetitive operations or processes. The costs are averaged over the units produced during the period, being initially charged to the operation or process." Thus, process costing is used in those industries where the raw material passes through several processes to become finished goods.

4.2.2 Features of Process Costing:

- i. Applicable if the product products are homogeneous, passes through series of stages and the production is continuous
- ii. Process wise costs are identifiable and accumulated before going to the subsequent process.
- iii. Output of current process becomes input of subsequent process.
- iv. There might be normal or abnormal losses during the processes.
- v. Process accounts are maintained in T shape account with 'Dr' and 'Cr' sides.

4.2.3 Steps in Process Costing:

1. Identify the stages/ processes of manufacturing activities and prepare the process account.
2. Identify and calculate various costs associated with each process and record them in process accounts. All the input costs and expenses are taken on the debit side while output values of each process are identified on the credit side.
3. Output value of current process is transferred to input value of next process
4. Identify the cost of finished goods by calculating output cost of the last process.

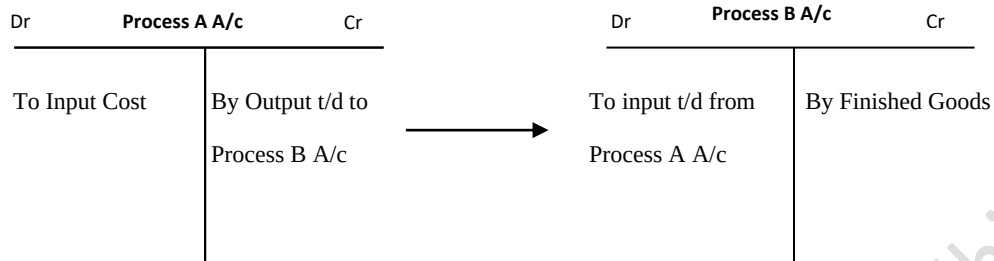


Illustration 1:

From the following information, calculate cost per unit of output at each process if total units produced are 500.

Particulars	Process I	Process II	Process III
Material	1,00,000	44,000	24,000
Labour	85,000	1,00,000	1,55,000
Other Expenses	36,000	84,000	25,000

Indirect Expense amounting to Rs 85,000 can be apportioned on the basis of labour expense.

Solution:

Dr	Process I A/c		Cr
Particulars	Amount	Particulars	Amount
Material	1,00,000	Process II A/c	2,42,250
Labour	85,000		
Other Expense	36,000		
Indirect Expense	21,250		
	2,42,250		2,42,250

Cost per unit = $\frac{2,42,250}{500} = \text{Rs } 484.50$

Dr	Process II A/c		Cr
Particulars	Amount	Particulars	Amount



Process I A/c	2,42,250		
Material	44,000	Process III A/c	4,95,250
Labour	1,00,000		
Other Expense	84,000		
Indirect Expense	25,000		
	4,95,250		4,95,250

Cost per unit = $4,95,250/500 = \text{Rs } 990.50$

Dr	Process III A/c		Cr
Particulars	Amount	Particulars	Amount
Process II A/c	4,95,250		
Material	24,000	Finished Goods A/c	7,38,000
Labour	1,55,000		
Other Expense	25,000		
Indirect Expense	38,750		
	7,38,000		7,38,000

Cost per unit = $7,38,000/500 = \text{Rs } 1,476/-$

Note: Indirect Expense can be apportioned in the ratio of 85,000:1,00,000:1,55,000 = Rs. 21,250 in Process I, Rs 25,000 in Process II and Rs. 38,750 in Process III.

4.3 WASTAGES: PROCESS LOSSES

During the manufacturing process, there may be material loss at different stages known as process loss. Process loss may be in the form of weight loss, as in the case of preparing powder sugar from crystals or may be due to wastage during the consumption of material in the process. Such expected, regular and unavoidable losses may be considered normal. The management considers this loss as a part of cost of production. There might be losses which are may not be



regular, uncertain and avoidable due to inefficiency of labour, theft or fire etc. Such losses are abnormal losses. Such losses are not considered while calculating cost of production. Hence, following types of losses may occur during the course of processing operations:

(1) Normal Process Loss: Normal Process loss or normal wastage due to evaporation, weight loss or scrap are routine of process and hence can be anticipated by the management. These losses cannot be avoided and are expected to occur under normal conditions. The cost of production of normal loss units is added to the cost of production of good units produced under the process. Thus, any amount, if realized by the sale of normal loss units, should be deducted from total cost of production of good units and credited to the process account thereby reducing the burden of loss on good units.

Following accounting treatment may be done

Normal Loss A/c ...Dr
 To Process A/c
(With the amount of scrap realised)

(2) Abnormal Process Loss: Abnormal loss, as the name suggests, is the loss over and above the normal loss. It is avoidable and does not occur under the normal conditions. It may be caused by abnormal conditions such as breakdown of machinery, inefficiencies, lack of effective supervision, substandard materials etc. The cost of an abnormal process loss unit is not absorbed by good units while calculating cost of production. Therefore, cost per unit of abnormal loss is equal to per unit cost of production of good unit after normal loss. The calculated value of abnormal loss is transferred and credited to the process account. This cost of abnormal loss is taken to the debit of Costing Profit and Loss Account.

Computation of Abnormal Loss:

Value of Abnormal Loss = Cost of production per unit after normal loss x Units of abnormal loss

Where:

Quantity of Abnormal Loss = Total Quantity after normal loss – Actual Quantity
= Input - Normal Loss – Actual Quantity

Following accounting treatment may be done

Abnormal Loss A/c... Dr



To Process A/c
(with amount computed above)

Bank A/c... Dr (with amount of scrap realised)
Costing Profit & Loss A/c... Dr (with difference in the value)
To Abnormal Loss A/c (with amount computed above)

(3) **Abnormal Process Gain:** Sometimes, due to better and improved conditions, actual output generated is more than normal output. Thus, when actual loss during production is less than normal loss, it gives rise to abnormal gain. Abnormal gain is defined as unexpected gain of units during production under normal conditions. The value of abnormal gain is calculated in the same manner as abnormal loss i.e. cost of production per unit of good units multiplied by abnormal gain units. The process account is debited with abnormal gain as accounting treatment.

Process A/c... Dr
To Abnormal Gain A/c
(Amount calculated on the basis of cost of production of units after normal loss)

Abnormal Gain A/c...Dr (with amount calculated above)
To Normal Loss A/c (with the amount of scrap value)
To Costing Profit & Loss A/c (difference in the above values)

Illustration 2: (Normal Loss) A product passes through Process- I and Process- II. Materials issued to Process- I amounted to Rs 45,000, Wages Rs 32,000 and manufacturing overheads were Rs 26,000. Normal loss anticipated was 6% of input and net output was transferred-out from Process-I. Input raw material issued to Process I were 10,000 units. You are required to Prepare Process- I account if (a) Scrap has no realisable value (b) scrap have realisable value of Rs 2.20 per unit.

Particulars	Process I (in Rs.)
Material	45,000
Wages	32,000
Manufacturing Expenses	26,000
Normal Loss	6%
Normal Loss (units)	600
Input units	10,000



(a)

Dr	Process I A/c				Cr
Particulars	units	Amount	Particulars	units	Amount
Material	10,000	45,000	Process II A/c	9,400	1,03,000
Wages		32,000	Normal Loss	600	NIL
Manufacturing Expense		26,000			
	10,000	1,03,000		10,000	1,03,000

Cost per unit = $1,03,000 \div (10,000 - 600) = \text{Rs } 10.96$

(b)

Dr	Process I A/c				Cr
Particulars	units	Amount	Particulars	units	Amount
Material	10,000	45,000	Process II A/c	9,400	1,01,680
Wages		32,000	Normal Loss	600	1,320
Manufacturing Expense		26,000			
	10,000	1,03,000		10,000	1,03,000

Cost per unit = $(1,03,000 - 1,320) \div (10,000 - 600) = \text{Rs } 10.82$

Illustration 3: (Normal Loss, Abnormal Loss, Abnormal Gain) Product Zinga passes through three processes namely, Process A, Process B and Process C. Output of process A is the input of process B and output of Process B is input of Product C. Following information is considered:

Particulars	Process A	Process B	Process C
Materials issued	51,000	32,000	11,200
Labour	7,200	4,800	1,200
Manufacturing Expenses	11,800	10,200	16,400
Output	14,000	13,300	12,000



Normal Loss	3%	6%	9%

Calculate the value of Zinga if 15,000 units have been issued to the Process-A and Rs 1.50 per unit can be realised from scrap.

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Dr	Process A A/c				Cr
Particulars	units	Amount	Particulars	units	Amount
Material issued	15,000	51,000	Process B A/c	14,000	66,704
Labour		7,200	Normal Loss (3% of 15000)	450	675
Manufacturing Expense		11,800	Abnormal Loss	550	2,621
	15,000	70,000		15,000	70,000

Cost per unit of completed units and abnormal loss:

$$= (\text{Total Cost} - \text{Scrap Value of Normal Loss}) \div (\text{Total units} - \text{Normal Loss})$$

$$= (70,000 - 675) \div (15,000 - 450) = \text{Rs } 4.76$$

Dr	Process B A/c				Cr
Particulars	units	Amount	Particulars	units	Amount
Process A A/c	14,000	66,704			
Material issued		32,000	Process C A/c	13,300	1,13,641
Labour		4,800	Normal Loss	840	1,260
Manufacturing Expense		10,200			
Abnormal Gain	140	1,196			
	14,140	1,14,901		14,140	1,14,901

Cost per unit of completed units and abnormal loss:

$$= (\text{Total Cost} - \text{Scrap Value of Normal Loss}) \div (\text{Total units} - \text{Normal Loss})$$

$$= (1,13,704 - 1,260) \div (14,000 - 840) = \text{Rs } 8.54$$

Dr	Process C A/c				Cr
Particulars	units	Amount	Particulars	units	Amount



Process B A/c	13,300	1,13,641			
Material issued		11,200	Finished Goods A/c	12,000	1,39,448
Labour		1,200	Normal Loss	1,197	1,796
Manufacturing Expense		16,400	Abnormal Loss	103	1,197
	13,300	1,42,441		13,300	1,42,441

Cost per unit of completed units and abnormal loss:

$$= (\text{Total Cost} - \text{Scrap Value of Normal Loss}) \div (\text{Total units} - \text{Normal Loss})$$

$$= (1,42,441 - 1,796) \div (13,300 - 1,197) = \text{Rs } 11.62$$

Dr		Normal Loss A/c				Cr	
Particulars	units	Amount	Particulars	units	Amount		
Process A A/c	450	675	Abnormal Gain (Process B)	140	210		
Process B A/c	840	1,260	Bank (Scrap Process A)	450	675		
Process C A/c	1,197	1,796	Bank (Scrap Process B)	700	1,050		
			Bank (Scrap Process C)	1,197	1,796		
	2,487	3,731		2,487	3,731		

Dr		Abnormal Loss A/c				Cr	
Particulars	units	Amount	Particulars	units	Amount		
Process A A/c	550	2,621	Bank (Scrap Process A)	550	825.0		
Process C A/c	103	1,197	Bank (Scrap Process C)	103	155		
			Costing P&L A/c		2,838		
	653	3,817		653	3,817		

Dr		Abnormal Gain A/c				Cr	



Particulars	units	Amount	Particulars	units	Amount
Normal Loss A/c	140	210	Process B A/c	140	1,196
Costing P&L A/c		986			
	140	1,196		140	1,196

Dr	Costing P&L A/c				Cr
Particulars	units	Amount	Particulars	units	Amount
Abnormal Loss A/c		2,838	Abnormal Gain A/c		986
	-	2,838		-	986

4.4 VALUATION OF WORK IN PROGRESS

In the manufacturing industries, simultaneous processes are run for meeting continuous production demands. At the end of a reporting period, there may be certain units which are either completely processed into finished goods or there may be raw materials left unused. Apart from these two categories, some goods are in the incomplete stage. They are no more the raw material as process has already started on them, but they could not be completed into final good. Such units are known as Work in Progress. The calculation of cost of work-in-progress is a challenging task as units are in different stages of completion. Though material, directly attributable in the process is identified on actual basis, but bifurcation of labour and other expenses might lack some degree of accuracy. To ascertain appropriate value, we may use the concept of equivalent production units that converts partly finished units into equivalent finished units. For instance, 50% of work done on four units is equivalent to 100% of work done on two equivalent units.

Equivalent Units: are the incomplete production units converted into their equivalent completed units by multiplying the percentage of completion with total units introduced in reference to the elements of costs classified into material, labour and overheads.

The formula is

Equivalent Completed Production Units = Actual number of units in the process x Percentage (Degree) of Work completed



For example,

200 units of material were introduced in the process. 60% of the work is completed and 40% is still under progress. Work completed is equivalent to $200 \times 60\% = 120$ units of complete finished goods.

Valuation of WIP can be done by either of the methods

1. First in First Out (FIFO) Method – In case of FIFO, value of WIP in the beginning is calculated to the extent of work done in the given period. It is added to the total cost to calculate cost per unit. The value added in the current period is added to the opening value of WIP to get the final value of WIP.
2. Weighted Average Method – The cost of WIP in the beginning and current cost are aggregated and not considered separately.

Step 1: (FIFO)

Calculation of equivalent units can be done by using the table below:

Input Details	Units	Output Particulars	Units	Equivalent Units					
				Material		Labour		Overheads	
				%	Units	%	Units	%	Units
			A	B	C = A x B	D	E = A x D	F	G = A x F
Opening WIP	Xxx	Opening WIP	xxx	Xxx	xxx	xxx	xxx	xxx	xxx
Units Introduced	Xxx	Finished Output (from current units)	xxx	Xxx	xxx	xxx	xxx	xxx	Xxx
		Normal Loss	xxx	-	-	-	-	-	-
		Abnormal Loss/ Gain	xxx	Xxx	xxx	xxx	xxx	xxx	Xxx
		Closing WIP	xxx	Xxx	xxx	xxx	xxx	xxx	xxx
Total	Xxx	Total	xxx		xxx		xxx		xxx

Step 2:



Calculation of Cost per Equivalent Unit of Production = Total Cost ÷ Equivalent Production units

Step 3: Statement of Evaluation (FIFO)

Particulars	Equivalent Units	Cost per unit	Amount
	(Q)	(Rs per unit)	(in Rs)
Opening WIP completed during the period	Xxx	xxx	xxx
Add: Cost of WIP in the beginning			xxx
Completed cost of WIP			xxx
Completely processed units	Xxx	xxx	xxx
Abnormal Loss	Xxx	xxx	xxx
Closing WIP	Xxx	xxx	xxx

Illustration 4:

M/s ABC Ltd is manufacturing product P by passing through process A and process B. The following information is available in respect of Process A for April, 2022.

- Opening stock of work in progress: 800 units at a total cost of Rs 4,000.
- Degree of completion of opening work in progress – Materials 100%, Labour 65%, Overheads 65%
- Input of materials at a total cost of Rs 36,800 for 9,200 units.
- Direct wages incurred Rs 16,440.
- Production overhead Rs 8,220.
- Units scrapped 1,200 units. The stage of completion of these units was: Materials 100%, Labour 75%, Overheads 75%
- Closing Work in Progress is 900 units. The stage of completion of these units was Materials 100%, Labour 60%, Overheads 60%
- 7,900 units were completed and transferred to the next process.
- Normal loss is 8% of the total input (opening stock plus units put in)
- Scrap Value is Rs 4 per unit.

You are required to:

- Compute equivalent production
- Calculate cost per unit for each element



- c. Calculate cost of abnormal loss/gain, WIP, and units transferred to the next process using FIFO and weighted average method
- d. Prepare Process Account.

Solution: FIFO Method

Statement of Equivalent Production									
Inputs	Units	Output	Units	Equivalent Production					
				Material		Labour		Overhead	
				%	units	%	units	%	units
Opening WIP	800	Opening WIP	800	0	0	35	280	35	280
Raw Material	9200	Completed units	7100	100	7100	100	7100	100	7100
		Normal Loss	800		0		0		0
		Abnormal Loss	400	100	400	75	300	75	300
		Closing WIP	900	100	900	60	540	60	540
Total	10000		10000		8400		8220		8220

Statement of Cost				
Element of Cost		Cost	Equivalent Production	Cost per Equivalent unit
Material	36800			
Less: Scrap Value	3200	33600	8400	4
Labour Cost		16440	8220	2
Overhead		8220	8220	1

Statement of Evaluation				
Particulars	Units	Cost per unit	Cost	Total Cost
Opening WIP				
Material	0	4	0	
Labour	280	2	560	
Overhead	280	1	280	840
Opening Value				4000



				4840
Completed Units				
Material	7100	4	28400	
Labour	7100	2	14200	
Overhead	7100	1	7100	49700
Abnormal Loss				
Material	400	4	1600	
Labour	300	2	600	
Overhead	300	1	300	2500
Closing WIP				
Material	900	4	3600	
Labour	540	2	1080	
Overhead	540	1	540	5220

Dr

Process A A/C

Cr

Particulars	Units	Amount	Particulars	units	Amount
Opening WIP	800	4000	Normal Loss	800	3200
Material	9200	36800	Abnormal Loss	400	2500
Labour		16440	Completed and transferred to next process	7900	54540
Overhead		8220	Closing WIP	900	5220
	10000	65460		10000	65460

Notes:

1. Normal Loss units are not considered for the purpose of calculation of equivalent production units.
2. Units completed and transferred to next process include 800 units of opening WIP and 7100 units of current stock, according to FIFO.
3. Value of completed units in Process A/c = Value of opening WIP + Value of current completed units.

Average Method



Statement of Equivalent Production									
Inputs	Units	Output	Units	Equivalent Production					
				Material		Labour		Overhead	
				%	units	%	units	%	units
Opening WIP	800	Completed units	7900	100	7900	100	7900	100	7900
Raw Material	9200	Normal Loss	800		0		0		0
		Abnormal Loss	400	100	400	75	300	75	300
		Closing WIP	900	100	900	60	540	60	540
Total	10000		10000		9200		8740		8740

Statement of Cost				
Element of Cost		Cost	Equivalent Production	Cost per Equivalent unit
Material	40800			
Less: Scrap Value	3200	37600	9200	4.086957
Labour Cost		16440	8740	1.881007
Overhead		8220	8740	0.940503

Statement of Evaluation				
Particulars	Units	Cost per unit	Cost	Total Cost
Completed Units				
Material	7900	4.09	32286.96	
Labour	7900	1.88	14859.95	
Overhead	7900	0.94	7429.98	54576.89
Abnormal Loss				
Material	400	4.09	1634.78	
Labour	300	1.88	564.30	
Overhead	300	0.94	282.15	2481.24
Closing WIP				
Material	900	4.09	3678.26	
Labour	540	1.88	1015.74	



Overhead	540	0.94	507.87	5201.88

Dr

Process A A/C

Cr

Particulars	Units	Amount	Particulars	units	Amount
Opening WIP	800	4000	Normal Loss	800	3200
Material	9200	36800	Abnormal Loss	400	2481.236
Labour		16440	Completed and transferred to next process	7900	54576.89
Overhead		8220	Closing WIP	900	5201.876
	10000	65460		10000	65460

Notes:

1. Normal Loss units are not considered for the purpose of calculation of equivalent production units.
2. Units completed and transferred to next process are 7900 units (irrespective of being WIP or new units). The value of opening WIP is added to the cost of material introduced. The final cost per unit has average cost of material.

4.5 JOINT PRODUCT AND BY PRODUCT

- 4.5.1 **Joint Products:** Joint products are the multiple products produced simultaneously in the same process from the use of same raw material. Joint Products are generally equally important. However, the core product which is under the process resulting in several other products is known as joint product. For example, crude oil refining leads to petrol, kerosene, oil tar etc. which can be considered as joint-products.

Characteristics of Joint Products

Joint products have following important features:

- (1) Same set of raw materials are used to produce joint products.
- (2) They are produced in common manufacturing process.
- (3) The values of joint products are almost equal
- (4) They may undergo further processing after their separation



Methods of Apportionment of Joint Products

Some of the important methods mentioned below are used for apportionment of joint costs upto the point of separation

- i. **Average Unit Cost Method** - Average cost per unit of the finished product is calculated and used as weightage to apportion the joint cost to the respective products, under this method.

Average costs = Total joint costs up to the point of separation ÷ total production of all the products or outputs.
- ii. **Physical Unit Method** – Physical units of output for each joint product such as weight, volume or quantity of products (till the split-off occurs) are considered for joint costs apportionment. It is suitable if joint products can be measured in the same units. If not, joint products must be converted to the denominator common to all the units produced.
- iii. **Survey Method** – or **Points Value Method** considers points value or percentage assigned to each products as a result of survey or technical evaluation to allocate the joint costs.

Share of joint costs = physical quantities of each product x weightage points.
- iv. **Contribution Margin Method** - or "Gross Margin Method" is based on calculation of contribution each product. Contribution is the excess of sales over variable costs. Under this method, joint costs are bifurcated as fixed and variable costs. Contribution of each product will be considered for ratio of apportioning Fixed Joint costs whereas units of goods are considered for variable portion of joint costs.
- v. **Standard Cost Method** – Standard costs are determined on the basis of experience, efficiency, cost factors and technical issues etc. Joint costs, under this method, are apportioned on the basis of standard costs.
- vi. **Market Value Method** – or "Relative Sales Value Method" or simply Sales Value method follows allocation of joint production costs on the basis of final market value of products. Market value can be calculated by multiplying number of units of each product manufactured by the product's selling price. The portion of total joint costs allocated to each product is, apparently, proportional to the sales value of each product.

Market value methods can be sub classified as:

(a) *Market Value at Separation Point*: As the name says, market value of the joint products at the split off point is identified and used to allocate the joint production cost. The quantities of each product are taken as weightage.



(b) *Market Value After Further Processing*: Final Selling Price is considered for bifurcation of joint costs in this method.

(c) *Net Realizable Value*: or the "Reverse Cost Method" is the one in which reverse calculation is done on sales value by deducting estimated profit, selling and distribution expenses and after split off processing costs of each joint products. Based on the ratio of value derived, the total costs before separation point is apportioned.

4.5.2 **By Products:**

It refers to the products which have comparatively less value than the main product being incidentally manufactured during the production process. By products are also known as "Minor Products." The value of by products is significantly low from the main product, however they are jointly manufactured with the main products. By products remain inseparable and are produced alongwith the main product till the split off point or point of separation.

Illustration 5:

Azba Ltd, a manufacturing company purchases a raw material that is processed to make three products namely, Am, El and Bt. In February, 2023, the Company purchased 12,000 kg of the raw materials at the cost of Rs.17,50,000 and company has incurred additional joint conversion costs of Rs.4,50,000. February, 2023 sales and production information are as follows:

	Units of output Produced	Price at Split Off point (per unit)	Further Processing Cost per unit	Eventual Sale Price
Am	6,000	Rs 270	-	-
El	4,000	Rs 210	-	-
Bt	2,000	Rs 180	Rs 40	Rs 400

For the products, Am and El, they can be sold to other manufacturing companies at the split off point. But for the product, Bt, it undergoes two options, either can be sold at the split-off point or may be processed further and packaged for sale as an advanced level of product Bt.

You are required to: (i) allocate the joint costs of the three products by using

- the Physical Units Method,



- b. the Sales Value at Split-off Method and
- c. the Net Realizable Value Method.

(ii) Suppose that in half of the month of February, 2023, manufacturing of El could be further processed and mixed with the whole of Am, to make a new product namely, EA. Further processing costs amounts to Rs.2,62,000. The selling price of EA is fixed at Rs.400 per unit.

As an analyst you are required to suggest, if the manufacturing company shall further process Am into EA. Assume that 6,000 unit as the resultant quantity of EA must be produced.

Solution:

- (i) Total Joint Cost that is required to be allocated = Rs. 17,50,000 + Rs. 4,50,000
= Rs. 22,00,000

Physical Units Method

Product	Units of Output Produced	Proportion of Joint Cost on the basis of output units	Joint Cost Allocation
Am	6,000	$6,000 \div 12,000 = 0.5$	$0.5 \times 22,00,000 = 11,00,000$
El	4,000	$4,000 \div 12,000 = 0.333$ or $1/3^{\text{rd}}$	$0.333 \times 22,00,000 = 7,33,333$
Bt	2,000	$2,000 \div 12,000 = 0.167$ or $1/6^{\text{th}}$	$0.167 \times 22,00,000 = 3,66,667$

Sales Value at Split Off Point Method

Product	Units of Output Produced	Sale Price per unit	Sales Value = Output x Price	Proportion of Joint Cost on the basis of sale value	Joint Cost Allocation



Am	6,000	270	16,20,000	$\frac{16,20,000}{28,20,000} = 0.5745$	$0.5745 \times 22,00,000 = 12,63,900$
El	4,000	210	8,40,000	$\frac{8,40,000}{28,20,000} = 0.2979$	$0.2979 \times 22,00,000 = 6,55,380$
Bt	2,000	180	3,60,000	$\frac{3,60,000}{28,20,000} = 0.1276$	$0.1276 \times 22,00,000 = 2,80,720$

Net Realisable Value Method

Product	Units of Output Produced	Net Realisable Value per unit	Net Realisable Value = Output $\times$ NRV pu	Proportion of Joint Cost on the basis of NRV	Joint Cost Allocation
Am	6,000	270	16,20,000	$\frac{16,20,000}{31,80,000} = 0.5094$	$0.5094 \times 22,00,000 = 11,20,680$
El	4,000	210	8,40,000	$\frac{8,40,000}{31,80,000} = 0.2642$	$0.2642 \times 22,00,000 = 5,81,240$
Bt	2,000	$400 - 40 = 360$	7,20,000	$\frac{7,20,000}{31,80,000} = 0.2264$	$0.2264 \times 22,00,000 = 4,98,080$

- (ii) For the Joint costs are not relevant to this decision. Instead, following costs may be considered - further processing costs and the opportunity cost of the lost contribution margin on the El diverted to Am purification.

Incremental Revenues (Rs.400 - Rs.270) $\times$ 6000 units = Rs. 7,80,000



Less: Further processing cost of Am Mixture =	(Rs. 2,62,000)
Less: Contribution margin lost on El (2000 kg & Rs. 210) =	<u>(Rs.4,20,000)</u>
Increased Net Income	<u>Rs. 98,000</u>

Alternatively

Existing Revenue

El = 2000 kg x Rs.210 =	Rs. 4,20,000	
Am = 6000 kg x Rs.270 =	<u>16,20,000</u>	Rs. 20,40,000

Proposed Income

EA = 6000 units x Rs.400 =	24,00,000	
Less: Processing Cost =	<u>2,62,000</u>	<u>21,38,000</u>
Increased Income		<u>98,000</u>

Alternatively

Joint cost

- 6,000 kg of Am	Rs. 12,63,900
- 2,000 kg of El (half of Rs. 6,55,380) =	Rs 3,77,690
(at the point of split off):	Rs. 16,41,590

We will get 6,000 units of EA after incurring additional Rs. 2,62,000 of further processing cost.

On 6,000 units of EA, the total sale revenue earned is Rs. 24,00,000. Hence the profit can be calculated as Rs. 24,00,000 – Rs 16,41,590 – Rs 2,62,000 = 4,96,410.

If 6,000 kg of Am and 2,000 kg of El were sold at the split off point, total profit earned (Rs. 16,20,000 + 4,20,000 - Rs. 16,41,590) = Rs. 3,98,410.

As the amount of profit on making EA of Am increases by Rs. 98,000, therefore, company must consider the proposal and accept it.



IN-TEXT QUESTIONS

1. Fill in the blanks
 - (a) _____ is defined as the type of costing procedure which can be used for calculation of cost of product in continuous or mass production industries.
 - (b) Cost for units lost through _____ is absorbed by the remaining "good" units produced during the period.
 - (c) The _____ is the number of complete units that could have been obtained from the materials, labour and overheads that went into the partially completed units.
 - (d) The difference between actual loss and normal loss is termed as _____.
2. Chose the correct options
 - (a) Two or more products produced simultaneously from the same raw materials less important than main product are known as
 - (i) Joint Product (ii) Finished Product (iii) By Product (iv) Raw Materials
 - (b) Which of these is not a method of calculating value of joint cost
 - (i) Physical Units Method
 - (ii) Average Cost Method
 - (iii) Net Realisable Value Method
 - (iv) Budgeted Cost Method
 - (c) Which of the following is not a process loss
 - (i) By Products
 - (ii) Normal Loss
 - (iii) Wastage
 - (iv) Scraps
 - (d) Which of these is not a feature of process costing
 - (i) Products pass through different processes
 - (ii) Cost of materials, labour and overheads are calculated for each process.
 - (iii) Products produced are heterogeneous and differential.
 - (iv) Output and value of output of each process is transferred to the next process until the finished good is completed.



IN-TEXT QUESTIONS

Q3. Following information relating to the cost of X product passes through three processes. During the month of March, 1000 units were produced. Prepare the process accounts and calculate per unit cost of each process.

	Process I	Process II	Process III
Raw Materials	40,000	20,000	10,000
Wages	20,000	15,000	15,000
Direct Expense	6,000	2,000	4,000

Rs. 10,000 are the overhead expenses that can be apportioned on the basis of wages.

Q4. For MN Ltd, the product Generator passes through three processes namely Alpha, Beta and Gamma. The output of each process is passed as the input in the next process. Following information is considered:

Particulars	Process Alpha	Process Beta	Process Gamma
Materials issued	31,000	22,000	7,500
Wages	6,300	4,500	800
Production Expenses	9,800	8,200	12,600
Output	19,000	18,000	16,000
Normal Loss	3%	6%	9%

Calculate the cost of the final product if 20,000 units have been issued to the Process-Alpha and Rs 2 per unit can be realised from scrap.



4.6 SUMMARY

Process Costing is the method of costing in which costs are compiled process wise for the standard products. Cost of one process is transferred to the cost of next process as input. During the production, each process may generate wastes alongwith goods. Process Loss including wastes, scraps, defectives may be normal loss, abnormal loss or abnormal gains. In case of raw material that is under production but not completed yet as finished goods are known as work in progress. Calculation of value of work in progress is done by calculating equivalent units of production. Two or more products which are formed during the same process are either joint products or by products.

4.7 GLOSSARY

- Costs – price paid for something
- Scrap – waste material from manufacturing process
- Valuation – judgement on worth of something
- Equivalent Production - converting incomplete production into equivalent level of completed units
- Split Off Point- location in the production process where jointly manufactured products will be henceforth manufactured separately;

4.8 ANSWERS TO IN TEXT QUESTIONS

1. (a) Process Costing (b) Normal Loss (c) Equivalent Units (d) Abnormal Loss.	2. (a) (iii) By Products (b) (iv) Budgeted Cost Method (c) (i) By Product (d) (iii) Products produced are heterogeneous and differential.



4.9 SELF-ASSESSMENT QUESTIONS

- (i) Explain Process Costing. Mention the advantages and limitations of process costing.
- (ii) Differentiate between joint products and by products with example. Briefly explain the methods used in accounting of the same.
- (iii) Distinguish between normal loss and abnormal loss. Explain how to treat the losses in the process accounting.
- (iv) 500 kgs of raw material was introduced in Process I at the rate of Rs 100. Direct Labour and Other manufacturing expenses amount to Rs 25,000 and Rs 10,000 respectively. Normal loss is 10% and the net output generated is 420 kgs. Prepare a ledger account of Process I, if the scrap realises Rs 12 per unit.
- (v) Product Alpha passes through three processes during the month of January. If 2000 units of alpha was produced, prepare the process accounts and calculate per unit cost of each process.

	Process M	Process N	Process O
Raw Materials	70,000	60,000	30,000
Wages	30,000	25,000	25,000
Other Expense	12,000	20,000	26,000

Overhead expenses amounting to Rs. 16,000 can be apportioned on the basis of wages.

- (vi) For Gabra Ltd, the product passes through three processes I, II and III. The output of each process is passed as the input in the next process. Following information is considered:

Particulars	Process I	Process II	Process III
Cost of Materials consumed (Rs)	51,000	32,000	10,500
Labour (Rs)	6,700	4,800	5,100
Manufacturing Expenses (Rs)	12,800	10,200	9,600
Finished Goods (units)	2,800	2,700	2,400
Normal Loss	3%	6%	9%

Calculate the cost of the final product if 3,000 units have been issued to the Process-I and Rs 2.50 per unit can be realised from scrap.



4.10 REFERENCES

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4.11 SUGGESTED READINGS

- Datar, S.M. & Rajan, M.V., (2017), Horngren's Cost Accounting: A Managerial Emphasis (16th Edition) Pearson.



LESSON 5

COST CONCEPTS IN DECISION MAKING

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STRUCTURE

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- 5.2 Introduction
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- 5.4 Objectives of a Costing System
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- 5.7 Limitations of Marginal Costing
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5.1 LEARNING OBJECTIVES

After reading this lesson student should be able to understand:



- Various cost concepts involved in Decision making.
- Concepts of Relevant, differential, incremental and Opportunity costs.
- Objectives of various costing systems
- Concepts of marginal costing.
- Advantages & limitations of marginal costing.
- Difference between absorption and marginal costing,
- Break-even analysis and its uses for decision making.
- Concept of CVP analysis and its practical application in various decision making process like make or buy decisions, selection of a suitable product mix, effect of change in price, Shut down or continue, maintaining a desired level of profit.

5.2 INTRODUCTION

Meaning of Managerial Decision-Making:

In simple words Managerial decision making is the process of deciding the particular course of action from among various alternatives course of action available in present scenario. For every managerial problem, generally there are various course of actions available, the manager has to choose from among them that course of action which he / she believes or considers to be most effective in solving that particular problem. In deciding this he/she has to consider all the given resources and other internal and external factors which are relevant and can impact the decisions like Govt. Policies, laws of the country, Policies of the competitors.

Since all decisions are futuristic in nature, so involve lot of forecast on what could occur in future. Due to this reason in all managerial decision manager try to build in the concept of probability. Larger is the period of forecast, greater is the degree of analysis required. Decisions can be routine in nature like how much of goods to be produced next week to achieve desired level of sales, such decisions can be taken with little consumption of time and efforts as degree of uncertainty is less.

On the other hand some non-routine decisions like to shut down a plant or not due to very little demand of product is a major decision and may involve lot of calculations, analysis and forecasting by managers as it will have major financial and non-financial implications. So while taking such decision manager has to spend lot of time in discussions with various departments involved and to be impacted by this decision.



5.3 Cost Concepts in Decision Making

RELEVANT AND IRRELEVANT COSTS:

To take correct managerial decisions managers must always be aware about the fact that which costs are relevant for that particular decision and which are irrelevant.

Relevant costs are the costs which would be impacted by managerial decisions. They are the future cost whose magnitude will be effected by a decision. While **Irrelevant costs** are those which would not be effected by the decision.

For example, if a manager is considering closing down of a factory for 1-2 year due to low demand of the goods produced in that factory, wages payable to the workers of the factory are relevant in this connection as they will not be paid on closing down of the factory so result in cost saving, but prepaid rent for the factory will be irrelevant costs as it will not be refunded so it must be ignored.

DIFFERENTIAL COST: (Incremental and Decremental costs)

Quite often managers are confronted with 2 or more alternatives which have different cost implications and he/she has to choose one out of them keeping in mind all relevant factors. When one alternative is chosen over the other it is bound to have impact on total cost , either total cost will be increased or decreased.

The difference in total costs between two alternatives is termed as **Differential Costs**.

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

- (a) Producing a few more or few less of products
- (b) A change in the method of production
- (c) An addition or deletion of a product in product mix
- (d) The selection of an additional sales channel.

Differential costs can be very useful in planning and decision making and helps manager to choose the best alternative among all options available. It helps management to know the additional profit that would be earned if a particular alternative is selected over another one.

In case the choice of an alternative results in increase in total costs, such increased costs are known as **Incremental Costs**. In case the choice results in decrease in total costs, such decreased costs are termed as **Decremental Costs**.



For example: Suppose cost of Raw material supplied by our current Supplier A is Rs 6 per unit while cost of material supplied by supplier B is Rs.8 per Unit and we need 10000 units of such raw material. If Manager decides to choose supplier B over the current supplier A as B is giving better quality material Than The differential cost will be Rs. 20000 (2×10000) Also since there is an increase in cost due to the decision so it will be called as incremental cost.

OPPORTUNITY COST

Opportunity cost is a very important concept in decision making. It represents the best alternative that is foregone in taking the decision. The opportunity cost emphasises that decision making is mainly concerned with alternatives and that the cost of taking one decision is the profit or benefit foregone by not taking the next best alternative.

In other words This cost means the value of benefit sacrificed in favour of an alternative course of action.

Example: if the owner starts a business and invests money in buying plant and machinery. He has to foregone the interest he was earning while this money was in Fixed deposits from where it is withdrawn. The loss of interest that would have been earned is the opportunity cost.

Opportunity costs are not recorded in the books as no cash payment is involved but It is important in decision making and comparing various alternatives. It is also known asputed cost.

5.4 Objectives of a Costing System

From the discussion in the previous section, now you are aware that there are different type of costs and we need to carefully examine whether a particular cost is to be considered for decision making or not.

Some costs are direct in nature while others are indirect, direct costs can be associated to a specific product/ service but indirect costs are the ones which can not be associated to specific product/ services as there is no direct relation between there occurrence and the production activity, So all different costs need to be allocated on some objective and rational basis for calculating the total cost of a particular product or service and thereby do the pricing which can be justifiable to customers.

Costing Systems are the systematic allocation of cost to products by following one or the other available and suitable technique. It can be used for planning and decision making. Since costing



is mostly done in advance for goods or services to be produced and delivered in future so generally forecasted/Budgeted figures are used.

Objectives of A Costing System

Whatever costing system we follow as per suitability in that particular industry or type of product, basic objectives of costing system remains same and they are:

1. Ascertainment of cost :

This is the primary objective of cost accounting. The cost of each product, job or service is ascertained.

2. Determining selling price.

All Business entities operate with profit making as one of major objective. So it is expected that the revenue should be greater than the costs incurred in producing goods and services. Cost system should be so designed that it provides complete information regarding the cost to produce and sell such goods or services.

3. Cost Control and Cost Reduction.

It must assist in cost control. Budgets should be prepared well in advance. The standards for each item of cost can be determined, the actual costs are compared with the standard costs and variances to be calculated along with the causes of variances. The aim of a good costing system is not only to control cost but also provide important information to assist in cost reduction without compromising on the quality of goods or services.

4. Providing data for managerial decision-making:

Cost data must provide information for various managerial decisions for eg.:

- (a) Introduction of a new product,
- (b) Utilization of unused plant capacity,
- (c) Making components in house or buying components from outside suppliers.
- (d) Shut down or continue.
- (e) Selling below total cost in special orders.



IN-TEXT QUESTIONS

1. The benefit which is foregone due to a particular managerial decision is known as _____ cost.
2. The cost which will be impacted by managerial decisions is known as _____ cost.

5.5 Marginal Costing

Marginal costing is the process of ascertaining marginal (additional) costs and the effect of changes in volume of output on profit

This is done by differentiating between fixed costs and variable costs. Several other terms are used synonymously in place of marginal costing like direct costing, variable costing, and incremental costing.

Marginal costing can also be defined as a process whereby each costs element is analysed and is classified into fixed cost and variable cost and with after this division managerial decisions are taken to be more effective. Variable costs are the one which vary with volume of production or output, whereas fixed costs are the ones which remains unchanged irrespective of changes in the volume of production or output.

In other words per unit variable cost remains same at different levels of output and total variable cost changes in direct proportion with the number of units. On the other hand, total fixed cost remains same for all levels of output, while per unit fixed cost keep changing with change in number of units, more the number of units produced lesser will be the per unit fixed cost.

5.6 ADVANTAGES OF MARGINAL COSTING

1. It Helps in determining the volume of production:

Marginal costing helps in determining the level of output which is most profitable for a running concern. The production capacity, therefore, can be utilized to the maximum possible extent.

2. Maximisation of Profit:



It helps, in determining the most profitable relationship between cost, price and volume in the business, which helps the management in fixing appropriate selling price for its products thus, maximization of profit can be achieved.

3. Helps in selecting optimum production mix:

The techniques of Marginal costing helps in determining the most profitable production mix by comparing the profitability of different products. With analysis of data it can help in deleting the less profitable products from the portfolio of products and adding new more profitable new products thereby creating an optimum product mix products.

4. Helps in deciding whether to Make or Buy:

The decision whether a particular product should be manufactured in the factory or to be bought from outside supplier can be taken. In case the purchase price is lower than the marginal cost of production, it will be advisable to purchase the product from outside rather than manufacturing it in the factory.

5. Help in deciding method of manufacturing:

In case a product can be manufactured by two or more alternative methods, ascertaining the marginal cost of manufacturing the product by each method will be helpful in deciding as to which method should be adopted for maximum cost saving.

6. Helps in deciding whether to shut down or continue:

In the periods when company is suffering losses due to lower demand for its products Marginal costing helps in deciding in whether the production in the plant should be temporarily suspended or continued.

There are numerous other managerial decisions in which marginal costing will be very helpful by providing the relevant data.

5.7 Limitations of Marginal Costing

1. Artificial Classification:-

Marginal costing assumes that all expense can be classified into fixed and variable expenses. But in real life scenario it is difficult to analyse and classify all costs into fixed and variable elements. Some elements of costs are partly fixed and partly variable and their separation is mostly based on assumption and not on facts. In reality all costs are variable in the long run.

2. Faculty Decision:-



In marginal costing most decisions are taken based on variable costs that's why it is also sometimes referred as variable costing but if fixed costs are completely ignored, decisions taken by management can be deceptive in certain circumstances. For eg. With the introduction of costly automatic machine, the importance of fixed costs is increasing day by day.

3. Marginal costing ignores time factor and investment:-

The marginal cost of two jobs may be the same but the time taken for their completion and the cost of machines used may differ. The true cost of a job which takes longer time and uses costlier machine would be higher. This fact is not covered by marginal costing.

4. Controllability of Fixed cost:-

In Marginal costing the importance of controlling fixed costs is completely ignored. No doubt, fixed costs can also be controlled in short term but by placing them in a separate category and by accepting them as fixed and completely non controllable, the importance of controllability of fixed cost is undermined.

5. Difficult to apply:-

The technique of marginal costing is difficult to apply in industries such as ship building, and other construction based industries where due to long operating cycle the value of work in progress is generally high in relation to turnover.

6. Stock is understated:-

Under marginal costing stocks and work in progress are valued at variable cost only so their value is bound to be understated.

7. No Basis for Cost control or reduction:-

Marginal costing does not provide any standard for the evaluation of performance. A system of budgetary control and standard costing provides more effective tools and basis for cost control than the one provided by marginal costing.

5.8 Difference between Marginal costing and Absorption costing

Absorption costing :-

The process of charging all costs, both variable and fixed, to operations, products or process is known as absorption costing. So in other words absorption costing is a method of costing in which all direct costs and appropriate overheads are absorbed/charged in cost of the product or services for finding out the total cost of production.

**STOCK VALUATION under Absorption costing Vs Marginal Costing**

Inventories are over-stated in absorption costing as it includes one extra cost element in inventory value than under marginal costing, i.e the fixed manufacturing cost.

Inventory value under absorption costing

= Direct material+ Direct labour +variable manufacturing costs+ Fixed manufacturing costs

Inventory value under marginal costing

= Direct material+ Direct labour +variable manufacturing costs

From the Discussion so far one can easily understand that there are some basic differences in basic premise on which cost are ascertained in absorption costing and marginal costing. The main difference is in treatment of fixed cost among the two. While in absorption costing it is treated in same manner as variable cost and form part of total cost based on which stock is valued but on the other hand in marginal costing only variable costs are considered in decision making and valuing the stock.

Following are various points of difference between Absorption costing and Marginal Costing

Basis of Difference	Absorption costing	Marginal costing
Classification of Costs	Costs are not classified into variable and fixed.	Costs have to be classified into fixed costs and variable costs. To establish cost-volume-profit relationship.
Treatment of Fixed Production overheads	Fixed production overheads are charged to the product. It is included in cost per unit.	Fixed production costs are regarded as period cost and are charged to revenue along with the selling and administration expenses, i.e., they are not included in cost per unit.
Calculation of Profit	Profit is the difference between sales and cost of goods sold.	Under marginal costing first contribution is ascertained by subtracting variable cost from total revenue. After that we deduct therefrom the total fixed expenses to calculate profit.



Effect of valuation of inventory on Profit	If inventories increase during a period, this method will reveal more profit than marginal costing. When inventories decrease, less profits are reported because under this method closing stock is valued at higher figures as it includes absorbed fixed cost also.	If inventories increase during a period, this method generally reports less profit than absorption costing but when inventories decrease this method reports more profit. As closing stock is valued at lower cost as compared to absorption costing
Over/under absorption of Overheads	Arbitrary apportionment of fixed costs may result in under or over absorption of overheads.	Since fixed costs are excluded, there is no question of arbitrary apportionment of fixed overheads and thus no under or over absorption of overheads.

Let's understand with the help of an example how profit is calculated under absorption costing and Marginal costing. Before that understand the format for income statement under both methods.

Income Statement under Absorption Costing

Particulars	Amount Rs.
Sales (A)	XXX
Variable (Direct Material Cost)	X
Variable (Direct Labour Cost)	X
Variable (Direct Expenses)	X
Variable Factory Overhead	X
Fixed Factory Overhead absorbed (units produced x standard rate per unit)	X
Total manufacturing cost of Quantity Produced	XXX



Add:- Opening FG	X
Less:- Closing FG	X
Total manufacturing cost of Quantity Sold	XXX
Add:- Variable Office & Admin Overhead	X
Fixed Office and Admin Overhead	X
Variable Selling & Distribution Overhead	X
Fixed Selling & Distribution Overhead	X
Add:- Under absorbed Overhead(Actual Overhead incurred – Overhead absorbed)	X
Less:- Over absorbed Overhead (Overhead absorbed – Actual Overhead incurred)	X
Total Cost of Sales (B)	XXX
Profit (A-B)	XXX

Income Statement Under Marginal Costing

Particulars	Amount Rs.
Sales	XXX
Less Variable Cost	
Direct Material Cost	X
Direct Labour Cost	X
Direct Exp.	X
Variable Factory Overhead	X
Variable Office & Admin Overhead	X
Variable Selling & Dist. Overhead	X
Contribution	XXX
Less Fixed Cost	
Fixed Factory Overhead	X



Fixed Office & Admin Overhead	X
Fixed Selling & Dist. Overhead	X
Profit	XXX

Example 1 VGA Ltd. Produces a single product and normal level of production is 18000 units. Information for last accounting year is provided below:

Production 20000 units sales 16000 units

Particulars	Rs
Selling Price per unit	30
Production cost:	
Direct material cost per unit	7
Direct labour cost per unit	6
Variable Overheads per unit	4
Fixed Overhead incurred	54,000
Variable Selling and administration overheads per unit	4.5
Fixed Selling and administration overheads	25,000

There was no opening stock of finished goods.

Income statement under Absorption costing method

Particulars	Amount (Rs.)	Amount (Rs.)
Sales (A)		4,80,000
Production cost:		
Direct material cost (20000*7)	1,40,000	
Direct labour cost (20000*6)	1,20,000	
Variable Overheads (20000*4)	80,000	
Fixed Overhead incurred	60,000	4,00,000



Add: Opening stock		Nil
Less: Closing stock (4000*20)		(80,000)
Total Production cost		3,20,000
Less: over absorbed overheads (2000*3)		(6,000)
Adjusted Production Cost		3,14,000
Variable Selling and administration overheads (16000*4.5)	72,000	
Fixed Selling and administration overheads	25,000	97,000
Total Cost of Sales (B)		4,11,000
Profit (A-B)		69,000

Fixed production overheads given are Rs. 54,000 for budgeted 18000 units so it comes down to Rs.3 per unit (54000/18000)

Fixed production overheads absorbed for current production of 20,000 units is Rs. 60,000 (20000*3)

Therefore over absorbed fixed production overheads 6000 (60000-54000)

Income statement under Marginal costing

Particulars	Amount Rs.	Amount Rs.
Sales		4,80,000
Less <u>Variable Cost</u>		
Direct Material Cost	1,40,000	
Direct Labour Cost	1,20,000	
Variable Factory Overhead	80,000	
Total Variable cost of production	<u>3,40,000</u>	
Add Opening Stock	<u>Nil</u>	



Less: Closing Stock (4000*17)	(68,000)	
	<u>2,72,000</u>	
Add: Variable Selling and Administration overheads	<u>72,000</u>	3,44,000
Contribution		1,36,000
Less <u>Fixed Cost</u>		
Fixed Production Overhead	54,000	
Fixed Selling & Admin Overhead	25,000	79,000
Profit		57,000

So it can be observed that there is a difference of Rs. 12,000 Between profits under two method, this is the same amount as difference between value of closing stock. Since closing stock under Absorption is valued at Rs. 80,000 (Full Cost of production) while in Marginal costing it is valued at Rs. 68,000 (Variable cost of Production)

5.9 COST-VOLUME-PROFIT ANALYSIS

Cost-Volume-Profit (CVP) analysis is the systematic study of relationship between cost of the product, volume of activity and the resultant profit. Since all these three factors are interrelated so its very important to study their relationship and how a change in one can effect the other as well. For eg. Cost of the product will provide the base on which selling price will be determined and accordingly profit will be calculated. If we change selling price it might impact volume of sales and volume of production and thereby will impact the cost .

So CVP analysis is very important technique used in managerial decision making and achieving the desired results.

Assumptions in CVP Analysis:

1. Any Changes in the levels of revenues (Sales) and costs arise only because of changes in the number units produced and sold – for example, the number of Cars produced and sold by Maruti Suzuki or the number of Passengers travelling in a bus.
2. Total costs can always be separated into two elements or parts i.e a fixed element which does not change with the level of output and a variable element which changes with level of output.



3. Selling price per unit, variable cost per unit, and total fixed costs are known and constant. (Mind it, Total sales and total variable cost will keep changing with level of output).

4. It is assumed that company is either selling a single product or that the proportion of different products will remain constant as the level of total units sold changes i.e. sales mix remains constant.

Before we proceed further, let us briefly discuss various concepts & symbols used in marginal costing and CVP analysis.

Total Fixed cost (TFC):

It remains constant or same at all levels of output.

Total Variable Cost (TVC):

It will be 0 at zero level of activity and increases proportionately with the volume of activity.

Total Cost (TC):

It is a combination of Fixed cost and variable cost so it will start from the level of fixed cost and keep increasing following the variable cost.

Total Sales (S): It represents the total amount received as revenue by selling the goods produced

Profit (P) : It represents the difference between Total sales and Total Cost.

Basic equation:

Total sales = Total Fixed Cost + Total variable Cost $\pm$ Total Profit

TS = FC + VC + P

Contribution (C): When only Variable cost is subtracted from Sales the resultant figure is called Contribution. Since in Marginal costing it is assumed that fixed cost will remain same at least in short run for all levels of production activity. So, contribution is an important concept to help in decision making in marginal costing.

Contribution = Total Sales – Total Variable Cost

OR Contribution = Fixed Cost + Profit

**Standard Marginal Cost Statement (Simplified)**

Particulars	Amount (Rs.)
Sales (S)	XXX
Less Variable cost (VC)	XXX
Contribution (C)	XXX
Less Fixed Cost (FC)	XXX
Profit (P)	XXX

Concepts Used in Marginal costing for Decision Making**1. Profit Volume (P/V) Ratio :**

This ratio helps in knowing the profitability of the operations of a business. It establishes the relationship between Contribution and sales. Since Fixed cost do not change with the level of output so any increase in contribution will leads to increase in profit.

So Profitability of the different Goods produced by a company can be ascertained by comparing their P/V ratio. Higher the P/V ratio higher the profit of that particular product and vice-versa. P/V ratio is also known as **Contribution Margin Ratio** or **Contribution to Sales Ratio**.

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$\text{Or } \frac{\text{Contribution per unit}}{\text{Sales per unit}} \times 100$$

$$\text{Or } \frac{\text{Change in contribution}}{\text{Change in sales}} \times 100$$

$$\text{Or } \frac{\text{Change in profit}}{\text{Change in sales}} \times 100$$

Let us see how all of these formulas will give same result for a given set of information.

Example 2 Khushi Enterprises shares with you their cost data for 2 years



Particulars	Year 1	Year 2	Change
Production	5000 units	8000 units	3000 units
Sales @5 per unit	25000	40000	15000
Variable cost @ 3 per Unit	15000	24000	9000
Contribution @2 per unit	10000	16000	6000
Fixed cost	4000	4000	0
Profit	6000	12000	6000

Lets check P/V ratio with all Formulas mentioned above

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 \quad \text{For Year 1} \quad (10000/25000) \times 100 = 40\%$$

$$\text{Or} \quad \frac{\text{Contribution per unit}}{\text{Sales per unit}} \times 100 \quad \text{For year 1} \quad (2/5) \times 100 = 40\%$$

$$\text{Or} \quad \frac{\text{Change in contribution}}{\text{Change in sales}} \times 100 \quad (6000/15000) \times 100 = 40\%$$

$$\text{Or} \quad \frac{\text{Change in profit}}{\text{Change in sales}} \times 100 \quad (6000/15000) \times 100 = 40\%$$

So, that's the benefit of this formula that as per given information we can use any of its version still getting same answer.

5.10 BREAK EVEN ANALYSIS

Though many believes that there is no difference in CVP analysis and Break even analysis and they refer to same concept others believe that CVP is a broader term and include Break even analysis But if we carefully observe concepts used in them we can say that Break-even analysis is a actually a method to apply the CVP analysis in decision making process by including many more related concepts into it.

**Break even point:**

Break-even point is production and sales level where there will be no profit and loss i.e. total cost (TC) is equal to total sales revenue (S)

or Sales = Total Fixed Cost + Total Variable cost & Profit = 0

Break-even Point can be calculated both in units and Rs. When calculated in Terms of Rs. It is also referred as **Break even sales**.

Let us calculate Break-even point for the given set of data we used in CVP analysis above

Particulars	Year 1	Year 2	Change
Production	5000 units	8000 units	3000 units
Sales @5 per unit	25000	40000	15000
Variable cost @ 3 per Unit	15000	24000	9000
Contribution @2 per unit	10000	16000	6000
Fixed cost	4000	4000	0
Profit	6000	12000	6000

$$\text{Break even point (in units)} = \text{BEP} = \frac{\text{Fixed costs}}{\text{Contribution per unit}}$$

So For given set of values Break Even Point = $(4000/2) = 2000$ units

We can Cross check this by simple calculations

Suppose we produce 2000 units and selling price is 5 per unit so total sales 10000

Variable cost @ 3 per unit will be $(2000 * 3) = 6000$ so contribution will be 4000 and fixed cost given is 4000 so profit will be 0

$$\text{3. Break even Point (in Rs.)} = \text{BES} = \frac{\text{Fixed cost}}{\text{Contribution per unit}} \times \text{Sales per unit}$$



Or $\text{BEP in units} * \text{Selling Price per unit}$ or $\frac{\text{Fixed Cost}}{\text{P/v ratio}}$

In our example $\text{BES} = 2000 * 5 = 10000 \text{ Rs.}$ Or $4000/40\% = 10000 \text{ Rs.}$

Lets see few other related concepts which further help in decision making

Break Even Point With Desired Profits: BEP with DP (in units)

Since no business entity would like to settle at Break even point , their main objective of existence is to earn profit for shareholders or owners so it makes sense to calculate particular level of units to be produced and sold to earn desired profits.

4. BEP with DP (in units) = $\frac{\text{Fixed cost} + \text{Desired profit}}{\text{Contribution per unit}}$

And following the same concept which we discussed for BEP in Rs. , BEP with desired profit in Rs can also be calculated in similar manner

5. BEP with DP (In Rs) = BES with DP = $\frac{\text{Fixed cost} + \text{Desired profit}}{\text{Contribution per unit}} \times \text{Sales per unit}$

Or $\text{BEP with DP in units} * \text{Selling Price per unit}$

Or $\frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P/V ratio}}$

Let us assume in our example shareholders have given a target of Rs. 24000 Profit to be earned

So BEP With DP in Units = $(4000 + 24000)/5 = 14000 \text{ units}$

BEP with DP in Rs. = $14000 * 5 = \text{Rs.}70000$ or $(4000 + 24000)/40\% = \text{Rs.} 70000$

This can be verified with following calculations

Production	14000 units
Sales @5 per Unit	70000
Variable cost Per unit @3 per unit	42000



Contribution @2 Per unit	28000
Fixed Cost	4000
Profit	24000

So it can be clearly observed that by producing and selling 14000 units The revenue will be Rs. 70000 and a profit of Rs 24,000 is expected to be achieved.

Margin Of Safety (MOS):

Margin of safety is the difference between actual sales and Break even sales It can be expressed in absolute terms or as a % of Actual sales

6. MOS (Absolute) = Actual Sales – Break Even Sales

MOS Can also be calculated with following Formula

$$\text{MOS} = \text{Profit/P/V ratio}$$

7. MOS (%) = MOS/ Actual sales

So in our example, if we calculate Margin of Safety for 2nd year it will be

$$\text{MOS (Absolute) Actual Sales- BES} = 40000-10000 = \text{Rs } 30000$$

$$\text{MOS} = 12000/40\% = \text{Rs.}30000$$

$$\text{MOS (\%)} = \text{MOS/Actual Sales} = 30000/40000 = 0.75 \text{ or } 75\%$$

Let us see with few more examples that with the minimal information given how we can calculate all these components which will help in decision making process to a great extent

Example 3 Homemakers Pvt Ltd. Gives you following data

Particulars	Amount in Rs.
Sales 500000 units	15,00,000



Fixed Cost	4,50,000
Profit	3,00,000

You need to find BEP, MOS

Solution:

Since All marginal costing concepts revolve around contribution and P/V ratio lets first calculate that

Contribution = Fixed Cost + Profit

$$= 4,50,000 + 3,00,000 = 7,50,000$$

P/V Ratio = (Contribution/Sales)*100

$$= (7,50,000/15,00,000)*100 = 50\%$$

BEP in Rs (In Sales) = Fixed Cost / P/V ratio

$$= 4,50,000/50\% = 9,00,000$$

BEP in Units = BEP in sales/ Selling Price per unit

$$= 9,00,000/3 = 3,00,000 \text{ units}$$

(note: Selling price per unit = sales/ no of units = 15,00,000/5,00,000 = 3 per unit)

Margin of Safety (in Rs.) = Actual sales – Break even sales

$$= 15,00,000 - 9,00,000 = \text{Rs. } 6,00,000$$

Margin of safety (in %) = MOS/ Actual Sales

$$= 6,00,000/15,00,000 = .4 \text{ or } 40\%$$

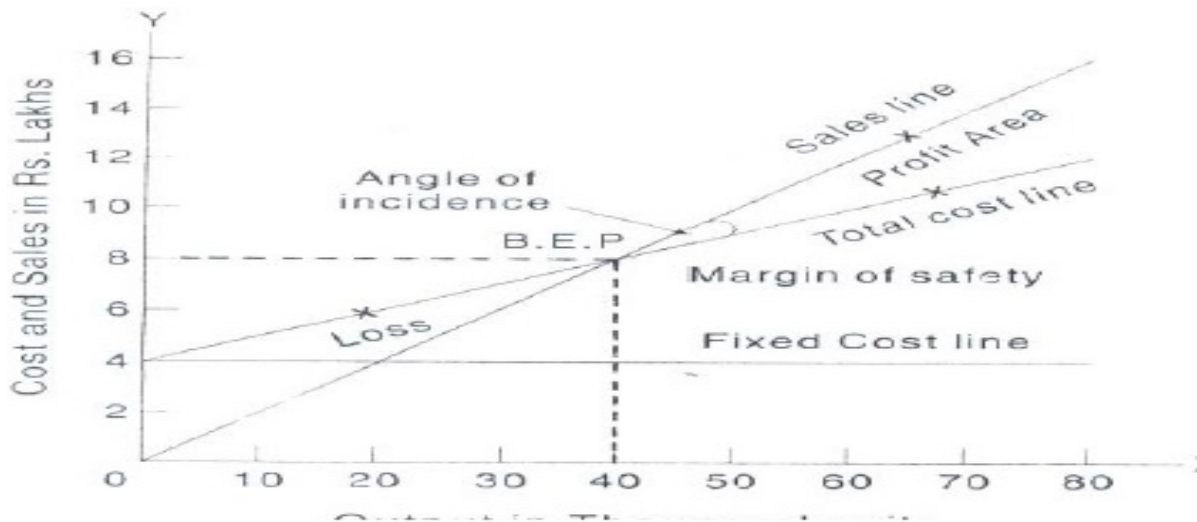
Angle of Incidence

The angle which the Total Sales Line makes with the Total Cost Line is known as the Angle of Incidence.

The angle indicates the profit-earning capacity of the company over the break-even point.



A large angle of incidence indicates a high margin of profit and a small angle of incidence indicates earning of low margin of profit.



Let us see with a few more examples that with the minimal information given how we can calculate all these components which will help in the decision-making process to a great extent.

Example 4 Mrs Anju is running a business named “AHAAR” for supplying packed foods to near by offices. She supplied you the following information and ask for answers to few questions.

Particulars	Year 1	Year 2
Sales	20,00,000	30,00,000
Profit	2,00,000	4,00,000

Answer the following:

1. P/V ratio
2. Variable cost for year 1
3. Fixed Cost
4. BEP
5. Sales to earn a Profit of Rs 6,00,000
6. Profit When sales are 50,00,000



7. MOS for a Profit of 6,00,000

Solution:

$$\begin{aligned} 1. \text{ P/V ratio} &= (\text{Change in Profit} / \text{Change in Sales}) * 100 \\ &= (2,00,000 / 10,00,000) * 100 = 20\% \end{aligned}$$

2. Variable cost in 1st year = Sales - Contribution

$$\begin{aligned} \text{Contribution in year 1} &= \text{Sales} * \text{P/V ratio} \\ &= 20,00,000 * 20\% = 4,00,000 \end{aligned}$$

$$\text{Therefore Variable cost} = 20,00,000 - 4,00,000 = 16,00,000$$

$$\begin{aligned} 3. \text{ Fixed Cost} &= \text{Contribution} - \text{Profit} \\ &= 4,00,000 - 2,00,000 = \text{Rs } 2,00,000 \end{aligned}$$

$$\begin{aligned} 4. \text{ BEP} &= \text{FC} / \text{P/V ratio} \\ &= 2,00,000 / 20\% = 10,00,000 \end{aligned}$$

5. Sales to earn a profit of 6,00,000

$$\begin{aligned} \text{BEP with DP} &= (\text{FC} + \text{DP}) / \text{P/V ratio} \\ &= (2,00,000 + 6,00,000) / 20\% \\ &= \text{Rs. } 40,00,000 \end{aligned}$$

6. Profit when sales are 50,00,000

$$\begin{aligned} \text{Contribution} &= \text{Sales} * \text{P/V ratio} \\ &= 50,00,000 * 20\% \\ &= 10,00,000 \end{aligned}$$

$$\begin{aligned} \text{Profit} &= \text{Contribution} - \text{fixed cost} \\ &= 10,00,000 - 2,00,000 = \text{Rs. } 8,00,000 \end{aligned}$$

7. MOS for a profit of 6,00,000



MOS = Profit/ P/V ratio

$$= 6,00,000/20\%$$

$$= 30,00,000$$

5.11 VARIOUS DECISION-MAKING PROBLEM

In every organisation Management uses marginal costing and CVP analysis concepts for making various decisions. Generally, short-term decisions are related with temporary gaps between demand and supply for available resources.

In this section, we will learn how the concepts of marginal costing and CVP is applied for analysis of identified options for short-term decision making. Some of the Decision problems faced are as follows:

1. Problem of Limiting Factor (Key Factor)
2. Processing of Special Order
3. Local vs Export sale
4. Make or Buy/ In-house-processing vs Outsourcing
5. Shut-down or continue decision etc.

1. Limiting Factor (Key Factor)

In normal circumstances, the company will always prioritise the product to be produced which will give the greatest contribution. To maximise profit, resources should be mobilised towards that product which gives the maximum contribution. But in real life, there may be several factors which may put a limit on the number of units to be produced even if the products give a high contribution. These factors limit the volume of output at a particular point of time or over a period. these are called key factors, scarce factors, limiting factors.

The limiting factors may be, raw material available, labour hours available, Machine hours available, availability of capital etc. For e.g., for a factory in a remote location, labour may be a key factor or the factory in a location with limited power supply may have limited machine hours for production. Contribution per unit of key factor should be considered and that particular course of action should be adopted which gives the highest contribution per unit of key factor.

**Example 5**

You are given the following information in respect of products X and Y of Altitude. Ltd.

	Product X	Product Y
Selling price	55	35
Direct material	10	5
Labour hours (2 Rs per hour)	5 hours	10 hours
Variable overheads	20% of Direct wages	

Show which product is more profitable during labour shortage. Also If Labour hours available are 25000 hours and demand for X and Y is 2000 and 3000 units respectively

Solution :

Particulars	Product X	Product Y
Selling price per unit in	<u>37</u>	<u>49</u>
Direct Material per unit in	10	5
Labour cost per unit (Hrs *2 per hour)	10	20
Variable overhead (20% of Labour Cost)	<u>2</u>	<u>4</u>
Total Variable Cost per unit	<u>22</u>	<u>29</u>
Contribution per unit	<u>15</u>	<u>20</u>

Since Labour is in shortage so it will be treated as Key factor and the product which is generating higher contribution per unit of labour hour will be produced first.

Contribution per Unit	15	20
Number of Hrs required per unit	5	10
Contribution per labour hour:	3	2

So You can see that though contribution per unit is higher for Y but contribution per labour hour for product X is higher so product X is more profitable in the case labour hours are limited



So we will first use labour hours for producing X to maximum possible extent i.e. 2000 units in our case as demand is only for 2000 pieces remaining labour hours will be used for Y

Total labour hours available 25000

Labour hours for X (2000*5) 10000

Remaining labour hours 15000

Maximum Production of Y possible is 15000/10(labour hr per unit for Y)

So only 1500 units of Y can be produced with remaining labour hour

Now we can calculate Total Contribution by multiplying the unit produced with the per unit contribution.

X (2000*15) = 30000

Y(1500*20) = 30000

Total = 60000

2. Processing of Special Order/ Accepting export order

Sometimes company is faced with a situation that it receives an order to supply goods below its normal selling price. In that case if company has additional idle capacity, only additional cost in producing and processing such order shall be compared with additional revenue to be generated. In simple words Only Marginal cost to be considered and if it is less than the price offered by exported or new local customer than it can be accepted, if its not going to impact current selling price of local market.

Example 6

Anjana Industries manufacture and sell toys and has following cost structure for each unit of Product

Particulars	Amount Rs. `
Materials	10.00
Labour	8.00
Variable expenses	10.00
Fixed expenses	17.00
Total cost	<u>45.00</u>



Per Unit Selling Price of the product is Rs 52.00.

The company's normal capacity is 1,00,000 units. The figures given above are for 70,000 units. The company has received an offer for 20,000 units @ Rs. 40 per unit from a customer in USA.

Advice the manufacturer on whether the order should be accepted. Also give your advice if the order is from a local merchant.

Solution:

Marginal cost for additional 20,000 units

	<i>Per unit</i>	<i>For 20,000 units</i>
Material	10.00	2,00,000
Labour	8.00	1,60,000
Variable expenses	10.00	2,00,000
Marginal cost/ variable cost	28.00	5,60,000
Additional revenue to be realised	40	8,00,000
Marginal cost		5,60,000
Net additional contribution)		2,40,000

The offer should be accepted because it gives an additional contribution of Rs. 2,40,000. The total profit will also increase by Rs 2,40,000 because fixed expenses have already been recovered from the local market.

As regarding answer to 2nd part of question, the order from the local customer should not be accepted at Rs. 40 per unit or at any rate below the normal price i.e., Rs. 52 because it will result in the general reduction of selling prices of the product.

Note: If circumstances are such that acceptance of the additional order is beyond the present capacity of the organization than in that case, some fixed expenses may also go up substantially. If there is an increase in fixed expenses, the increase should also be considered by including it in the total additional cost and then it shall be compared with the additional revenue.

3. Make or Buy decision



Sometimes company is faced with a decision whether to buy a component or part, required for its product from outside supplier or manufacture it on its own.

In such cases, Marginal cost of Producing that item internally shall be compared with Purchase price to come to a conclusion.

Example 7: SAANVI Automobile Ltd manufactures 20,000 units of Part UVW each year. At current level of activity, the cost per unit follows:

Direct materials Rs. 4.80

Direct labor Rs. 7.00

Variable manufacturing overhead Rs. 3.20

Fixed manufacturing overhead Rs. 10.00

Total cost per part UVW Rs.25

An outside supplier has offered to sell 20,000 units of Part UVW each for Rs. 22 per part. And

You Are Required to advice which option is better

Solution:

Total Marginal Cost of Producing the Part in Factory

Direct materials	Rs. 4.80

Direct labour	Rs. 7.00

Variable manufacturing overhead	<u>Rs. 3.20</u>

Total Marginal cost of manufacturing	Rs. 15

Total cost of purchase Rs 22

It is advisable to manufacture in our own factory as cost saved by not manufacturing is less than the purchase price. It is assumed that Fixed cost will still need to be incurred.

4. Product Profitability

In the event that a company produces multiple products, the issue of the product mix that maximises profitability will arise. Due to a lack of resources or capabilities, the company must deal with this issue. A company should use a combination of sales that results in higher profit



or maximum contribution. The key or limiting component should also be taken into account while choosing the profitable blend.

For example- The following describes a company's sales/production mix:

1. The company produce 500 units each of Product A and Product B.
2. 1500 units of product C.
3. 300 units each of product B and C, and 500 units of product A.

Particulars	Product A (Rs.)	Product B (Rs.)	Product C (Rs.)
Direct Material	5	5	6
Direct Labour	3	5	4
Variable Cost	4	4	3
Fixed Cost	1500	1500	1500
Selling Price	20	30	25

Determine the profitable product mix.

Solution- First of all let us calculate the contribution per unit. Formula to calculate Contribution per unit = Selling Price – (Direct material + Direct Labour + Variable cost)

Contribution per unit Product A = $20 - (5+3+4) = \text{Rs. } 8 \text{ per unit}$

Contribution per unit Product B = $30 - (5+5+4) = \text{Rs. } 16 \text{ per unit}$

Contribution per unit Product C = $25 - (6+4+3) = \text{Rs. } 12 \text{ per unit}$

Then, evaluate different alternative one by one:

Alternative 1: The company produce 500 units each of Product A and Product B.

$$\begin{aligned}\text{Total Contribution} &= (\text{Contribution per unit Product A} \times \text{No. of units of Product A}) + \\ &\quad (\text{Contribution per unit Product B} \times \text{No. of units of Product B}) \\ &= (\text{Rs. } 8 \text{ per unit} \times 500 \text{ units}) + (\text{Rs. } 16 \text{ per unit} \times 500 \text{ units}) \\ &= \text{Rs. } 4000 + \text{Rs. } 8000 = \text{Rs. } 12,000\end{aligned}$$

Profit = Total Contribution – Fixed cost

$$= 12,000 - 1500$$



= Rs. 10500

Alternative 2: 1500 units of Product C.

$$\begin{aligned}\text{Total Contribution} &= (\text{Contribution per unit Product C} \times \text{No. of units of Product C}) \\ &= (\text{Rs.12 per unit} \times 1500 \text{ units}) \\ &= \text{Rs. 18000}\end{aligned}$$

$$\begin{aligned}\text{Profit} &= \text{Total Contribution} - \text{Fixed cost} \\ &= 18,000 - 1500 \\ &= \text{Rs. 16500}\end{aligned}$$

Alternative 3: 300 units each of product B and C, and 500 units of product A.

$$\begin{aligned}\text{Total Contribution} &= (\text{Contribution per unit Product A} \times \text{No. of units of Product A}) + \\ &\quad (\text{Contribution per unit Product B} \times \text{No. of units of Product B}) + \\ &\quad (\text{Contribution per unit Product C} \times \text{No. of units of Product C}) \\ &= (\text{Rs.8 per unit} \times 500 \text{ units}) + (\text{Rs. 16 per unit} \times 300 \text{ units}) + \\ &\quad (\text{Rs. 12 per unit} \times 300 \text{ units}) \\ &= \text{Rs. 4000} + \text{Rs. 4800} + \text{Rs. 3600} = \text{Rs. 12,400}\end{aligned}$$

$$\begin{aligned}\text{Profit} &= \text{Total Contribution} - \text{Fixed cost} \\ &= 12,400 - 1500 \\ &= \text{Rs. 10900}\end{aligned}$$

Conclusion: As a result of its larger profit of Rs. 16500, product mix 2 is more profitable than the other product mixes.

5. Dropping a product line

When a company produces multiple products and needs to stop one of them, management should make a decision based on the product's contribution, the impact on sales of other products, the plant's capacity, etc. Using the marginal costing technique, management can decide whether to add or remove a product or product line. The product that contributes the least should be discontinued.



Since the goal of every corporate organisation is to maximise profits, the company can think about the efficiencies of doing away with unproductive items and replacing them with more lucrative ones (s).

In such circumstances, the company may have two options, as follows:

- (a) To discontinue the unprofitable product and not use the available capacity.
- (b) To stop producing the unprofitable product and use the available resources to start producing a more lucrative product.

For choosing whether to add or remove a product line the contribution technique is used for this purpose, accounting for the following elements:

- Contribution from a product that isn't viable (i.e. Sale Revenue Less Variable Costs)
- Specific unprofitable product fixed costs that can now be avoided or minimised.
- Contribution from a different profitable product that would be produced using all available capacity.

The following considerations should be made into account whenever a decision is made on whether or not the capacity will be increased.

- Additional fixed costs will be incurred.
- Possibility of a drop in selling price as a result of increased output.
- Whether there is enough demand to accommodate the extra production.
- The cost schedule will be developed based on the aforementioned points.
- The division of fixed expenses and the marginal contribution cost must be considered while considering whether to shrink the firm.

Example: XYZ Ltd. manufactures three products:

A — 500 units @ Selling price Rs. 25 Per unit;

B — 400 units @ Selling price Rs. 30 Per unit;

C — 300 units @ Selling price Rs. 28 Per unit;



The company decides to stop producing one product, which will result in a 50% increase in the production of other products. The others details are as follow:

Particulars	Product A (Rs.)	Product B (Rs.)	Product C (Rs.)
Direct Material	5	6	7
Direct Labour	4	7	6
Variable cost	6	5	4
Fixed cost	8	7	9

You must determine which product needs to be discontinued.

Solution: First of all, let us calculate the contribution per unit. Formula to calculate Contribution per unit = Selling Price – (Direct material + Direct Labour + Variable cost)

Contribution per unit Product A = 25 – (5+4+6) = Rs. 10 per unit

Contribution per unit Product B = 30 – (6+7+5) = Rs. 12 per unit

Contribution per unit Product C = 28 – (7+6+4) = Rs. 11 per unit

Situation 1: Now let us suppose that, production of products B and C will each be boosted by 50% if product A is discontinued. 600 units of B and 450 units of C would be produced, respectively.

Total Contribution = (Contribution per unit Product B x No. of units of Product B) +
(Contribution per unit Product C x No. of units of Product C)
= (Rs.12 per unit x 600 units) + (Rs. 11 per unit x 450 units)
= Rs. 7200 + Rs. 4950 = Rs. 12,150

Total Fixed Cost= (Fixed Cost per unit Product B x No. of units of Product B) +
(Fixed cost per unit Product C x No. of units of Product C)
= (Rs.7 x 600) + (Rs. 9 x 450)
= Rs. 4200 + Rs. 4050
= Rs. 8250

Profit = Total Contribution – Fixed cost



$$= 12,150 - 8250$$

$$= \text{Rs. } 3900$$

Situation 2: Now let us suppose that, production of products A and C will each be boosted by 50% if product B is discontinued. 750 units of A and 450 units of C would be produced, respectively.

$$\begin{aligned}\text{Total Contribution} &= (\text{Contribution per unit Product A} \times \text{No. of units of Product A}) + \\ &\quad (\text{Contribution per unit Product C} \times \text{No. of units of Product C}) \\ &= (\text{Rs. } 10 \text{ per unit} \times 750 \text{ units}) + (\text{Rs. } 11 \text{ per unit} \times 450 \text{ units}) \\ &= \text{Rs. } 7500 + \text{Rs. } 4950 = \text{Rs. } 12,450\end{aligned}$$

$$\begin{aligned}\text{Total Fixed Cost} &= (\text{Fixed Cost per unit Product A} \times \text{No. of units of Product A}) + \\ &\quad (\text{Fixed cost per unit Product C} \times \text{No. of units of Product C}) \\ &= (\text{Rs. } 8 \times 750) + (\text{Rs. } 9 \times 450) \\ &= \text{Rs. } 6000 + \text{Rs. } 4050 \\ &= \text{Rs. } 10,050\end{aligned}$$

$$\begin{aligned}\text{Profit} &= \text{Total Contribution} - \text{Fixed cost} \\ &= 12,450 - 10,050 \\ &= \text{Rs. } 2400\end{aligned}$$

Situation 3: Now let us suppose that, production of products A and B will each be boosted by 50% if product C is discontinued. 750 units of A and 600 units of B would be produced, respectively.

$$\begin{aligned}\text{Total Contribution} &= (\text{Contribution per unit Product A} \times \text{No. of units of Product A}) + \\ &\quad (\text{Contribution per unit Product B} \times \text{No. of units of Product B}) \\ &= (\text{Rs. } 10 \text{ per unit} \times 750 \text{ units}) + (\text{Rs. } 12 \text{ per unit} \times 600 \text{ units}) \\ &= \text{Rs. } 7500 + \text{Rs. } 7200 = \text{Rs. } 14,700\end{aligned}$$

$$\begin{aligned}\text{Total Fixed Cost} &= (\text{Fixed Cost per unit Product A} \times \text{No. of units of Product A}) + \\ &\quad (\text{Fixed cost per unit Product B} \times \text{No. of units of Product B}) \\ &= (\text{Rs. } 8 \times 750) + (\text{Rs. } 7 \times 600)\end{aligned}$$



$$= \text{Rs. } 6000 + \text{Rs. } 4200$$

$$= \text{Rs. } 10200$$

Profit = Total Contribution – Fixed cost

$$= 14,700 - 10,200$$

$$= \text{Rs. } 4500$$

Conclusion: If product C is discontinued, production of products A and B will each be boosted by 50%. As a result of its larger profit of Rs. 4500, this product mix is more profitable than the other product mixes.

6. Shut Down Vs. Continue Operations

When a corporation decides to shut down, it signifies that production will stop temporarily. That indicates that the company will restart production in the future. Reasons of shut down production include- decline in demand; financial difficulty; high tax rates and technological change; inadequate raw material availability a market downturn and mismanagement.

In general, all businesses should have greater revenue than total cost (Revenue > Total Cost) in order to remain in operation. But in the short run, all businesses disregard fixed costs; as a result, Revenue must be equal to or higher than variable cost.

If the items are helping to pay for fixed costs, or if the selling price is higher than the marginal cost then it is preferable to continue because the losses are kept to a minimum.

Shut Down Point determines whether to shut down. The shutdown point describes the precise point at which a company's revenue and variable costs are equal. labour costs, supplies for production, and other varying costs. It describes the precise point at which a company's revenue and variable costs are equal. A corporation is said to be operating at a shutdown point when there is no advantage to continuing such operations. in order to decide to temporarily or, in certain situations, permanently shut down.

Depending on the nature of the industry, certain fixed expenses can be avoided by pausing production while other fixed expenses may go up.

The contribution must be more than the difference between fixed expenses incurred during normal operation and fixed expenses incurred during plant shutdown before a decision can be made. The formula below can be used to determine the shutdown point.

Shutdown point is calculated as Total Fixed Cost – Shutdown Cost = Contribution per unit



1. A short-run criterion

Depending on the company, the short-run is for a finite amount of time, such as quarterly, half-yearly, or yearly. For choosing whether to stop or continue in short run, only variable cost is taken into account during the short-term outage. In other words, we analyze whether or not the business can cover its variable costs for the short period during which sales occur. Otherwise, the Firm must close.

As an illustration, suppose a company's income is Rs. 500 and its variable cost is Rs. 400. then the contribution will be Rs. 100. There is no need to turn the product off in this case. However, the corporation must discontinue that product if the variable cost exceeds the sales.

2. Long-term criterion

Depending on the sort of business, the long run may be annually or more frequently than annually. Both fixed and variable costs are taken into account when considering a long-term shutdown. As an illustration, let's say a corporation sells for Rs. 500, with Rs. 450 in variable costs and Rs. 100 in fixed costs. Then a loss of Rs. 50 occurs.

That suggests that while the business won't last in the long run, it will likely survive in the short term.

Marginal costs is useful when a department or product is being discontinued. The marginal costing technique demonstrates how each product affects the profit at fixed costs. If a department or product makes the smallest contribution, it may be closed or its production may be stopped. It implies that just the product with the highest level of contribution should be used, and the rest should be discarded.



IN-TEXT QUESTIONS

Following information is available of Anvi enterprises for year ended June, 2022

Fixed cost Rs. 3,00,000

Variable cost Rs. 12 per unit

Selling price Rs. 15 per unit

Output level 1,50,000 units

3. P/V Ratio is

a) 80% b) 20% c) 100% d) 33.3%

4. BEP in Units

a) 200000 b) 100000 c) 600000 d) 300000

5. BEP in Rs.

a) 10,00,000 b) 12,00,000 c) 15,00,000 d) 20,00,000

6. Sales Required To earn Profit Of Rs. 6,00,000

a) 30,00,000 b) 45,00,000 c) 60,00,000 d) 20,00,000

5.12 SUMMARY

Costing Systems are the systematic allocation of cost to products by following one or the other available and suitable technique. It can be used for planning and decision making. **Objectives of A Costing System**

1. Ascertainment of cost :
2. Determining selling price.
3. Cost Control and Cost Reduction.
4. Providing data for managerial decision-making:
 - a) Introduction of a new product,
 - b) Utilization of unused plant capacity,



- c) Making components in house or buying components from outside suppliers.
- d) Shut down or continue.
- e) Selling below total cost in special orders.

Marginal costing is the process of ascertaining marginal (additional) costs and the effect of changes in volume of output on profit

Advantages of Marginal Costing

1. It Helps in determining the volume of production:-
2. Maximisation of Profit:
3. Helps in selecting optimum production mix:-
4. Helps in deciding whether to Make or Buy:-
5. Help in deciding method of manufacturing:-
6. Helps in deciding whether to shut down or continue:-

Limitations of Marginal Costing

1. Artificial Classification:-
2. Faculty Decision:-
3. Marginal costing ignores time factor and investment:-
4. Controllability of Fixed cost:-
5. Difficult to apply:-
6. Stock is understated:-
7. No Basis for Cost control or reduction:-

Marginal Costing Vs Absorption Costing

The main difference is in treatment of fixed cost among the two. While in absorption costing it is treated in same manner as variable cost and form part of total cost based on which stock is valued but on the other hand in marginal costing only variable costs are considered in decision making and valuing the stock.



Cost-Volume-Profit (CVP) analysis is the systematic study of relationship between cost of the product, volume of activity and the resultant profit. Since all these three factors are interrelated so its very important to study their relationship and how a change in one can effect the other as well.

Decision Making Problems

In this section, we have learned how the concepts of marginal costing and CVP is applied for analysis of identified options for short-term decision making. Some of the Decision problems faced are as follows:

1. Problem of Limiting Factor (Key Factor)
2. Processing of Special Order
3. Local vs Export sale
4. Make or Buy/ In-house-processing vs Outsourcing
5. Shut-down or continue decision etc.

5.13 PRACTICAL PROBLEMS

1. Two competing companies HERO Ltd. And ZERO Ltd. Sell the same type of product in the same market. Their forecasted profit and loss accounts for the year ending December 2022 are as follows:

Particulars	Hero Ltd.	Zero Ltd.
Sales	Rs.5,00,000	Rs. 5,00,000
Less: Variable Costs	Rs.4,00,000	Rs.3,00,000
Less: Fixed Costs	Rs.50,000	Rs.50,000
Forecasted Profit	Rs.50,000	Rs.50,000

You are required to state which company is likely to earn greater profits in conditions of:

- a) Low demand
- b) High demand

2. Two manufacturing companies which have the following operating decides to merge:

Particulars	Company A	Company B
Capacity Utilization (%)	90	60
Sales (Rs. in lacs)	540	300



Variable Costs (Rs. in lacs)	396	225
Fixed Assets (Rs. in lacs)	80	50

Assuming that the proposal is implemented, calculate:

- Break-even sales of the merged plant and the capacity utilization at that stage
 - Profitability of the merged plant at 80% capacity utilization
 - Turnover of the merged plant to earn a profit of Rs.75 lacs
 - When the merged plant is working at a capacity to earn a profit of Rs.75 lacs, what percentage increase in selling price is required to sustain an increase of 5% in fixed overheads
3. Croma manufactures and sells four types of products under the brand names A, B, C and D. The sales mix in value comprises of 33-1/3%, 41-2/3%, 16-2/3% and 8-1/3% of A, B, C and D respectively. The total budgeted sales are Rs.60,000 per month.

Operating costs of the company are as follows:

Product	% of sale price
A	60%
B	68%
C	80%
D	40%

Fixed Cost is Rs.14,700 per month.

The company proposes to change the sales mix for the next month as follows and it is estimated that total sales would be maintained at the same level as the current month:

Product	Sales mix
A	25%
B	40%
C	30%
D	5%

You are required to calculate:

- Break-even point for the products on an overall basis for the current month.
- Break-even point for the products on an overall basis for the next month assuming that the proposal is implemented



5.14 GLOSSARY

Relevant costs are the costs which would be impacted by managerial decisions. They are the future cost whose magnitude will be effected by a decision.

Irrelevant costs are those which would not be effected by the decision.

Differential Costs The difference in total costs between two alternatives is termed as.

Opportunity Cost This cost means the value of benefit sacrificed in favour of an alternative course of action.

Costing Systems are the systematic allocation of cost to products by following one or the other available and suitable technique.

Marginal costing is the process of ascertaining marginal (additional) costs and the effect of changes in volume of output on profit

Absorption costing The process of charging all costs, both variable and fixed, to operations, products or process is known as absorption costing.

Cost-Volume-Profit (CVP) analysis is the systematic study of relationship between cost of the product, volume of activity and the resultant profit.

Break-even analysis is a actually a method to apply the CVP analysis in decision making process by including many more related concepts into it.

All Formulas at a Glance

1. Basic Cost equation:

Total sales = Total Fixed Cost + Total variable Cost $\pm$ Total Profit

$$TS = FC + VC + P$$

2. Contribution = Total Sales – Total Variable Cost

OR Contribution = Fixed Cost + Profit

$$3. \text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$\text{Or } \frac{\text{Contribution per unit} \times 100}{\text{Sales per unit}}$$

$$\text{Or } \frac{\text{Change in contribution} \times 100}{\text{Change in sales}}$$



Or $\frac{\text{Change in profit} \times 100}{\text{Change in sales}}$

4. Break even point (in units) = BEP = $\frac{\text{Fixed costs}}{\text{Contribution per unit}}$

5. Break even Point (in Rs.) = BES = $\frac{\text{Fixed cost}}{\text{Contribution per unit}} \times \text{Sales per unit}$

Or BEP in units * Selling Price per unit or $\frac{\text{Fixed Cost}}{\text{P/v ratio}}$

6. BEP with DP (in units) = $\frac{\text{Fixed cost} + \text{Desired profit}}{\text{Contribution per unit}}$

7. BEP with DP (In Rs) = BES with DP = $\frac{\text{Fixed cost} + \text{Desired profit}}{\text{Contribution per unit}} \times \text{Sales per unit}$

Or BEP with DP in units * Selling Price per unit

Or $\frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P/V ratio}}$

8. MOS (Absolute) = Actual Sales – Break Even Sales

MOS Can also be calculated with following Formula

MOS = Profit/P/V ratio

9. MOS (%) = $(\text{MOS} / \text{Actual sales}) \times 100$

5.15 Answers to in-text Questions

1. Opportunity	4. b) 1,00,000
2. Relevant	5. c) 15,00,000
3. b)20%	6. b) 45,00,000



5.16 SELF-ASSESSMENT QUESTIONS

- Q1 What are various Cost concepts involved in managerial decision making?
Q2 What is Marginal Costing ? How is it Different From Absorption Costing?
Q3 What is CVP analysis and what are its uses?
Q4 What are Advantages of Marginal Costing?

5.17 REFERENCES

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5.18 SUGGESTED READINGS

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LESSON 6

STANDARD COSTING AND VARIANCE ANALYSIS

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STRUCTURE

- 6.1 Learning Objectives
- 6.2 Introduction
- 6.3 Standard Cost
- 6.4 Standard Costing
 - 6.4.1 Meaning
 - 6.4.2 Purpose of Standard Costing
 - 6.4.3 Establishing the Standard Cost
 - 6.4.4 Kinds of Standards
 - 6.4.5 Process of Standard Costing
 - 6.4.6 Types of Variances
- 6.5 Classification of Variances
- 6.6 Summary
- 6.7 Glossary
- 6.8 Answers to In-text Questions
- 6.9 Self-Assessment Questions
- 6.10 Suggested Readings



6.1 LEARNING OBJECTIVES

After this chapter, learners will be able to:-

- To understand the standard costing and its relevance.
- Learn the pre requirements for the success of the standard costing in the company.
- Analysis the classification of the overhead variances.

Develop an understanding and examining the reasons behind the variances within the actual and planned results.

6.2 INTRODUCTION

The business organisation's success depends upon how effectively and efficiently it is able to control the costs. In a wider context the cost can be calculated and reported through predetermined costing and historical costing. Where the historical cost refers to identification and reporting of the actual cost that has been incurred postproduction. Moreover, efficiently ascertaining and controlling the cost is one of the essential goal of cost accounting.

Historical costing has not been considered as an efficient method for exercising the cost control since it is not applicable as per plan of action. Also, it is unable to furnish any benchmark which may be utilised for gauging the actual performance. Hence on the basis of these shortcomings of historical costing, it is considered important to understand before the production phase begins what costs should be examined for finding the exact cause of failures (if any) for achieving the target and fixation of responsibility thereupon. Therefore, standard costing has been considered as an essential equipment that helps management for planning and controlling the operations of the business. In standard costing each costs are determined beforehand, where a comparison is made between these pre-determined costs and actual costs. Moreover, the difference in between these two costs (predetermined and actual) has been named as Variance. And these variances are informed to the management of the company for taking the corrective measure so that actual costs adhered to the pre-determined costs.

Accordingly, in historical costing, actual costs are evaluated once they were incurred. These costs have been not considered useful to the management for decision purposes and controlling of costs. As a result, standard costing is being considered as a useful technique to plan, make



various decisions and controlling the business operations. In this unit you are going to study about the standard costing and variance analysis.

6.3 STANDARD COST

Standard costs are the costs which have been pre-determined and used as benchmark for measuring the effectiveness on the basis of which the actual costs were incurred under the given situations. For instance, the quantum of raw material needed for producing one unit of a product can be ascertained and the cost can be estimated for that raw material. This became the standard material input. As per official terminology of C.I.M.A (Chartered Institute of Management Accountants), standard cost comprises of unit cost of a product, component or service planned by an organisation. This cost could be evaluated on various number of base. Its utility lies in measuring performance, valuation of stock, control and formulating selling price. Hence it can be said that standard cost is:-

- Planned
- Decided upon single or several bases

6.4 STANDARD COSTING

Standard Costing is a costing technique used by the company's management as a tool of control. Where controlling is function of the management besides other functions of management such as directing, staffing and planning. Each company sets a target and for achieving it the management of the company has to make plans, thereafter, get them in execution and oversee the work for checking any deviation (comparison of actual with that standard) from the planned one.

6.4.1 Meaning :

Standard costing is a method employed for determining the standard cost and making comparison between them and actual costs in order to ascertain the reasons behind such differences, for taking any remedial measures that must be taken with immediate effect. According to Chartered Institute of Management Accountants (C.I.M.A), standard costing has been defined as *“the preparation of standard costs and applying them to measure the variations from actual costs and analysing the causes of variations with a view to maintain*



maximum efficiency in production". Hence it is a method of the cost accounting for comparing the standard cost for every product with that of the actual cost, for determining the operation's efficiency. So, standard costing includes the subsequent steps:-

- a) Determining the standard costs of several elements for costs.
- b) Documenting the actual costs.
- c) Making a comparison in between actual costs and standard costs for finding variances.
- d) Examining the causes of the variances.
- e) Informing the management on the variance analysis in order to take corrective steps where required.

6.4.2 Purpose of Standard Costing:

- a) Controlling of costs – It has been one of the essential aims of standard cost whereby it assists the management in the controlling of all the costs.
- b) Creating an environment of awareness on cost – This objective helps to make an environment of consciousness about costs in the organisation. This further helps to ensure that employees recognize the significance of the efficiency in the business operations wherein the cost can be optimized because of combined efforts of all.
- c) Management plans – Standard costing is appropriate for budgetary plans made by the company on several stages since it has been made in a prudent way by considering all the technicality related in the business.
- d) Developing policies and setting of prices – It intends to support the management in policies formulation and determination of the prices involved in the operations of the business.

6.4.3 Establishing the Standard Cost:

The accuracy and trustworthiness determine the successfulness of a standard costing system. Hence, each operation must be considered during setting the standards. The standard costs have made for every component of the cost namely: -

- Direct labour
- Direct Material and



➤ Overheads

Standards are determined both in: - Physical manner and Monetary manner for every element of cost.

- Physical Standards – It refers to recording of the standards in hours or units. At this point the standard hours and quantity have been fixed for a specific service or product. The intent of fixing the standards is to achieve the economies of scale in the production stage and setting the price for quoting it. During the process of setting the standards the following things must be considered:-
 - Company's Budget.
 - Production of final output.
 - Where multiple inputs are there then the material's proportion that has to be used must be determined.
 - Specification of the material in terms of quality and quantity as required.
 - Availability and skills of the workers.
 - Production method.
 - Internal and external factors.
 - Working conditions
- Material quantity standards - The process for setting up of material quantity standard have been enumerated as follows: -
 - a. Products standardization – In this stage decision has been on the products to be made on the basis of the plan of production and customers orders. Normally questions to name a few – what has to produce, how many products to be made and what type of the product has to be made are answered during this stage.
 - b. Study of the product – The production and development of the product requires its thorough analysis. This analysis is being carried by the specialized departments or product experts. During this stage the answers to questions like how product can be produced, what are preconditions, what type of material has to be used, how to make the acceptability of the product in markets, etc. have been addressed.
 - c. Formulating the specification list – Once product has been studied thereafter a list of the materials is made specifying the quantity as well as the quality of the material that has to be utilized, preconditions, procedure to be used, necessary conditions, expected



wastage etc.

- d. Sample runs – The trial runs with specific circumstances must be conducted and the sample is being tested of the desirable quantity and quality.
 - Labour time standards – The steps for determining the labour quantity standards are as follows:-
 - a. Product standardization and its study as conducted in case of material quantity standards.
 - b. Labour description – In this type and time of labour has been mentioned. Time specification of labour has been established from the past records along with considering the normal time wastage.
 - c. Process standardization – Selecting the appropriate machine to be used for correct sequence and modalities of operations.
 - d. Manufacturing framework – A design of operation of every product enlisted and required in operations has to be made.
 - e. Motion & time study – This study helps to select best path required in the completion of a motion or job that worker will execute along with considering the standard time required to take by an average worker for every job.
 - f. Training – Training must be provided to workers for doing their work and time used up during dry run.
 - Quantity standards/overheads time – Indirect costs are known as overheads. Variable overhead quantity/time is ascertained on the basis of specification as required by the specific departments. These variable overheads are based on labour hour or direct material quantity.
 - Fixed overhead time has been based on the budgeted volume of production.

Challenges associated with the setting up of physical standards:-

The issues faced when fixing physical standards might differ from one industry to another and are as follows: -

- In case of introduction of a new product line, a company has to employ workers with minimal or no experience of the job at times. In such situations setting of the standard time involves a problem as requisite adjustments have to be made on timely basis for the workers with less/no experience.
- Where changes in the technology have to be made new machinery are being installed. Under such scenario exact valuation of the output as well as efficiency in standards might be an issue and requires a considerable time and work.



- On account of diversification of the product line, the issue also arises because of redefining the production facilities.
- Unavailability of the materials also poses problems in the establishment of the standards.

Difference between Standard Cost and Estimated Cost

Standard Costs and estimated costs are the predetermined costs which vary in their objectives. The differences between the two are:

Standard Cost	Estimated Cost
It aims at what the cost should be. These costs are developed scientifically. Standard costs are used only with the standard costing system. The objective is to control costs. These costs are usually entered in the accounting system and used in variance computation and analysis.	It gives an estimate of what the cost would be. These costs are based on past averages and future anticipations. These costs are used in any organisation working with a historical costing system. The objective is to provide a basis for price fixation. These costs do not enter the accounting system.

Difference between Standard Costing and Budgetary Control

Both Standard costing and budgetary control are cost-control techniques involving the comparison of predetermined costs with the actuals and further followed with corrective action. However, the two techniques differ from each other in many aspects:

Standard Costing	Budgetary Control
Standard costing is based on scientific calculations. The standard costing system is mainly used by the manufacturing division. It is used to measure efficiency.	It is based on past performance and future anticipations. Budgetary control is used in various departments like production, sales, finance etc. It is used for forecasting.



Its main objective is the ascertainment of costs and cost control.	It's mainly concerned with the profitability of the business.
Standard costing is a projection of cost accounts.	It's a projection of financial accounts.
It is intensive in the application and requires a detailed analysis of variances.	It is extensive in the application and does not call for rigorous analysis of deviations.

Rate or Price Standards – Generally, such standards are set on following ways: -

- Normal prices anticipated to persist during cyclical seasons for several years.
- Average actual price anticipated to prevail within upcoming time.

Material Price Standards – The prices of the material used in manufacturing are not in the manufacturer's control entirely. At the same time an approximation can be made by the purchase department after knowing the requirement of production quantities from their understanding of the present market trends. It will further help in stating the sufficiently the price accuracy of the constituent elements. The following factors must be considered generally for setting standards for material prices provided fluctuations in prices are minimal and not significant: -

- a. In hand materials stock along with the prices upon which they were held.
- b. Expected price fluctuations.
- c. Minimal support price determined by the competent authority.
- d. The prices of future material deliveries for which orders have been place already.

Wage Rate Standards – The labour type required for doing a particular work is an essential element in fixing the wage rate for workers. The wage rate standards for unskilled and skilled workers are determined as per following grounds: -

- a. Piece rate or time prevalent in the industry and it can be learned from the fellows.



- b. The wage agreement in between the workers union and management.
- c. Time which has been taken by workers for completing a single production unit.
- d. Laws prevalent in the operation area such as Payment of Bonus Act, payment of minimum wages act, etc.

Overhead Expense Standard – For ascertaining the standards for overhead expenses, deliberation must be made on the output level and budgeted expenses. The budget representing the output level which is examined for reaching the standards for overhead expenses might be on the basis of average capacity of sales or budgeted capacity to be employed in the following year. Post choosing one bases for the computation of the level of output, then expenses perhaps budgeted with respect to variable and fixed categories. Hence the standards for overhead expenses are fixed by ascertaining the optimal output level for production unit and then preparing a budget considering variable and expenses that has been incurred this level. A flexible budget can be prepared for seasonal production or during fluctuations in a year which facilitates comparison in between actual expenditure and target for the period.

6.4.4 Kinds of Standards

The significance and exactness for stating the standard cost rests on the credibility for the standards that are being established. For setting standards, it is important to identify the level of certainty with the proximate standards with that of actual outcome. Therefore, the following standards are enumerated as follows: -

- a) **Ideal Standard** – It denotes the performance level which can be attained when labour and material prices are utmost favourable and when the maximum output is realized from the best layout as well as tool and where highest efficiency by utilizing the resources leads to maximization of output with minimal cost. However, these standards are subject to following criticisms: -
 - As standards are not attainable so they are not taken seriously by anyone.
 - The variances reported are the one from that of ideal standards. Hence do not reflect the extent to avoid them in a reasonable manner.
 - Absence of rational way to dispose these variances.
- b) **Normal Standard** – Such standards are achievable under the normal operating circumstances. The normal work is being defined as number of the standard hours that will produce at the normal level of efficiency which will be adequate in meeting the

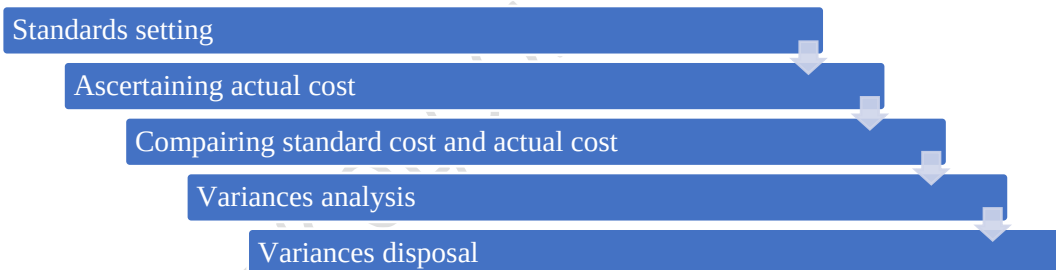


average demand of sales over the period of years. Though they are difficult to determine since they need a forecasting level. In case of actual performance is abnormal, then it could result into larger variances, and it requires standards revision.

- c) **Basic Standard** - They are used when standards are probably to remain fixed or constant over longer time. In this a base year is selected for comparing. These standards are suitable for small products range and are set for a longer term with less revisions. In these variances are not estimated and actual cost has been stated in percentage of the basic cost and current cost is also expressed similarly, thereafter a comparison is made in these two percentages to ascertain how far the current standards deviated from actual cost. And the percentages are then compared with that of former periods for establishing trend of current and actual standard from the basic cost.
- d) **Current Standard** – Such standards represent the anticipation of the management on actual costs for the current period and these costs are the one which business will make in case expected prices have been paid for goods as well as services and usage appear to be believed necessary for the production of planned level of output.

6.4.5 Process of Standard Costing

Following is the procedure for standard costing:



6.4.6 Types of Variances

The difference in the actual and standard cost or the deviation from the standard performance is known as Variance. The primary purpose of variance computing and analysing variance is to enable the management to find out reasons for deviation from the budgeted profit. In other words, variance analysis helps the management to know the responsibility centres which can be held accountable for various variances.

According to CIMA London, “Variance Analysis is the process of computing the amount of variance and isolating the causes of variance between actual and standard.”



For achieving the objective of the standard costing, a report on variance analysis is prepared to show the actual cost, standard cost, and the variances (along with the causes) and submitted to the management for further action. The report is prepared to indicate the direction (favourable or unfavourable), nature (controllable or uncontrollable) and the quantum of variance. The variances may be cost variances or sales variances.

In the case of cost variances, when the actual cost is less than the standard cost, the variance is favourable and vice versa. Both favourable and unfavourable variances need analysis. Favourable variance not always implies efficiency. It may be due to certain favourable external factors or the standards are loosely set. In the same way, an unfavourable variance does not always mean inefficiency. Controllable variances are those variances which can be or are within the influence of a particular responsibility centre or a particular individual. Uncontrollable variances are to be disposed of by apportioning to the unit of the finished good and work in progress.

The aim of standard costing involves investigation of the causes behind important variances with a view to find the issues and taking remedial actions. The following are the types of variances:-

- a) **Controllable and Uncontrollable Variances** – The variances which are controllable by the department are known as controllable variances while those variances beyond the control of the department are termed as uncontrollable. Controllability has been considered as a subjective thing and differs as per the situations. In case the uncontrollable variances have been of a significant kind and are continuous, then it calls for revision in the standards.
- b) **Favourable and Adverse Variances** – The variances which provide profits to the company are considered as favourable variances and those variances that drives losses have been categorized as adverse variances. In the computation of cost variances, the favourable variances are standard cost minus actual cost. While adverse variances are where actual cost is in excess of the standard cost. The situation is inverse in case of sales variance. Favourable variance occurs when actual exceeds the budgeted and adverse variances are when actual lowers the budgeted. They have been credited and debited in costing profit & loss account respectively.

‘F’ denotes the favourable variance and ‘A’ represents the adverse variance.



In text Questions

Q1) State in case the statements mentioned below are True or False:-

- a) The standard hour can be considered as a hypothetical hour representing the quantum of the work to be performed in an hour given subject to specific situations.
- b) Standard cost can be utilised as a benchmark for measuring the effectiveness on the basis of which actual costs are being incurred.
- c) Generally, standards are fix for long time and being revised on annual basis.
- d) For controlling the costs either budgetary controls or standard costing can be employed and not both of the methods.
- e) Standard costs project the cost accounts however budgeting projects the financial accounts.

Q2) Select one of the options and mark (✓) the correct answers

- a) Standard costing includes the determination of
 - ☐ Actual Costs
 - ☐ Standard Costs
 - ☐ Budgeted Costs
 - ☐ Estimated Costs
- b) The difference in between the standard costs and actual costs has been considered as
 - ☐ Variances
 - ☐ Loss
 - ☐ Profit
 - ☐ Historical Costs
- c) The aim of standard costing
 - ☐ Measuring efficiency
 - ☐ Controlling prices
 - ☐ Reducing costs
 - ☐ Examining the variances

Q3) Mark the following statements as correct or wrong:-

- a) Standard costing is suitable for those companies where products are repetitive and standardised.
- b) It is important for a standard costing system to be accurate and trustworthy in order to be successful.
- c) Budgeting involves preparation of the plans for the future events of a company.
- d) Expected standards are the figures of the past average performances after considering the cyclical/seasonal changes.



6.5 CLASSIFICATION OF VARIANCES

Variances can be broadly classified into – Revenue Variance and Cost Variance. Revenue Variance can be calculated by comparing the actual sales with budgeted (standard) sales. The Cost side variances, on the other hand, gets reflected in the cost components.

Computation of Variances: As mentioned earlier variances can be classified into two parts. Hence, we will begin the discussion with all the components of cost side and then move to labour side variance.

(a) Material Cost Variance: It is the difference between the standard cost and actual cost. Mathematically, it can be written as below:

$$\text{MCV} = (\text{SQ} \times \text{SP}) - (\text{AQ} \times \text{AP})$$

Where

MCV = Material Cost Variance

SQ = Standard Quantity

SP = Standard Price

AQ = Actual Quantity

AP = Actual Price

Reasons: The Material cost variance results from – (a) difference in the material as well standard price, (b) variation between material and standard consumption else may be due to both causes. Material cost variance evaluation could be obtained by – Material Price variance and Material Usage variance.

(i) Material Price Variance: estimates the variance that arises in the material cost due to the difference in actual material purchase price and standard material price. Mathematically, it can be written as below:

$$\text{Material Price Variance} = \text{Actual Quantity} \times (\text{Standard Price} - \text{Actual Price})$$

Or

$$\text{MPV} = \text{AQ} \times (\text{SP} - \text{AP})$$



*In this the actual quantity denotes actual quantity of the material that has been purchased. In case the question does not mention the material purchase then it is equivalent to the material consumed.

Material Price Variance is also calculated by taking the material utilised as the actual quantity rather than material that has been purchased. This technique is correct as well however, it does not serve the purpose of computation of variance. Material Price Variance can arise due to many reasons – some of them can be controlled and some cannot be controlled by the purchase department. If the price variance arises from the inefficiency of the purchase department or due to any other reason which is well within control of the organisation, in that case it is essential to inform about this variance at the earliest and it is done by taking the purchase quantity as actual quantity for the computation of price variance.

Responsibility: Generally, the purchase department purchases the material from market. Purchase department must perform its functions prudently so that the company does not incur any losses because of the inefficiency. Purchase department is made accountable if any adverse price variance results from the factors that could have been controlled by the department.

- (ii) **Material Usage Variance:** measures the variance that arises in the material cost due to consumption/usage of the materials. Mathematically, it can be written as: Material Usage Variance (MUV) = Standard Price(Standard Quantity – Actual Quantity*)

*where Actual Quantity is actual quantity of the material that has been used.

Responsibility: The purchase department has the onus of the Material Usage, and it is held accountable for the adverse usage variance.



Reasons of the Material Usage Variance: Actual Market consumption can differ with the standard quantity because of either the variation in usage of the proportion from that of standard proportion or because of the difference in the actual yield from standard yield. Material usage variance has been divided into 2 categories- (a) Material Usage Mix variance, (b.) Material Yield variance.

(a) Material Mix Variance: Variations in the material consumption arise because of difference in the proportion that has been used in real terms from standard proportion/mix. It is due to the reason(s) in case two or more inputs are being used in the manufacturing of the product. Therefore,

Material Mix Variance (MMV) = (Revised Standard Quantity–Actual Quantity)×Standard Price

where,

Revised Standard Quantity (RSQ) =

$$\frac{\text{Standard Quantity of one material}}{\text{Total of standard quantities of all materials}} \times \text{Total of actual quantities of all materials}$$

(b) Material Yield Variance or Material Sub-usage Variance: Variances in the material consumption that occurs because of the yield or productivity of the inputs. It can arise due to using the below average quality of the materials, workers inefficiency or because of the inaccurate processing.

Material Revised Usage Variance (MRUV)

= (Standard Quantity – Revised Standard quantity) × Standard Price

Or

Material Yield Variance (MYV)

= (Actual Yield – Standard Yield)×Standard output price

Note: MRUV can be referred as Material Sub – Usage Variance.

Where there is only 1 variance i.e., either Material Yield or Material Revised Usage Variance.



Verification of the formulae:

Material Cost Variance = Material Usage Variance + Material Price Variance*

Or Material Cost Variance = (Material Mix Variance + Material Revised Usage Variance) + Material Price Variance

*In case where material consumed quantity as well as material purchase quantity are one and same

Meaning of the terms used in the formulae:

TERMS	MEANING
Standard Quantity (SQ)	Quantity of the input that has to be used for producing actual output.
Actual Quantity (AQ)	Quantity of input used in real terms for producing the actual output.
Revised Standard Quantity (RSQ)	In case actual total quantity of the input are being used in the standard proportion.
Actual Yield (AY)	It denotes the Actual Output
Standard Yield (SY)	It signifies the Actual output when input is being used in the standard ratio
Standard Output Price (SOP)	It refers to Standard material cost for the actual output

Illustration 1 Calculate material cost variance from the given actual and standard amount for the product “ABC” are as follows: -

Particulars	Standard	Actual
Quantity of material	60 units	50 units
Price per unit of material	3.00	2.00

Answer:

(a) Material cost variance (MCV) = SC – AC = 180 – 100 = ₹80 (F)

(b) Price variance (PV) = AQ (SP – AP) = 50 (3 – 2) = ₹50 (F)



$$(c) \text{ Usage variance (UV)} = SP (SQ - AQ) = 3(60 - 50) = ₹20 (F)$$

Illustration 2 Calculate the material mix variance and yield variance from the following information:

The information for producing 1 unit of the product is:

Material	Units	Rate per unit
X	55	13
Y	70	19
Z	90	24

But in the month of May, 10 units had been produced as well as consumed and the information was as follows:

Material	Units	Rate per unit
X	600	15.50
Y	875	17.50
Z	730	21

Answer:

Material	Standard for 10 units			Actual for 10 units		
	Unit(s)	Rate	Amount	Unit(s)	Rate	Amount
X	550	13	7130	600	15.50	9300
Y	700	19	13300	875	17.50	15312.50
Z	900	24	21600	730	21	15330
Total	2150		42030	2205		39942.5

$$(a) \text{ Material cost variance (MCV)} = \text{Standard cost (SC)} - \text{Actual cost (AC)} = 42030 - 39942.5 = ₹2087.5 (F)$$

$$(b) \text{ Material Price variance (MPV)} = \text{Actual quantity (standard price - actual price)}$$

$$X = MPV = 600 (13 - 15.50) = ₹1500 (A)$$



$$Y = MPV = 875 (19 - 17.50) = ₹1312.5 (F)$$

$$Z = MPV = 730 (24 - 21) = ₹2190 (F)$$

(c) Material Usage variance (MUV) = Standard price (standard quantity – actual quantity)

$$X = MUV = 13 (550 - 600) = ₹650 (A)$$

$$Y = MUV = 19 (700 - 875) = ₹3325 (A)$$

$$Z = MUV = 24 (900 - 730) = ₹4080 (F)$$

(d) Material Mix variance (MMV) = Standard price (Revised standard quantity – Actual quantity)

$$X = MMV = 13 (566.5 - 600) = ₹435.5(A)$$

$$Y = MMV = 19 (721 - 875) = ₹2926(A)$$

$$Z = MMV = 24 (927 - 730) = ₹4728(F)$$

Revised standard quantity has been calculated for all the three material:

$$X = (2205/2150)550 = 566.5$$

$$Y = (2205/2150)700 = 721$$

$$Z = (2205/2150)900 = 927$$

(e) Material yield variance

In order to calculate material yield variance, certain calculations are required –

$$\begin{aligned} \text{Standard yield variance} &= \text{Actual usage of the material/Standard usage per unit of output} \\ &= 2205/215 = 10.26 \text{ units} \end{aligned}$$

$$\text{Standard material cost per unit (SOP)} = 42030/10 = ₹4203$$

$$\begin{aligned} \text{Material yield variance} &= (\text{Actual yield} - \text{Standard yield}) \text{ Standard material cost per unit} \\ &= (10 - 10.26) 4203 = ₹1092.78(A) \end{aligned}$$

[Note – Actual yield is the actual output]

$$\begin{aligned} \text{Material revised usage (sub-usage) variance (MRUV)} &= (\text{Standard quantity} - \text{Revised standard quantity}) \text{ Standard price} \end{aligned}$$

Any of the one can be calculated i.e., Material mix variance or Material revised sub-usage (usage) variance, as both are always equal.



Illustration 3: X chemical ltd. manufactures chemical X using three kinds of raw material A, B and C. The company uses standard costing system and furnishes following information about manufacturing of chemical X. Compute all material cost variances.

Standard price of raw material A	₹ 100 per kg
Standard price of raw material B	₹ 50 per kg
Standard price of raw material C	₹ 60 per kg
Actual price of raw material A	₹ 90 per kg
Actual price of raw material B	₹ 60 per kg
Actual price of raw material C	₹ 70 per kg
Standard quantity of raw material A to produce 1 tonne of chemical X	300 kg
Standard quantity of raw material B to produce 1 tonne of chemical X	400 kg
Standard quantity of raw material C to produce 1 tonne of chemical X	500 kg
Actual quantity of raw material A used to produce chemical X	3,50,000 kg
Actual quantity of raw material B used to produce chemical X	4,20,000 kg
Actual quantity of raw material C used to produce chemical X	5,30,000 kg
Actual output of chemical X	1000 tonnes

Solution:

Given,

SP of A = ₹100, B = ₹50, C = ₹60

AP of A = ₹90, B = ₹60, C = ₹70

SQ = Standard quantity of material required for actual output

A = $300 \times 1,000 = 3,00,000$ kg

B = $400 \times 1,000 = 4,00,000$ kg



$$C = 500 \times 1,000 = 5,00,000 \text{ kg}$$

AQ = Actual quantity of material used for actual output

$$A = 3,50,000 \text{ kg}$$

$$B = 4,20,000 \text{ kg}$$

$$C = 5,30,000 \text{ kg}$$

RSQ = Revised standard quantity based on actual quantity of material used in standard ratio

$$A = \frac{3}{12} \times 13,00,000 = 3,25,000 \text{ kg}$$

$$B = \frac{4}{12} \times 13,00,000 = 4,33,333 \text{ kg}$$

$$C = \frac{5}{12} \times 13,00,000 = 5,41,667 \text{ kg}$$

$$\text{Standard Yield for actual input} = 1300000 \times \frac{1}{1200} = 1083.33 \text{ tonnes}$$

$$\text{Standard cost per unit of output} = (300 \times 100) + (400 \times 50) + (500 \times 60) = ₹80000$$

$$\text{Material Cost Variance } MCV = (SQ \times SP) - (AQ \times AP)$$

$$\text{Material A } MCV = (300000 \times 100) - (350000 \times 90) = 1500000 \text{ (A)}$$

$$\text{Material B } MCV = (400000 \times 50) - (420000 \times 60) = 5200000 \text{ (A)}$$

$$\text{Material C } MCV = (500000 \times 60) - (530000 \times 70) = 1500000 \text{ (A)}$$

$$MCV = 13800000 \text{ (A)}$$

$$\text{Material Price Variance } MPV = AQ \times (SP - AP)$$

$$\text{Material A } MPV = 350000 \times (100 - 90) = 3500000 \text{ (F)}$$

$$\text{Material B } MPV = 420000 \times (50 - 60) = 4200000 \text{ (A)}$$

$$\text{Material C } MPV = 530000 \times (60 - 70) = 5300000 \text{ (A)}$$

$$MPV = 6000000 \text{ (A)}$$

$$\text{Material Usage Variance } MUV = SP \times (SQ - AQ)$$

$$\text{Material A } MUV = 100 \times (300000 - 350000) = 5000000 \text{ (A)}$$

$$\text{Material B } MUV = 50 \times (400000 - 420000) = 1000000 \text{ (A)}$$

$$\text{Material C } MUV = 60 \times (500000 - 530000) = 1800000 \text{ (A)}$$

$$MUV = 7800000 \text{ (A)}$$

$$\text{Material Mix Variance } MMV = SP \times (RSQ - AQ)$$

$$\text{Material A } MMV = 100 \times (325000 - 350000) = 2500000 \text{ (A)}$$



$$\begin{aligned}\text{Material B } MMV &= 50 \times (433333 - 420000) &= 666650 \text{ (F)} \\ \text{Material C } MMV &= 60 \times (541667 - 530000) &= 700020 \text{ (F)} \\ &&MMV=11,33,330 \text{ (A)}\end{aligned}$$

$$\begin{aligned}\text{Material Sub Usage Variance } MSuV &= SP \times (SQ - RSQ) \\ \text{Material A } MSuV &= 100 \times (300000 - 325000) &= 2500000 \text{ (A)} \\ \text{Material B } MSuV &= 50 \times (400000 - 433333) &= 1666650 \text{ (A)} \\ \text{Material C } MSuV &= 60 \times (500000 - 541667) &= 2500020 \text{ (A)} \\ &&MSuV=66,66,670 \text{ (A)}\end{aligned}$$

Material Yield Variance

$$\begin{aligned}MYV &= (AY - SY) \times SC \text{ per unit of output} \\ (1000-1083.34) \times 80000 &= 6666670 \text{ (A)}\end{aligned}$$

Material Yield Variance = Material Sub Usage Variance

(b) Labour Cost Variance: It is the variation between actual labour cost as well as standard cost. Hence,

Labour Cost Variance (LCV)

$$= (\text{Std. hours for actual output} \times \text{Std. rate per hour}) - (\text{Actual hours} \times \text{Actual rate per hour})$$

Reason: Because of the differences in labour cost that results either due to the differences in actual labour rate from standard rate or difference in the numbers of hours worked from standard hour. Labour Cost Variance has been divided into the two categories - (i) Labour Rate Variance (LRV) and (ii) Labour Efficiency Variance (LEV).

(i) Labour Rate Variance: It occurs because of differences in actual rate which is being paid and standard rate. It is very similar to the material price variance. It is being calculated as follows:-

$$\text{Labour Rate Variance (LRV)} = \text{Actual time} \times (\text{Std. rate} - \text{Actual rate})$$

*In this the Actual Time refers to the time where wage is being paid.

Responsibility: Normally labour rate is being impacted due to external factors which are not in the control. But personnel manager can be held responsible for negotiating the labour rate.



- (ii) **Labour Efficiency Variance (LEV):** It occurs because of digression in the hours of working from standard(s) set.

Labour efficiency Variance = Standard rate (Standard hour for actual output – Actual hour*)

*Actual time which is being worked

Responsibility: The variance in efficiency arises because of unsuitable team the of workers, production manager's or foreman's inefficiency etc. However, production manager may hold accountable in case of any of the adverse variances which can be controlled.

LEV can be further divided into the following variances:

- (a) Idle Time Variance (IDV)
- (b) Labour Mix Variance (LMV) or Gang variance (GV)
- (c) Labour Yield Variance (LYV) or Labour Revised-efficiency Variance(LREV)

(a) Idle Time Variance: It is being estimated for the labour hours which were considered as unproductive. In this the idle time refers to the idle time of labour which occurs because of the abnormal causes. It can be calculated as:

Idle Time Variance (ITV) = Idle hours × Standard Rate

(b) Labour Mix Variance: It occurs because of either change in the proportion or the combination of different skill set, i.e., skilled worker, semi-skilled worker as well as unskilled worker.

Labour Mix Variance (LMV)= (Revised standard hour – Actual hour)×Standard rate

(c) Labour Revised Efficiency Variance (LREV) or Labour Yield Variance (LYV): It occurs because of the productivity of the workers.



Labour Revised Efficiency Variance (LREV) = (Standard hour for the actual output - Revised standard hour) $\times$ Standard rate

Or

Labour Yield Variance (LYV) = (Actual yield – Standard yield from the actual input) $\times$ Standard labour cost per unit of output

Verification:

Labour Cost Variance (LCV) = Labour Rate Variance (LRV) + Labour Efficiency Variance (if hour paid as well as hour worked are same)

Or

Labour Cost Variance (LCV) = Labour Rate Variance (LRV) + Idle Time Variance (ITV) + Labour Efficiency Variance (in case idle time exists)

Labour Efficiency Variance (LEV) = Labour Mix Variance (LMV) + Labour Yield Variance (LYV)

Illustration 4: From the following information on an organisation.:-

Standards:- Standard time for work 900 hours

Standard rate on hourly basis for work ₹1

Actuals:- Actual time for work 700 hours

Actual rate to be paid for work ₹300

Calculate –

- a) Labour cost variance (LCV)
- b) Labour rate variance (LRV)
- c) Labour efficiency variance (LEV)

Answer

Std. labour cost (900 hours @ ₹1 per hour) = ₹900

Actual wages to be paid ₹300



Actual rate on hourly basis $(300/700) = ₹0.43$

LRV = Actual time (Std. rate – Actual rate) = $700 (1 - 0.43) = ₹399(F)$

LEV = Std. rate per hour (Standard time – Actual time) = $1 (900 - 700) = ₹200(F)$

LCV = Std. labour cost – Actual labour cost = $900 - 300 = ₹600(F)$

Illustration 5: X Ltd. is a cement manufacturing company using standard costing system. It furnishes following information about manufacturing of cement in tonnes. Compute all labour cost variances.

Standard rate of labour per hour	₹ 50
Actual rate of labour per hour	₹ 45
Standard hours required to produce one tonne of cement	15
Actual hours	15300 hours
Actual output	1000 tonnes

Solution:

Given,

SR = ₹ 50

AR = ₹ 45

ST = Standard hours of labour required for actual output = $15 \times 1000 = 15000$ hours

AT = Actual hours of labour = 15300 hours

Labour Cost Variance

$$LCV = (SR \times ST) - (AR \times AT_p)$$

$$LCV = (50 \times 15000) - (45 \times 15300)$$

$$LCV = 750000 - 688500$$

$$LCV = 61500 (F)$$

Labour Rate Variance

$$LRV = (SR - AR) \times AT$$

$$LRV = 15300 \times (50 - 45)$$

$$LRV = 76500 (F)$$



Labour Efficiency Variance

$$LEV = (ST - AT) \times SR$$

$$LEV = 50 \times (15000 - 15300)$$

$$LEV = 50 \times -300$$

$$LEV = 15000 (A)$$

Verification:

$$LCV = LRV + LEV$$

$$61500 (F) = 76500 (F) + 15000 (A)$$

Labour mix variance, labour revised efficiency variance and Idle time variance are not computed as only one type of labour used and no information about idle time is given.

Illustration 5: X Ltd. is a steel pipe manufacturing company using standard costing system. It furnishes following information about manufacturing of steel pipes for work scheduled to be completed in 30 hours in a week. Compute all labour cost variances and verify them.

Particulars	Unskilled	Semi-skilled	Skilled
Standard number of workers in one group	9	15	26
Actual number of workers employed	8	18	24
Standard wage rate per week	100	200	400
Actual wage rate per week	120	180	400

During the week, the gang produced 1600 standard labour hours.

Solution:

Type of workers	Standard			Actual		
	Hours	Rate	Amount	Hours	Rate	Amount
Skilled	780	400	312000	720	400	288000
Semi-skilled	450	200	90000	540	180	97200



Unskilled	270	100	27000	240	120	28800
	1500		429000	1500		414000

$$\text{Standard cost of actual output} = \frac{429000}{1500} \times 1600 = 457600$$

Labour Cost Variance

$$LCV = \text{Standard cost of actual output} - \text{Actual Cost}$$

$$LCV = 457600 - 414000$$

$$LCV = 43600 \text{ (F)}$$

Labour Rate Variance

$$LRV = (SR - AR) \times AT$$

$$\begin{aligned} \text{Skilled} \quad LRV &= (400 - 400) \times 720 &= 0 \\ \text{Semi-skilled} \quad LRV &= (200 - 180) \times 540 &= 10800 \text{ (F)} \\ \text{Unskilled} \quad LRV &= (100 - 120) \times 240 &= 4800 \text{ (A)} \\ &&LRV = 6000 \text{ (F)} \end{aligned}$$

Labour Efficiency Variance

$$LEV = (ST - AT) \times SR$$

$$\begin{aligned} \text{Skilled} \quad LEV &= (832 - 720) \times 400 &= 44800 \text{ (F)} \\ \text{Semi-skilled} \quad LEV &= (480 - 540) \times 200 &= 12000 \text{ (A)} \\ \text{Unskilled} \quad LEV &= (288 - 240) \times 100 &= 4800 \text{ (F)} \\ &&LEV = 37600 \text{ (F)} \end{aligned}$$

ST= Standard hours for actual output

$$\text{Skilled} = \frac{1600}{1500} \times 780 = 832$$

$$\text{Semi-skilled} = \frac{1600}{1500} \times 450 = 480$$

$$\text{Unskilled} = \frac{1600}{1500} \times 270 = 288$$

Labour Mix Variance

$$LMV = (RST - AT) \times SR$$

$$\begin{aligned} \text{Skilled} \quad LEV &= (780 - 720) \times 400 &= 24000 \text{ (F)} \\ \text{Semi-skilled} \quad LEV &= (450 - 540) \times 200 &= 18000 \text{ (A)} \\ \text{Unskilled} \quad LEV &= (270 - 240) \times 100 &= 3000 \text{ (F)} \\ &&LEV = 9000 \text{ (F)} \end{aligned}$$

Labour Yield Variance



$$LYV = (AY - SY) \times SC$$
$$LYV = (1600 - 1500) \times 286 = 28600(F)$$

$$SC = \text{Standard rate per hour of work} = \frac{429000}{1500} = 286$$

Verification:

$$LCV = LRV + LEV$$

$$43600 (F) = 6000 (F) + 37600 (F)$$

$$LEV = LMV + LYV$$

$$37600(F) = 9000(F) + 28600 (F)$$

Overhead Variance – Overhead involves the indirect labour, indirect material and indirect expenses. The overhead variances have been classified into variable overhead and fixed overhead.

Variable Overheads Cost Variance (VOCV): Variable Overhead involves the expenses other than that of direct material as well as direct labour expense which varies with level of the production. VOCV has been divided into two parts – (i) Variable Overhead Expenditure Variance (VOEV) and (ii) Variable Overhead Efficiency Variance (VOEV).

$$\text{Variable Overhead Cost Variance (VOCV)} = \text{Std. Cost} - \text{Actual Cost}$$

OR

$$(\text{Std. Rate} \times \text{Std. Hour}) - (\text{Actual Rate} \times \text{Actual Hour})$$

(i) Variable Overhead Expenditure Variance (VOEV)

$$= \text{Actual Hour}(\text{Standard Rate} - \text{Actual Rate})$$

(ii) Variable Overhead Efficiency Variance (VOEV)

$$= \text{Standard Rate}(\text{Standard Hours} - \text{Actual Hour})$$

Fixed overhead cost variance (FOCV): It occurs because of differences in Absorbed Fixed Overhead and Actual Fixed Overhead. Fixed Overhead consists of two parts – Fixed Overhead Expenditure Variance (FOEV) and Fixed Overhead Volume Variance (FOVV).



Fixed Overhead Cost Variance (FOCV) = Absorbed Fixed Overhead – Actual Fixed Overhead

or

= (Standard hour for the actual output × Standard fixed overhead rate) – Actual Fixed Overheads

(i) Fixed Overhead Expenditure Variance (FOEV) = Budgeted Fixed Overhead (BFO) – Actual Fixed Overheads (AFO)

or

= (Standard hour for actual output × Standard fixed overhead rate) – Actual Fixed Overhead

(ii) Fixed Overhead Volume Variance (FOVV) = Absorbed Overheads – Budgeted Overheads

= Std. Rate (Std. hour for the actual output – Budgeted hour)

Fixed Overhead Volume Variance (FOVV) are divided under three variances:

(a) Efficiency Variance (b) Capacity Variance (c) Calendar Variance

(a) Fixed Overhead Efficiency Variance (FOEV) = (Absorbed fixed overheads – Standard fixed overheads)

= (Standard hour for the actual output – Actual hour) × Standard fixed overhead rate

(b) Fixed Overhead Capacity Variance (FOCV) = (Std. fixed overheads – Budgeted Overheads)

= (Actual Hour – Budgeted Hour) × Standard Fixed Overhead Rate

(c) Fixed Overhead Calendar Variance (FOCV) = (Actual number of working days – Standard number of working days) × Standard fixed rate per day

or = (Revised Budgeted Hour – Budgeted hour) × Standard fixed rate per hour

Where,



Revised Budgeted Hours = (Actual days × [Budgeted Hours/Budgeted Days])

Illustration 6: The information has been extracted from the GHJ company. Estimate the overhead variances using the information provided below:-

Particulars	Budget	Actual
Output given in units	20000	22000
Hours	20000	23000
Fixed overhead	55000	60000
Variable overhead	70000	78000
Number of working days	24	25

Answer:

Standard hours per unit = Budgeted hours/Budgeted Units = $20000/20000 = 1$ hr.

Standard hours (SH) for the actual output = $22000 \times 1 = 22000$

Standard overhead (SO) rate per hour = Budgeted overhead/Budgeted hour

In case of the fixed overheads = $55000/20000 = ₹2.75$

In case of the variable overheads = $70000/20000 = ₹3.50$

Standard fixed overheads rate per day = $55000/25 = ₹2200$

Recovered overheads = Standard hour for the actual output × Standard rate

In case of the fixed overheads = $22000 \times 2.75 = ₹60500$

In case of the variable overheads = $22000 \times 3.50 = ₹77000$

Standard overhead (SO) = Actual hour × Std. rate

In case of the fixed overheads = $23000 \times 2.75 = ₹63250$

In case of the variable overheads = $23000 \times 3.50 = ₹80500$

Revised budgeted hour = (Budgeted hour/Budgeted day) × Actual day

= $(20000/24) \times 25 = 2083.3$ hours

Revised budgeted overheads for fixed overheads = $2083.3 \times 2.75 = ₹5729.08$



Calculation of fixed overhead variance:-

- (i) Fixed overhead cost variances = Recovered overhead (RO) – Actual overhead (AO) =
 $60500 - 60000$
 $= ₹500 (F)$
- (ii) Fixed overhead expenditure variances = Budgeted overheads – Actual overheads
 $= 55000 - 60000 = ₹5000 (A)$
- (iii) Fixed overhead volume variances = Recovered overheads – Budgeted overheads
 $= 60500 - 55000 = ₹5500 (F)$
- (iv) Fixed overhead efficiency variances = Recovered overheads – Standard overheads
 $= 60500 - 63250 = ₹2750 (A)$
- (v) Fixed overhead capacity variances = Standard overheads – Revised budgeted overheads
 $= 63250 - 5729.08 = ₹57520.92 (F)$
- (vi) Calendar variance = (Actual days – Budgeted days) × Std. rate per day
 $= (25-24) \times 2200 = ₹2200 (F)$

Calculation of the variable overhead variance:-

- (i) Variable overhead cost variances = Recovered overheads – Actual overheads
 $= 77000 - 78000 = ₹1000 (A)$
- (ii) Variable overhead expenditure variances = Standard overheads – Actual overheads
 $= 70000 - 78000 = ₹8000 (A)$
- (iii) Variable overhead efficiency variances = Recovered overheads – Standard overheads
 $= 77000 - 80500 = ₹3500 (A)$

Sales variances - Those variances that occur because of change in the actual sales price and the actual quantity of sold units from what it was budgeted have been termed as sales variance(s).

$$\text{Sales value variance} = \text{Actual sale(s)} - \text{Budgeted sale(s)}$$
$$= (\text{Actual price} \times \text{Actual quantity}) - (\text{Budgeted price} \times \text{Budgeted quantity})$$

In case variances have been given on the basis of margin then

$$\text{Sales margin variance} = \text{Actual margin} - \text{Budgeted margin}$$

$$\text{Actual margin} = \text{Actual sale price per unit} - \text{Std. cost per unit}$$

$$\text{Budgeted margin} = \text{Budgeted sales price per unit} - \text{Std. cost per unit}$$



The sales value variance has been divided into sales price variances and sales volume variances

- (i) **Sales price variance** = Actual quantity (Actual price – Budgeted price)
In case variance have given on margin basis
Sales price variance = Actual quantity (Actual margin – Budgeted margin)
- (ii) **Sales volume variance** = Budgeted price (Actual quantity – Budgeted quantity)
In case variances have given on margin basis
Sales margin volume variance = Budgeted margin (Actual quantity – Budgeted :quantity)

Illustration 7: Ascertain the sales variances from the following information:-

Service	Budgeted Quantity (BQ)	Budgeted price (BP)	Actual quantity (AQ)	Actual price (AP)
A	3000	2	2600	2.50
B	2500	5.50	2000	4
C	1000	8	900	7.50

Answer:

Service	BQ × BP	AQ × AP	AQ × BP
A	6000	6500	5200
B	13750	8000	11000
C	8000	6750	7200
Total	27750	21250	23400

- (i) Sales price variance = $AQ (AP - BP) = (AQ \times AP) - (AQ \times BP) = (21250 - 23400) = ₹2150 (A)$
- (ii) Sales volume variance = $BP (AQ - BQ) = (BP \times AQ) - (BP \times BQ) = (23400 - 27750) = ₹4350 (F)$
- (iii) Total variance = Actual sales – Budgeted sales = $21250 - 27750 = ₹6500(F)$



6.6 SUMMARY

Standard costing refers to the pre specified costs used as benchmark for measuring efficiency where actual costs must be incurred under the given situations. Further, analysis of variances involves measuring the deviations of the actual performance from that of desired performance, and then gauging the reasons of those deviations with a view to take remedial actions on timely basis. Variance are bifurcated on the basis of cost variances and sales variances. Moreover, as labour is also involved into the business operations, which call for measuring labour variances which is another form of variances. Overhead variances have been categorised in two parts – fixed and variable. Variable overhead varies directly with the production on the other hand fixed overheads are dependent on the activity level or volume and any changes in the activity level leads to changes in overhead rates as well.

6.7 GLOSSARY

- **Standard cost** : Pre specified cost of any product or service.
- **Standard costing** : A method of cost accounting that compares each product pr service standard cost with that of the actual cost for determining the effectiveness of a company.
- **Standard hour** : The output quantity that must be produced in an hour.
- **Ideal standard** : It is a standard that has been fixed under ideal circumstances.
- **Fixed overhead variance** : It is variation between the standard fixed overhead and the actual fixed overhead.
- **Variable overhead variance** : The variation in between the actual overhead and standard variance overhead.
- **Sales value variance** : It is the difference between actual overhead variances sales and budgeted sales.
- **Variances** : The difference between the actual costs and the pre-determined costs.

**6.8 ANSWERS TO IN-TEXT QUESTIONS**

Ans 1) – a) True, b) True, c) False, d) False, e) True

Ans 2) – a) Standard Costs, b) Variances, c) Measuring efficiency

Ans 3) - a) True, b) True, c) True, d) False

6.9 SELF-ASSESSMENT QUESTIONS

1. Explain your understanding on standard costing.
2. Mention the purpose of standard costing.
3. You are working in a company as team leader for setting up standard costing system. In lieu of this state how would you assure success of this system?
4. Describe how the standards are fixed?
5. Explain briefly the following terms:-
 - a) Normal Standard
 - b) Ideal Standard
 - c) Basic Standard
 - d) Standard Hour
6. From the following information of the Reliance group evaluate the material usage, price and total cost of variance (considering quantity of 1,000 kg).

The 10kg of sanitizer, the requirement of standard raw materials X and Y are:

Material	Quantity	Per kg rate
X	10	9
Y	7	5

However, because it is being anticipated by the company that demands for sanitizer might increases leading to production of 1,000kg of sanitizer. This makes the actual consumption as:

Material	Quantity	Per kg rate
X	500	10



Y	350	8

7. From the following provided by the TCZ company, you are required to calculate the following labour variances: -

- Labour cost variances
- Labour rate variances
- Labour efficiency variances
- Labour mix variances

Type of workers	Standard wages	Actual wages
Skilled worker	85 workers @ ₹1.50 per hours	78 workers @ ₹2 per hours
Unskilled worker	73 workers @ ₹4 per hours	75 workers @ ₹1 per hours
	Budgeted hours 1100	Actual hours 950

8. The information provided has been obtained from the AXC company records. Since you are working as a Cost accountant in this company, so you wanted to know the position of the overhead variances. Hence in this respect estimate the following: -

- Fixed overhead variances
- Variable overhead variances

Particulars	Standard	Actual
Production	2000 units	1500 units
Number of working days	10	12
Fixed overhead	30000	27000
Variable overhead	10000	9000

9. Compute the sales value variances, sales price variance and sales volume variance as per the details provided from the records of GYT company: -

Product	Budgeted Quantity (BQ)	Budgeted price (BP)	Actual quantity (AQ)	Actual price (AP)
X	2200	5	3000	4
Y	3400	2.50	1400	6.25



Z	1100	4	3700	5
T	3200	7.45	4750	3.75

6.10 REFERENCES & SUGGESTED READINGS

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LESSON 7

BUDGETS AND BUDGETARY CONTROL

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STRUCTURE

- 7.1 Learning Objectives
- 7.2 Introduction
- 7.3 Meaning of Budget and Steps in Budgetary Control
 - 7.3.1 Meaning of Budget, Budgeting and Budgetary Control
 - 7.3.2 Objectives and Functions of Budgeting
 - 7.3.3 Advantages of Budgeting
 - 7.3.4 Disadvantages of Budgeting
 - 7.3.5 Steps in Budgetary Control
- 7.4 Types of Budgets
 - 7.4.1 Sales Budget
 - 7.4.2 Production Budget
 - 7.4.3 Raw Material Consumption Budget
 - 7.4.4 Raw Material Purchase Budget
 - 7.4.5 Overheads Budget
 - 7.4.6 Cash Budget
 - 7.4.7 Master Budget
 - 7.4.8 Fixed and Flexible Budget
- 7.5 Zero-Based Budgeting
- 7.6 Summary
- 7.7 Practical Problems
- 7.8 Glossary
- 7.9 Answers to In-text Questions
- 7.10 Self-Assessment Questions



7.11 References

7.12 Suggested Readings

7.1 LEARNING OBJECTIVES

After studying this chapter, the students will be able to understand:

- Meaning of Budget, Budgeting and Budgetary Control
- Distinction between Budget and Forecast
- Objectives and functions of the Budget
- Advantages and disadvantages in budgeting
- Budgeting Process
- Steps involved in Budgetary control.
- Various types of Budgets.
- Distinction between Fixed and Flexible Budgeting.
- Zero Based Budgeting and its comparison with Traditional Budgeting

7.2 INTRODUCTION

Every company makes plans. Some plans are more formal than others and some companies plan more formally than others but all make same attempt to consider the risk and opportunities that lie ahead and how to face them. In most businesses this process is formalised in short-term with considerable effort put into preparing annual budgets and monitoring performance against those budgets. Budgeting is a management tool used for short-term planning and control.

For effective running of a business, management must know:

- Where it intends to go i.e. organizational objectives
- How it intends to accomplish its objectives i.e. plans
- Whether individual plans fit in the overall organizational objective i.e. coordination and
- Whether operations conform to the plan of operations relating to that period i.e. control.

Budgetary Control is the device that a company uses for all these purposes.



7.3 MEANING OF BUDGET AND STEPS IN BUDGETARY

7.3.1 Meaning of Budget, Budgeting and Budgetary Control:

Budget: CIMA has defined a Budget as “a financial and/or quantitative statement, prepared and approved prior to a defined time, of the policy to be pursued during that period for the purpose of attaining a given objective”

A budget is necessary to plan for the future, to motivate the staff associated, to coordinate the activities of different departments and to control the performance of various persons operating at different levels.

ACTIVITY

Suppose you are planning to travel with your friends, You are required to prepare a Budget including all the expected expenditures keeping in mind the following:

1. Budget has to be in monetary terms.
2. It should only consider quantitative aspect.
3. It has to be for defined period of time

Budgeting

Budgeting is the whole process of designing, implementing and operating budgets. The main emphasis in this is short-term budgeting process involving the provision of resources to support plans which are being implemented.

Budgetary Control

CIMA has defined Budgetary Control as “the establishment of budgets relating the responsibilities of executives to the requirements of a policy, and the continuous comparison



of actual with budgeted results, either to secure by individual action the objective of that policy or to provide a basis of its revision”.

Difference between Budget and Forecast

S. No.	Forecast	Budget
1	an estimate of what is likely to happen. It is a statement of probable events	Depicts the policy and programme to be followed in a period under planned conditions
2	Forecasts, being statements of future events, do not connote any sense of control	A budget is a tool of control since it represents actions that can be shaped according to will so that it can be suited to the conditions which may or may not happening
3	Forecasting is a preliminary step for budgeting. It ends with the forecast of likely events.	It begins when forecasting ends. Forecasts are converted into budgets
4	Forecasts are wider in scope	Budgets have limited scope

7.3.2 Objectives and Functions of Budgeting:

The following are the various objectives and functions of budgeting:

- a) **Planning:** Planning is an important managerial function. Budgeting allows us to plan ahead of time what to do, how to do it, when to do it, and who will do it. Planning enables managers to anticipate and plan for contingencies in order to achieve their goals. Budget preparation motivates managers to plan ahead of time. Thus, budgeting is an important planning device.
- b) **Coordination:** To coordinate is to harmonise all the activities of a company so as to facilitate its working and its success. Coordination will lead to following results:
 - Each department will work in harmony with others
 - Each department will know their specific role to play in the accomplishment of overall organizational objectives
 - Overlapping of activities and wastage of time and labour could be avoided by the sequential arrangement of activities of different departments
- c) **Communication:** Budgets effectively communicate the information to the employees within the organization. Budgets keep different sections of the



organization informed about the contribution of different sub-units in the attainment of overall organizational objective.

- d) **Control:** Budgets act as a great tool to control various activities within the organization. Many 'adjustments' are made to make functional budgets align with organisational goals.
- e) **Performance Evaluation:** Budgets assist businesses in determining variances by comparing budgeted, estimated, or anticipated activity against actual activity. Budgets also aid in reviewing employee performance to determine whether or not they have met the business's objectives.

7.3.3 Requirements of a Good Budgeting System:

Following are the requirements of a good budgeting system.

- Budgeting process should be backed and well supported by the CEO of an organization
- The organizational goal should be quantified and clearly stated
- The organizational goal must be divided in functional goals
- All employees should mentally accept the exercise of budget preparation
- The persons responsible for the execution of budget should participate in budget preparation
- The budget should be realistic and attainable
- The budgeting should be a continuous process
- Periodic reports should be prepared to compare the actual results with the budgeted one to find out the deviations

7.3.3 Advantages of Budgeting:

The following advantages of budgeting are:

1. A budget forces management to plan ahead so that long-term objectives are achieved
2. It establishes a basis of internal audit by regularly evaluating departmental results
3. All members of top management participate in budget committee. For this reason even planning at departmental level gets benefit of experience of seasoned executives
4. All functional heads are compelled to make plans in harmony with the plans of other departments
5. Only reporting information which has not gone according to plan, it economises on managerial time and maximises efficiency. This is called 'Management By Exception' reporting



6. Scarce resources should be allocated in an optimal way, thus controlling expenditure
7. Communication increased throughout the company and coordination also improves
8. Areas of efficiency and inefficiency are identified. Remedial measures are taken with the help of variance analysis
9. People are made responsible for items of cost and revenue
10. It facilitates periodic self-analysis of the organisation
11. It helps in obtaining bank credit

7.3.4 Disadvantages of Budgeting:

Budgeting has numerous benefits, but it also has some drawbacks. The following are some of the drawbacks of budgeting:

1. Budgeting is based on estimation. As a result, it is subjective in nature, and those involved in budgeting exercise their discretion. As a result, budgeting based on inaccurate estimates is pointless.
2. The circumstances are changing constantly and therefore, budgets and budgetary techniques will not be useful, till they are continually adapted
3. Budgeting could only be successful only when there is coordination and cooperation among all the departments, management, and employees and thus, the organization will be able to achieve its goals and objectives.
4. Budgeting is just a tool to control the business activities and can only help in achieving the objectives of the company only when all managerial functions are performed efficiently and effectively
5. Preparing a budget is time-consuming and requires great amount of effort
6. Management places a lot of pressure on lower-level employees to achieve goals, which causes them to offer inaccurate information to upper-level management.
7. When upper level employees see that the expenses that have occurred are far less than those that were intended, they have an urge to spend more extravagantly, resulting in a decrease in the company's revenues.

7.3.5 Steps in Budgetary Control:

The following steps are to be followed in budgetary control:

1. Standards are established
2. Actuals are measured
3. Comparison of standards with the actuals done
4. Finding out deviations



5. Remedial measures taken

Features of budgetary control:

1. Establishment of budgets for each purpose of the business.
2. Revision of budget in view of changes in conditions.
3. Comparison of actual performances with the budget on a continuous basis.
4. Taking suitable remedial action, wherever necessary.
5. Analysis of variations of actual performance from that of the budgeted performance to know the reasons thereof.

IN-TEXT QUESTIONS

1. A quantitative expression of management objectives is a (n) _____
2. Is budget futuristic in nature? Yes / No
3. Budgeting system _____ key managerial functions.
4. Budget is prepared for a _____ period of time.
5. The first step in Budgetary control is to _____.

7.4 TYPES OF BUDGETS

To achieve the overall companies' objectives, the company makes various types of budgets. Let us study few of them.



7.4.1 Sales Budget

The sales budget is the most common functional budget. If sales figure is incorrect, practically all functional budgets and consequently the master budget will get affected. Sales budget can be prepared showing sales under any one or combination of the following headings:

1. Product
2. Territory
3. Types of customers
4. Salesman
5. Month, quarter, week

The exercise of preparing sales budget can be broadly divided into two categories:

1. Sales Forecast
2. Evaluating Sales Forecast

7.4.2 Production Budget

After having established sales budget, production budget is made as it shows the quantities to be produced for achieving sales targets and keeping sufficient inventories. Budgeted



production is equal to projected sales plus closing inventory of finished goods minus opening stock of finished goods. Thus, production budget is based on sales budget and desired inventory levels. Production budget is prepared in physical units.

$$\text{Units to be produced} = \text{Budgeted Sales (+) Desired Closing Stock (-) Opening Stock}$$

Illustration 1:

The Rama & Company plans to sell 1,08,000 units of a certain product line in 1st quarter, 1,20,000 units in 2nd quarter, 1,32,000 in 3rd quarter, 1,56,000 units in 4th quarter and 1,38,000 units in the 1st quarter of the following year. At the beginning of the 1st quarter of the current year, there are 18,000 units in stock. At the end of each quarter the company plans to have an inventory equal to 1/6th of the sale for the next quarter. How many units must be manufactured in each quarter of the current year?

Solution:

$$\text{Production} = \text{Sales} + \text{Closing Stock} - \text{Opening Stock}$$

Rama & Company Production Budget

Particulars	1 st Qtr. (Units)	2 nd Qtr. (Units)	3 rd Qtr. (Units)	4 th Qtr. (Units)
Sales Budget	1,08,000	1,20,000	1,32,000	1,56,000
+ Closing Inventory	20,000	22,000	26,000	23,000
Total	1,28,000	1,42,000	1,58,000	1,79,000
- Opening Inventory	18,000	20,000	22,000	26,000
Estimated Production	1,10,000	1,22,000	1,36,000	1,52,000

7.4.3 Raw Material Budget

Direct Materials budget is prepared to compute standard material cost per unit. The Raw Material Budget budget shows the projected quantity of all raw materials and components required for the production budgeted. This budget serves the following purposes:

- It helps the purchasing department to plan purchase schedule to avoid default in delivery of material
- It forms basis for purchase cost budget



- It forms basis for determination of minimum and maximum levels of inventory of material and components

7.4.4 Purchase Budget

Purchase budget sets out 'purchase' plan of the company during the budget period. Material budget only gives an idea of the material requirements of the company during the budget. For preparing purchase budget, it is also necessary to know the level of inventories to be maintained. The purchase budget can be expressed in terms of both quantity and monetary value. The governing points for preparation of purchase budget are:

1. Opening stock of different types of materials and components
2. Closing stock of different types of materials and components
3. Orders already placed
4. Storage space available
5. Economic Order Quantity
6. Price to be paid
7. Seasonal discounts that can be availed of
8. Finance available

7.4.5 Cash Budget

A cash budget is a concise statement of a company's expected cash revenues and payments over a given time period. A cash budget projects cash inflows and outflows over some specified period of time. The basis is mostly the sales forecast and the level of assets that will be required to meet those forecasts. A cash budget can be created for any interval but firms typically use a monthly cash budget for the coming year, mostly for planning purposes and a daily or weekly budget for actual cash control.

A typical cash budget consists of three sections:

- Sales and Expenses worksheet that summarizes the firm's sales income and expenses incurred in purchasing materials
- Cash Gain or Loss section that indicates the cash inflows and outflows with the 'bottom line' indicating either a gain or loss
- Cash surplus or Loan requirement (Net Cash Balances) section that summarizes the firm's surplus cash held or total loans needed.

This will be estimated by deducting total expenses for a given period e.g. a month from the total cash receipts for that period. The result will either indicate a surplus or deficit.

-In case of surplus, it can be invested in bonds, equities or in savings accounts



- **In case of a deficit**, it can be bridged by:

1. Borrowing short-term funds e.g. through overdrafts.
2. Delaying capital expenditures until the firm's cash position improves.
3. Requesting suppliers for a longer credit period.
4. Delay payment of taxes.
5. Postpone payment of dividends.

Note: Since the cash budget represents a forecast, all the values shown are expected values.

- If the firm's inflows and outflows are not uniform over the budget interval, the cash budget for that period will overestimate or underestimate the firm's cash needs.
- A cash budget can be used to help set the firm's target cash balance i.e. the desired cash balance that a firm plans to maintain in order to conduct business. The target balance can be adjusted over time depending on the size of the firm's operations during various business cycles
- Even though depreciation amounts do not appear directly in the budget, they still affect the amount of taxes shown

Advantages of Cash Budget

1. Helps determine future cash flows thus enabling the company to plan for its financing.
2. Helps management know when to borrow and how much to borrow.
3. Helps in determining when there will be a cash surplus so management can plan for its use i.e. whether to pay dividends or invest in short-term securities.
4. Helps management to control expenditure based on the forecasted income and expenditure.
5. Assists management in planning for its obligations and knowing when and how to meet those obligations.
6. Strengthens the liquidity position of a company since it helps a company know its accurate cash position and what measures to take depending on its position.

Disadvantages of Cash Budget

1. Uncertainty – It assumes that everything remains constant while in reality, anything can actually happen.
2. Forecasting budgets isn't always accurate since one can predict expenses but can't accurately predict income / sales
3. Requires highly skilled personnel to forecast and prepare a cash budget
4. If there is any deviation from the fixed budget, a new budget has to be designed again.

Format of Cash Budget

Particular	January	February	March
Opening Cash Balance	-	-	-
Add: Cash Receipts:			



Cash Sales	-	-	-
Receipts from Debtors	-	-	-
Interest received	-	-	-
Dividend Received	-	-	-
Sale of fixed assets / Investments	-	-	-
Bank Loan	-	-	-
Issue of Equity Shares	-	-	-
Issue of Debenture	-	-	-
Others cash receipts	-	-	-
Total Receipts (A)	-	-	-
Less: Cash Payments			
Cash Purchases	-	-	-
Payment to creditors	-	-	-
Salaries paid	-	-	-
Wages paid	-	-	-
Administrative expenses	-	-	-
Selling expenses	-	-	-
Dividend paid	-	-	-
Purchase of long-term assets	-	-	-
Repayment of Loan	-	-	-
Taxes Paid	-	-	-
Total Payments (B)	-	-	-
Closing Balance (A - B)	-	-	-

7.4.6 Master Budget

The Master Budget is consolidated summary of the various functional budgets. Master Budget is defined as “a summary of the budget schedules in capsule form made for the purpose of presenting, in one report, the highlights of the budget forecast”.

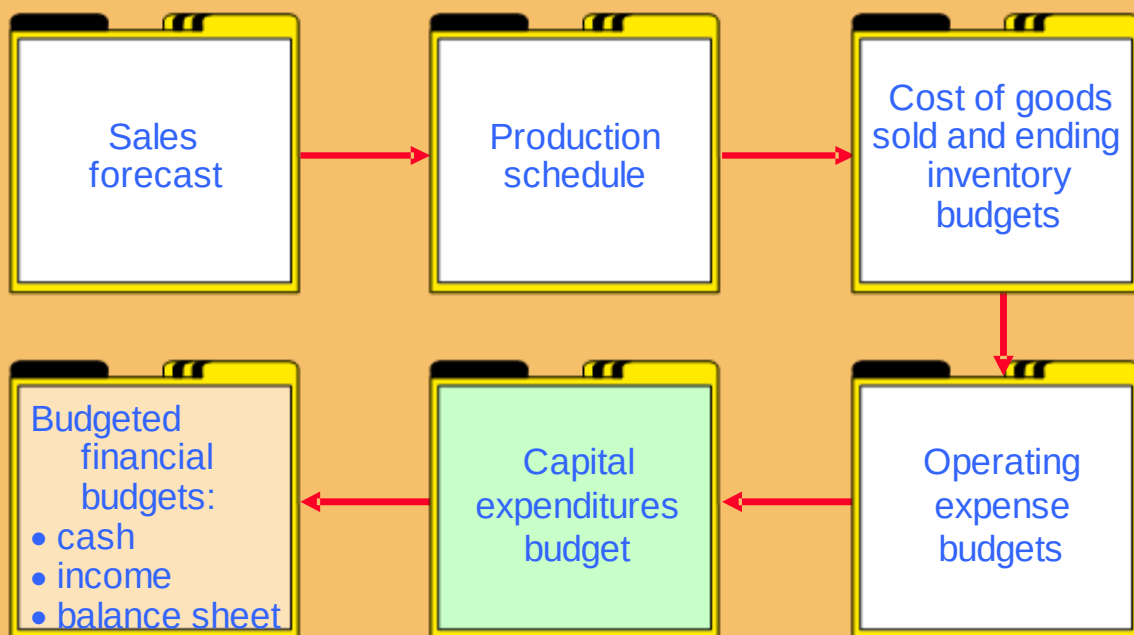
The master budget is prepared by the budget committee on the basis of co-ordinated functional budgets and becomes the target for the company during the budget period when it is finally approved by the committee. This budget summarises functional budgets to produce a Budgeted Profit & Loss Account and a Budgeted Balance Sheet as at the end of the budget period.

Advantages of the Master Budget are as follows:

1. A summary of all functional budgets in capsule form is available in one report
2. The accuracy of all the functional budgets is checked because the summarised information of all functional budgets should agree with the information given in the master budget
3. It gives an overall estimated profit position of the company for the budget period



The Master Budget



McGraw-Hill/Irwin

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7.4.7 Fixed and Flexible Budget

FIXED BUDGET: A fixed budget is a budget that does not change during the budget period. It is prepared for a particular activity level and it does not change with actual activity level being higher or lower budgeted activity level. This budget does not highlight the 'activity variance'. In this budget, there is no absolute difference between budgeted figures and actual figures.

Following are the advantages of fixed budget:

1. It is misleading
2. It is inadequate for control purposes
3. It violates logic



FLEXIBLE BUDGET: A flexible budget is a budget which is designed to change as volume of output changes – CIMA. The flexible budget is also known as a variable budget because it keeps on fluctuating. A flexible budget takes into account the cost classification into fixed, variable, and semi-variable.

A flexible budget may be more effective in the following circumstances:

- When the level of activity varies from one period to the next.
- Where the firm is new and forecasting demand is tough.
- Where the organisation is experiencing a scarcity of any production element. For example, material, labor, and so on, as the amount of activity is determined by the availability of such a thing.
- Where the nature of the business is such that sales fluctuate.
- Where changes in fashion or trend have an impact on production and sales.
- Where the organisation frequently offers new products or changes the patterns and styles of its products.
- When a significant portion of output is destined for export.

Format of Flexible Budget

Particulars	Capacity Utilization		
	50%	70%	90%
Sales	xxx	xxx	Xxx
Less: Variable Overheads			
Contribution			
Less: Fixed Overheads			
Profit			



Difference between Fixed Budget and Flexible Budget

S. No.	BASIS	FIXED BUDGET	FLEXIBLE BUDGET
1.	Activity level	Based on one single activity	Based on different levels of activity
2.	Nature of the budget	Static in nature thus is rigid. That means this budget does not change with the level of output	Dynamic in nature and thus flexible. This means this budget changes with the level of output achieved
3.	Difficulty in comparing.	True picture is not depicted on comparing the actual level of output with the budgeted level of output	True picture is shown on comparing the actual level of output with the budgeted level of output
4.	Working conditions of the business	Assumes that the business conditions remain the same and does not consider this fact.	Assumes that the business situations keeps on changing and takes this fact into consideration.
5.	Differentiation in cost	Does not consider the difference between fixed cost, variable cost, and semi-variable cost	Consider the difference between fixed cost, variable cost, and semi-variable cost
6.	Cost ascertainment	Correct cost ascertainment is difficult as business working conditions are not static	Correct cost ascertainment is easy as the budget changes with the volume of output
7.	Tool for cost control	It has a limited application and is ineffective as a tool for cost control	It has more applications and can be used as a tool for effective cost control
8.	Price fixation	If the budgeted and actual activity levels vary, the correct cost ascertainment and fixation of prices become difficult	It helps in fixation of price and submission of tenders due to correct cost ascertainment



IN-TEXT QUESTIONS

6. The production budget is determined by the sales budget. True or false?
7. The budget that specifies the amount of raw materials that will be utilised during the manufacturing process is called as _____.
8. The raw material consumption budget and the raw material purchasing budget are the same. Yes/No
9. The _____ budget includes cash inflows and outflows.
10. A budget that is a compilation of all budgets is termed as _____.

7.5 ZERO-BASED BUDGETING

ZBB may be better termed as '*De nova budgeting*' or budgeting from the beginning without any reference to any base-past budgets and actual happening. Zero-Based Budgeting is a subset of budgeting. As the name implies, we start budget preparation from zero. In basic terms, we begin budget preparation from the scratch, that is, from the beginning. Zero Base Budgeting is:

1. A technique of planning and decision-making.
2. Reverses the working process of traditional [budgeting](#).
3. In traditional incremental budgeting, departmental managers need to justify only increases over the previous year budget. This means what has been already spent is automatically sanctioned.
4. In the case of ZBB, no reference is made to the previous level of expenditure. Every department function is reviewed comprehensively and all expenditures rather than only increases are approved.



5. ZBB is a technique, by which the budget request has to be justified in complete detail by each division manager starting from the Zero-base. The Zero-base is indifferent to whether the total budget is increasing or decreasing.

Advantages of Zero Base Budgeting:

1. Results in efficient allocation of resources as it is based on needs and benefits
2. Drives managers to find out cost effective ways to improve operations
3. Detects inflated budgets
4. Useful for service departments where the output is difficult to identify
5. Increases staff motivation by providing greater initiative and responsibility in decision-making
6. Increases communication and coordination within the organization
7. Identifies and eliminates wastage and obsolete operations.
8. Identifies opportunities for outsourcing.
9. Forces cost centers to identify their mission and their relationship to overall goals.

Disadvantages of Zero Base Budgeting:

1. Difficult to define decision units and decision packages, as it is very time-consuming and exhaustive.
2. Forced to justify every detail related to expenditure. The R&D department is threatened whereas the production department benefits.
3. Necessary to train managers. ZBB should be clearly understood by managers at various levels otherwise they cannot be successfully implemented. Difficult to administer and communicate the budgeting because more managers are involved in the process.
4. In a large organization, the volume of forms may be so large that no one person could read it all. Compressing the information down to a usable size might remove critically important details.
5. Honesty of the managers must be reliable and uniform. Any manager that is prone to exaggeration might skew the results.



Traditional budgets are based on historical performance and costs from the previous accounting period. However, with Zero-Based Budgeting, we do not take anything from the prior accounting period.

We focus on the goals and objectives that we need to achieve in zero-based budgeting, and the rest of the budgeting technique is the same as we do in traditional budgeting.

Comparison of ZBB from Traditional Budgeting is as follows:

TRADITIONAL BUDGETING	ZERO-BASED BUDGETING
It takes into consideration the previous accounting period's data to make the new budget.	It does not take into consideration the previous accounting period's data for making the new budget, rather it starts from scratch.
It has a major focus on money.	It has a major focus on the attainment of goals and objectives.
It does not consider different approaches.	It takes different approaches to achieve similar results.



IN-TEXT QUESTIONS

11. Zero base Budgeting means starting from the ____.
12. Zero base Budgeting takes into consideration previous accounting period's data. True/False
13. Zero base Budgeting is time-consuming. Yes/No
14. Traditional Budgeting takes into consideration previous accounting period's data. True/False
15. The primary emphasis of Zero-based Budgeting is on ____ and ____.
16. Following tools can be used to create interest among the learners:
 - a) Jargons
 - b) complex language
 - c) Pictures
 - d) repetitive sentences
17. **Fill up the blanks:**
 - a. Budget is drawn for ____.
 - b. Key factor is also known as ____.
 - c. ____ requires classifications of cost as fixed, variable and semi-variable.
 - d. Flexible budget is drawn for ____ level of activity.
 - e. ____ budget is prepared for a longer period.
 - f. ____ is a summary of all the functional budgets.
 - g. ____ shows estimate of sales in future.
 - h. Flexible budget is useful for ____.
 - i. Budget defines ____ of a concerned manager.
 - j. ____ shows budgeted receipts and payments.

[Ans.: a. Future, b. Limiting factor, c. Flexible budget, d. Fixed, e. Capital, f. Master budget, g. Sales budget, h. Control, i. Responsibility j. Cash budget.]



7.6 SUMMARY

In a nutshell, a budget is a financial statement that is based on estimates. And if there are any differences between the intended level of activity and the activity achieved, these are referred to as deviations, and corrective procedures can be implemented to address them. The budget serves as a regulating tool and aids in the achievement of the organisation's goals and objectives. Budgets are classified into several types, including sales budgets, production budgets, raw material consumption budgets, raw material purchase budgets, cash budgets, master budgets, fixed budgets, and flexible budgets. There is also the idea of zero-based budgeting, which indicates that no data from prior accounting periods is used and the budget is created from start.

7.7 PRACTICAL PROBLEMS

1. Bharat Forging Limited manufactures a single product for which market demand exists for additional quantity. Present sales of Rs.60,000 per month utilises only 60% capacity of the plant. Marketing Manager assures that with the reduction of 10% in the price he would be able to increase the sale by about 25% to 30%.

The following data are available:

Selling Price	Rs.10 per unit
Variable Cost	Rs.3 per unit
Semi-variable Cost	Rs.6,000 fixed + 50 paise per unit
Fixed Cost	Rs.20,000 at present level estimated to be Rs.24,000 at 80% Output

You are required to prepare the following statements:

- a) The operating profits at 60%, 70% and 80% levels at current selling price, and
- b) The operating profits at proposed selling price at the above levels



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

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

The current selling price Rs.100 per unit.

At 60% working, material cost per unit increases by 2% and selling price per unit falls by 2%

At 80% working, material cost per unit increases by 5% and selling price per unit falls by 5%

Estimate profits of the factory at 60% and 80% working and offer your comments.

3. Based on the following information, prepare a Cash Budget for the three months ending 30th June, 2022

Month	Sales	Materials	Wages	Overheads
February	Rs.14,000	Rs.9,600	Rs.3,000	Rs.1,700
March	Rs.15,000	Rs.9,000	Rs.3,000	Rs.1,900
April	Rs.16,000	Rs.9,200	Rs.3,200	Rs.2,000
May	Rs.17,000	Rs.10,000	Rs.3,600	Rs.2,200
June	Rs.18,000	Rs.10,400	Rs.4,000	Rs.2,300

Credit Terms are:

- Sales / Debtor – 10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month.
- Creditors: Materials 2 months, Wages $\frac{1}{4}$ month, Overheads $\frac{1}{2}$ month
- Cash and Bank Balance on 1st April, 2022 is expected to be Rs.6,000



Other relevant information is:

- Plant & Machinery will be installed in February 2022 at a cost of Rs.96,000. The monthly installments of Rs.2,000 is payable from April onwards.
- Dividend @ 5% on Preference Share Capital of Rs.2,00,000 will be paid on 1st June.
- Advance to be received for sale of vehicles Rs.9,000 in June
- Dividends from investments amounting to Rs.1,000 are expected to be received in June.
- Income Tax (advance) to be paid in June is Rs.2,000

7.8 GLOSSARY

- **Deviation:** It shows the amount of difference between the two things.
- **Remedial Action:** The corrective action which needs to be taken in the case of deviation.
- **Attain:** To attain anything is to achieve something.
- **Target Audience:** A group of people who will become our potential customers.
- **Allocation of expenses:** It means assigning a particular expense to a particular unit.
- **Aggregation:** It is the sum total of all.
- **Ascertainment:** It means to find out something.

7.9 ANSWERS TO IN-TEXT QUESTIONS

1. Quantitative Statement	9. Cash budget
2. False	10. Master budget
3. Yes	11. Scratch or zero
4. Defined	12. False
5. Set Standards	13. Yes
6. True	14. True
7. Raw material consumption budget	15. Goals and Objectives
8. No	



7.10 SELF-ASSESSMENT QUESTIONS

1. Define budgetary control.
2. Define budget and budgetary control. State the advantages of budgetary control in an organization.
3. Distinguish between cost control and cost reduction.
4. Distinguish between fixed and flexible budget. Briefly state the circumstances in which flexible budgets are used.
5. Write short note on Zero Based Budgeting?

7.11 REFERENCES

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7.12 SUGGESTED READINGS

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LESSON 8

COST MANAGEMENT

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STRUCTURE

- 8.1 Learning Objectives
- 8.2 Introduction
- 8.3 Cost Management, Cost Control and Cost Reduction
- 8.4 Strategies for Cost Management
- 8.5 Activity Based Costing
- 8.6 Accounting And The Theory Of Constraints (TOC)
- 8.7 Throughput Accounting
- 8.8 Target Costing
- 8.9 Value Chain Analysis
- 8.10 Life Cycle Costing
- 8.11 Just-In-Time (JIT)
- 8.12 Backflush Costing
- 8.13 Summary
- 8.14 Glossary
- 8.15 Self-Assessment Questions
- 8.16 References
- 8.17 Suggested Readings



8.1 LEARNING OBJECTIVES

Learning objectives of this unit are:

- Explain the concept of cost management, cost control and cost reduction
- Describe activity based costing in detail
- Concept of value chain analysis
- Target costing and life cycle costing
- Modern accounting techniques like throughput and backflush costing

8.2 INTRODUCTION

The business environment has changed considerably over last few decades. Many of the organisations have already adopted automated modes for most of their operations following the lean business model resulting in decrease in direct labour but increase in indirect overheads. Therefore, direct labour is no more considered a good base or predictor for overheads allocation. Besides that, increased competition in the market has led to emergence of organisations that are manufacturing multiple types of products or services. Diverse nature of manufactured products or services generally consume resources or overheads in different proportion and it is not possible to correctly capture this diversity by following traditional costing systems.

8.3 COST MANAGEMENT, COST CONTROL AND COST REDUCTION

Companies utilise cost reduction analysis as a method to lower their expenses and boost earnings. Depending on the goods or services they provide, many businesses adopt various strategies. Every choice made during the product development process has an impact on the price.

Companies frequently launch new products without concentrating on how much value there will be. However, the importance of pricing changes drastically when market rivalry rises and prices of goods and services become a significant point of differentiation.



The action is regulated by cost management to maintain the cost components within the predetermined bounds. Contrarily, cost reduction refers to a real, long-term decrease in the unit price. Understanding the distinction between cost reduction and cost control will be helpful.

8.3.1 Control of Costs

The goal of cost control is to rationalise overall value through the use of competitive analysis. The goal of this technique is to keep the real price in line with the specified policy. The operational costs must not exceed the budgeted amount, thus this must be ensured.

Cost control encompasses a number of tasks, beginning with the creation of the budget for the operation, evaluation of the performance, computation of the differences between the actual costs and the budgeted value, and identification of the causes of those differences. The final task is carrying out the appropriate corrections to address the discrepancies.

Importance of Cost Control and Cost Reduction

- Better utilization of resources
- To prepare for meeting a future competitive position
- Reasonable prices for the customers
- Firm standing in domestic and export markets
- Improved methods of production and use of latest manufacturing techniques which have the effect of rising productivity and minimizing cost
- Improves rate of return on investment
- Improves the image of the company for long-term benefits

8.3.2 What Distinguishes Cost Reduction from Cost Control?

The distinction between the two can be summed up as follows: cost management ensures that costs are within defined criteria; cost reduction focuses on trying to continuously improve costs while ignoring any standards.

The key advantages of cost reduction initiatives are that they can improve an organization's cash flow and profitability. The essential components and variables for programme design and



implementation are presented. The results of a cost-cutting programme can also be guaranteed to align with the organization's beliefs and aims. The fact that a corporation must implement a cost reduction programme is widely understood, especially given the abundance of options available to managers who are cost-conscious. Last but not least, a comprehensive tax reduction programme can lessen the heavy financial obligations that can stabilise a business's growth and can free up valuable capital that can result in the long-term advantage of the organisation.

S.No.	Cost Control	Cost Reduction
1	This process undertakes the competitive analysis of actual results with established norms	This process finds out the substitute by finding new ways or methods
2	Under this method, variances are appraised and reported and necessary course of action will be taken to revise norms, standards	Under this process, necessary steps are taken for further modification in the method
3	It starts from established cost standards and attempts to keep the costs of operation of a process in line with those of materials	It challenges the standards forthwith and attempts to reduce cost on a continuous basis
4	It is a preventive function	It is a corrective function
5	The main stress is on the present and past behaviour of costs	The emphasis is partly on the present costs and largely on future costs

8.4. STRATEGIES FOR COST MANAGEMENT

Businesses generally use different strategies to cut costs. The techniques include Just in Time (JIT), Activity-Based Costing (ABC), Value Engineering (VE), Target Costing (TC) and Life Cycle Costing. Some more advanced techniques like Throughput Costing and Backflush Costing.



8.5. ACTIVITY BASED COSTING

Consider the cost computation of manufacturing a product. It is not difficult to trace the cost of direct materials and labour on the cost object. Problem arises for overheads that are difficult to trace and need to be allocated taking some suitable and rational measure. The accuracy of allocation of overhead relates to how well the consumption of labour by the production activity tracks the incurrence of the overhead cost. If the incurrence of overhead is unrelated to consumption of direct labour, the allocation of overheads to the cost of object using direct labour as the base of allocation can cause significant errors. It should be made clear that choice of *any* base for allocation will be prone to some errors because the correlation between the overhead cost incurrence and the use of allocation base will be less than perfect. It can be considered a fundamental challenge when costs are not directly traceable while computing production cost. It produces the concept of activity based costing (ABC) as an alternative approach for cost allocation with aim to enhance the accuracy in overhead allocation by providing reliable estimates of product cost.

Activity Based Costing is a method of cost allocation that attempts to assign overheads cost to cost objects more accurately than the traditional costing methods. The basic idea underlying concept of ABC is that every order from a client or customer for a service or products triggers to number of activities; a number of different types of resources are required to carry out these activities; and money is involved in using these resources. Through activity based costing, an attempt is made to trace these costs directly to the activities causing them. The activities are believed to drive the cost, that's the reason they are called cost drivers.

CIMA defines ABC as “cost attribution to cost units on the basis of benefit received from indirect activities like ordering, setting-up, assuring quality”.

ABC has been defined as “the collection of financial and operational performance information tracing the significant activities of the firm to product costs”.

Definition of terms:

Cost Objects: The products under consideration for computing cost are generally cost objects. But with the widening of the scope of managerial consideration for numerous purposes besides computing cost, customers or clients, services that are being provided or even the area or territory can also be cost objects.



Activities: The most common term used in concern of ABC is "activity". An activity may be defined as the aggregation of various tasks or functions that are being performed concerning the cost objects. Activities can again be of two different types. It can be either any support activity or it can be any activity that is related to the process of production. Activities that are grouped under support activities need to be performed before or after the production process. For example, deciding about the schedule of production, setting up of machine, queuing the customer orders, an inspection of different items, etc., while activities performed during the process of production like using machines or assembling are called production process activities.

Cost pool: The cost centre described above may also sometimes be termed a Cost pool. Hence cost pool is nothing but the other name of the cost centre.

Cost Drivers: The reason or cause due to which some overhead occurs or is incurred, is known as a cost driver. In other words, cost drivers can be termed as the factor because of which the cost of production gradually changes. With the change in the level of cost driver, the level of the total cost of production also changes. Some examples of cost drivers are the setup of machines, an inspection of quality, scheduling of production orders, receiving material, shipments, units of power consumed, etc.

The activity measure expresses the carried out part of activity i.e. volume of activity. This activity measure is generally used as base for allocation of overheads to product and service cost. For example, number of complaints received from customers can be a natural choice of an activity measure for the activity *handling customer's complaints*.

Each activity has its own activity rate that is used to apply cost of overheads.

Predetermined Activity Rate = Estimated activity costs / Estimated activity volume

For example, the activity *maintenance* would be having their own activity cost pool. If we assume that total cost in this pool is ₹ 100,000 and total expected activity is 1000 hours, the activity rate will be ₹ 100 per maintenance hour. This amount calculated for activity rate is not dependent on number or size of job. Whether the job is big or small, all will be charged at the same rate per maintenance hour.

**Objectives of ABC:**

The primary objectives of ABC system are as follows:

- a. To improve the accuracy of product costs by carefully changing the type and number of factors used to assign costs, and
- b. To use this information to improve product mix and pricing decision

The other important objectives of ABC systems are as below:

- To identify value-added activities in transactions
- To chalk out ways to eliminate non-value added activities
- To distribute overheads on the basis of activities
- To ensure accurate product costing of decision-making process
- To focus the high cost activities
- To identify the opportunities for improvement and reduction of costs

8.5.1 Steps Involved In Designing Activity Based Costing System

Designing of activity based costing system requires commitment and time from almost all levels of managers and involves the following seven steps, which sometimes vary from organisation to organisations. These are general steps that are expected to be followed while implementing activity based costing (ABC). These steps are:

1. Identification of activities and creation of activity dictionary.
2. Creation of pools of activity cost.
3. Identification of consumed resources by individual activity cost pools.
4. Identification of activity measures for each cost pool.
5. Estimation of total activity volume for each cost measure.
6. Computation of predetermined activity rate for each activity cost pool.
7. Allocation of cost to the desired cost objects.



Step 1: Identification of activities and creation of activity dictionary

In most of the organisations, overheads are caused due to hundreds or even thousands of activities. For example taking calls over telephone, making invoices, ordering materials, training of staff, packaging and dispatching orders, etc. It may be extremely difficult to design and maintain a complex costing system that can include and record every activity. The main challenge faced while designing the activity based costing system may be identification of activities that are manageable and able to explain the variations in overhead costs. The simplest and most common way to do this is interviewing the broad range of managers to identify activities that they think are most relevant and consumes major portion of resources. This list may be more refined by consulting top managers; activities that are related can be combined that can help in reducing cost of keeping details and records. At the end of this process, an activity dictionary will be created that defines all the activities and how to measure them.

Step 2 : Creation of pools of activity cost

In manufacturing organisations, it is not necessary that all the activities mentioned in activity directory are performed every time whenever additional units are produced. Some activities may require to perform every time an additional unit is manufactured, but others may not be. To have more clarity regarding this aspect of activities, generally manufacturing units divide all activities into four groups

- a. **Unit level activities**, performed every time a unit is produced.
- b. **Batch level activities**, that consist of tasks that are required to be performed every time a batch or a lot is processed.
- c. **Product level activities**, that are related to specific products and must be performed every time regardless of number of batches or units produced.
- d. **Facility level activities**, also sometimes called as organisation sustaining activities and are regularly performed regardless of which products or how many batches are being manufactured. These are generally related to administration like salary, insurance etc., are combined into single cost pool and then allocated taking some arbitrary base such as direct labour-hours.

*Exhibit 8.1 Activities and Activity measures in a Manufacturing organisation*

Activity type	Activity	Activity Measure
Unit level	Assembly	Direct labour- hours
	Machining	Machine hours
Batch level	Production Scheduling	Number of orders
	Material Receipts	Number of receipts
	Product Testing	Number of tests
Product level	Administration of Parts	Number of parts numbers
Facility level	Factory general administration	Direct labour hours

Using such a classification allows the designer of ABC system to examine whether the activities can be combined in a meaningful manner so that system is simplified and proper activity measure can be identified to allocate cost to different cost objects.

Step 3: Identification of consumed resources by individual activity cost pools

Next important step after creation of cost pool is identifying the total cost that is consumed by each of the cost pool. For example to identify the resources consumed by a activity cost pool *testing of products*, expenses like time taken by tester, depreciation of testing equipment, supplies used during testing procedure are traceable and directly allocated to the cost pool. But other costs like rent of building, electricity, maintenance of building that are common across all of the activities cost pools, must be allocated to individual cost pools taking some suitable base, like rent of building can be allocated on the basis of percentage area allotted to testing activity. Other example for taking base for common expenses may be:

- Fringe benefits of employees - Direct labour hours
- Electricity – Number of machine Hours
- Maintenance of Equipment – Number of machine hours
- Maintenance of Factory – Area in Sq. Feet

**Step 4: Identification of activity measures for each cost pool**

After the determination of assigned amount of cost to each cost pool, the next is to assign the cost of the pool to the cost objects by using an activity cost measure. For example, once the total cost assigned to testing activity is determined, the next is to identifying the activity measure that will be used to allocate the cost of this cost pool to the final cost object, like number of testings' done on a particular cost object.

Step 5: Estimation of total activity volume for each cost measure

Remaining of the steps are related to designing the mechanism of activity pool cost allocation to final cost objects. Like in example of product testing activity, the activity volume will be the estimated numbers of tests conducted in a given period of time. Because testing of products generally is a batch level activity, it is dependent on volume of the estimated number of batches produced and policy of testing (like testing 10 batches per day), what will be the volume of activity measure.

Step 6: Computation of predetermined activity rate for each activity cost pool

The activity measure expresses the carried out part of activity i.e. volume of activity. This activity measure is generally used as base for allocation of overheads to product and service cost. For example, number of complaints received from customers can be a natural choice of an activity measure for the activity *handling customer's complaints*. Each activity has its own activity rate that is used to apply cost of overheads.

$$\text{Predetermined Activity Rate} = \text{Estimated activity costs} / \text{Estimated activity volume}$$

Step 7: Allocation of cost to the desired cost objects

At this stage, costs obtained from different cost pools are finally allocated to different cost objects using the activity rate and volume of activity measure consumed by this cost object. For example, if the activity rate per test is ₹ 55, and production of a particular product requires 100 test to be performed, 55×100 , i.e. 5500 will be assigned to this product. Here it is necessary to mention that the information regarding number of tests required must be gathered. Such information again can prove a tool to manage and control cost which might not be necessary under traditional costing system, and is generally considered a key plus point of ABC system.



Different categories of Cost Pools and its Cost Drivers

Cost Pools	Cost Drivers
Customer Order Processing	No. of customers No. of order source No. of orders by quantity No. of orders by value No. of customer visits
Material Planning / Acquisition	No. of items / parts / components No. of deliveries No. of material receipts No. of material orders No. of stock shortages / discrepancies No. of material transactions No. of material movements
Inspection and Quality Control	No. of inspections No. of rejections No. of product changes No. of set-ups Batch sizes
Production Control	No. of product changes No. of parts operational No. of production hours No. of machine changes No. of schedule changes No. of machine layout changes No. of set-ups



	No. of work orders
Maintenance	No. of set-ups No. of machine break-downs No. of defects Capital Expenditure Maintenance schedule
Research & Development	No. of research projects Technical complexities of projects
Customer Service	No. of service calls No. of products serviced No. of hours spent on servicing products

8.5.2. Accounting -Based Vs Traditional Costing

Assume the Busy Ball Company makes two types of bouncing balls; one has a hollow center and the other has a solid center. The same equipment is used to produce the balls in different runs. Between batches, the equipment is cleaned, maintained, and set up in the proper configuration for the next batch. The hollow center balls are packaged with two balls per package, and the solid center balls are packaged one per package. During the year, Busy Ball

Material Purchased	4,00,000
Expenses on machine set up	7,00,560
Packaging expenses	6,00,000
Testing expenses	5,40,000
Maintenance	5,77,080
Total overheads cost	28,17,640

expects to make 2,000,000 hollow center balls and 4,000,000 solid center balls. The overhead costs incurred have been allocated to activity pools as follows:

Amount (in ₹)



After analysing the activity pools, cost drivers are identified, total units to be produced for each product are estimated and unit cost for each cost driver is calculated:

Activity	Cost driver	Total estimated units for cost driver (1)	Total cost (2)	Unit cost per cost driver (3)= (2) / (1)
Material Purchased	Number of purchase orders	200	4,00,000	2,000
Expenses on machine set up	Number of set ups	504	7,00,560	1,390
Packaging expenses	Number of containers filled	50,00,000	6,00,000	0.12
Testing expenses	Number of tests	6,000	5,40,000	90
Maintenance	Number of runs	504	5,77,080	1,145

Following table shows activity by product:

Activity	Cost Driver	Unit cost (3)	Hollow center (4)	Solid center (5)	Hollow center (3)*(4)	Solid center (3)*(5)
Material Purchased	Number of purchase orders	2,000	100	100	2,00,000	2,00,000
Expenses on machine set up	Number of set ups	1,390	252	252	3,50,280	3,50,280
Packaging expenses	Number of containers filled	0.12	10,00,000	40,00,000	1,20,000	4,80,000
Testing expenses	Number of tests	90	2,000	4,000	1,80,000	3,60,000
Maintenance	Number of runs	1,145	168	336	1,92,360	3,84,720
Total					10,42,640	17,75,000

Further, for the purpose of calculating per unit overhead rate under activity based costing, the total cost that have been assigned to each product is divided by number of units manufactured.



$$\frac{\text{Overhead cost assigned to hollow centre balls}}{\text{Number of hollow centre balls}} = \frac{10,42,640}{20,00,000} = ₹ 0.521$$

$$\frac{\text{Overhead cost assigned to solid centre balls}}{\text{Number of solid centre balls}} = \frac{17,75,000}{40,00,000} = ₹ 0.444$$

If following traditional costing, total overhead cost will be allocated on basis of direct labour cost, where total of overheads will be divided by total combined labour cost for both types of balls. Estimated direct labour cost for the year is ₹ 30,24,000 out of which 7,56,000 is for hollow center balls and 22,68,000 is for solid center balls. The per unit direct labour cost will be for hollow centre ball ₹ 0.378 (7,56,000/20,00,000) and ₹ 0.567 for Solid center balls (22,68,000/40,00,000).

Step 1: Calculation of overhead per direct labour hour

$$\frac{\text{Total overhead cost}}{\text{Total direct labour hours}} = \frac{28,17,640}{30,24,000} = 0.932$$

Step 2: Allocation of overhead

Overhead cost per direct labour hour * per unit direct labour hours

Hallow center balls = $0.932 \times 0.378 = ₹ 0.352$ overhead per unit

Solid center balls = $0.932 \times 0.576 = ₹ 0.528$ overhead per unit

A comparison of the overhead per unit calculated using the ABC and traditional methods often shows very different results:

	ABC	Traditional
Hollow center ball	Rs. 0.52	Rs. 0.35
Solid center ball	Rs. 0.44	Rs. 0.53

In above example, as per ABC, overheads are ₹ 0.52 per hollow ball, much higher than the ₹ 0.35 that is calculated using traditional costing. The cost calculated using ABC is more accurate while pricing the production. For the balls with solid center, cost of overheads per unit is ₹ 0.44



under ABC method while it is ₹ 0.53 under traditional costing. The reason behind this is under traditional costing, overheads have been allocated on the basis of direct labour cost, so the product having high direct labour cost gets higher of the overheads cost as well.

8.5.c. Advantages of ABC:

- I. Gives accurate manufacturing costs for particular products.
- II. More properly allocates manufacturing costs to the activity's user-facing products and processes.
- III. Identifies wasteful procedures and aims to improve them
- IV. More correctly calculates product profit margins
- V. Identifies the procedures with wasteful and excessive expenditures.
- VI. Provides a better explanation and defense of manufacturing overhead costs.

8.5.d. Limitations of ABC:

- I. Data preparation and collection take time.
- II. Information gathering and analysis are more expensive sources of data aren't always easily accessible from standard accounting reports
- III. It is not usually possible to utilize ABC reports for external reporting because they don't always follow widely accepted accounting rules.
- IV. Data generated by ABC could be at odds with managerial performance standards that were previously established using conventional costing methodologies.
- V. For businesses where overhead is low relative to total operating costs, it might not be as helpful.

8.6. ACCOUNTING AND THE THEORY OF CONSTRAINTS

The principles of the Theory of Constraints are used to clarify decisions after throughput accounting has laid the groundwork for a more straightforward approach to operational accounting.



When some of the limiting factors prevent production, this is referred to as a theory of constraint situation. Production plans must be managed in accordance with these limits because they can also be referred to as bottlenecks or scarce resources.

The Theory of Constraints, developed by Eliyahu M. GOLDRATT and popularised by his best-selling book "The Goal" and other works, led to the introduction of throughput accounting in the 1980s.

The foundation of management by constraints is the idea that the major constraint—typically represented by a bottleneck close to or directly at the entry of the constrained resource—limits the amount of money that can flow out of an industrial or commercial structure.

8.7. THROUGHPUT ACCOUNTING

Businesses utilise throughput accounting as a clever production planning tool. Profit maximisation is the goal of employing this accounting strategy. When producing several products, this idea is relevant if there is a particular constraint. So it's more about manufacturing and production planning.

Consider the possibility that you may need to use raw materials (the bottleneck) in a variety of your company's goods. A bottleneck is a material or any other element that lowers your production capacity. Any production-related factor, such as a limited supply of raw materials, manpower, or machine hours, may be the bottleneck.

Only the following situation makes this style of accounting appropriate.

- There is a bottleneck in your company.
- Your company makes more than one product, and each product uses bottleneck resources differently.

In this case, throughput accounting can assist in creating a production schedule that maximises your business's profits.

8.7.a. Process Of Throughput Accounting

Step 1: Knowing your production facility is important for identifying bottleneck resources. Consequently, this stage entails a thorough study of the production stages. For various enterprises, there may be various bottlenecks. An example of a scarce resource would be labour



hours, machine hours, raw materials, or any other production factor. Understanding the actual source of the problem is therefore more important when finding constrained resources.

Step 2: Calculate the contribution for each product, per unit. It involves using the product in some math. Just subtract all variable expenses from revenue.

Step 3: Divide the contribution per unit by the scarcity of the resource. Again, simple math requires dividing the contribution per unit by the limited resource. Throughput value is the name of it.

Step 4: Rank the values from step 3 in order of importance. The step three throughput value's top-ranked values show the highest use of scarce resources to produce profit. Simply said, we have found a product that makes the most contribution while utilising the fewest scarce resources. Therefore, the top-ranked products should be prioritised. The maximum demand for each product should, however, be taken into account while developing a product plan.

The product that uses the least amount of a scarce resource to provide the most contribution has been identified. We have also graded products according to how well they use limited resources. Consequently, a production plan with the maximum overall contribution can be created using this information.

8.7.b Throughput Ratio:

Throughput accounting ratio is equal to throughput value divided by fixed cost per unit, where contribution / unit of a scarce resource determines throughput value.

If the value determined is more than one, the throughput value can pay for the fixed cost. A throughput ratio of less than one, on the other hand, indicates that the business's fixed costs are not covered by the throughput value. Consequently, knowing if it is profitable to produce a product may be useful to the firm.

8.8. TARGET COSTING

Target Costing is defined as “as a cost management tool for reducing the overall cost of a product over its entire life cycle with the help of the production, engineering, R&D”.

Target costing is a market-driven design methodology and involves estimating a cost for a product and then designing the product to match the cost.



Target costing is a cost management tool for reducing product costs over its entire life cycle. It becomes an important reference point for cost management. Target costing includes actions management must take to establish reasonable target costs, develop methods for achieving those targets and develop means by which to test the cost effectiveness of different cost-cutting scenarios.

Sakurai discusses the most important procedure of target costing as follows:

1. To plan and design high quality products that meet customers' needs
2. To set a target cost for the products through the use of value engineering
3. To attain the target cost at the production stage by use of standard costs

How does Target Costing work?

Target costing is more than simply a way of costing; it is also a management technique in which prices are set by the market, taking into account a number of variables, including homogeneous product offerings, the intensity of competition, the cost of switching for the end user, etc. Management seeks to keep expenses under control when these elements are present since they have limited or no control over the selling price. Target costing is used to manage expenses prior to the company incurring any manufacturing expenditures, which saves a significant amount of time and money. Target costs can also be continuously employed to keep costs under control throughout the whole production life cycle.

The following may be construed as the components in the product target costing:

- Type of product
- Technical specifications
- Technical requirements
- Customer
- Resource consumption (acquisition price)
- Resource consumption (cost)

**Formula for Target Cost:**

Where the profit margin is based on selling price, target total cost can be calculated as follows:

$$\text{Target cost} = \text{Selling Price} - \text{Required Profit}$$

$$\text{Required Profit} = (\text{Gross Profit} / \text{Sales}) \times \text{Selling Price}$$

Where the profit margin is based on cost, target cost can be found as follows:

$$\text{Target Cost} = \frac{\text{Selling Price}}{1 + \text{Profit Percentage}}$$

Targets can be set for each individual cost component based on the standard costing.

Example

M&M is a dress manufacturer that operates in extreme competition. It sells dresses to different resellers market dresses under their own brands. M&M can only charge ₹ 5 per meter. If the company's intended profit margin is 25% on cost, calculate the target cost per unit. If 20% of the cost per meter of dress is related to direct materials, what's the target cost per unit for direct materials.

Solution

M&M wants to earn a margin of 25% on cost, so the following formula need to be applied to get the total target cost per unit.

$$\text{Target cost per unit} = \frac{\text{₹ 5 per meter}}{1 + 25\%} = \text{₹ 4}$$

M&M has to keep its cost per unit below ₹ 4 in order to generate 25% profit margin on cost.

If 20% of the unit cost is related to direct materials, target cost for direct materials shall be ₹ 0.80 (0.2*Rs.4).

If M&M wants to earn 25% on selling price, the total target cost per unit shall be worked out as follows:

$$\text{Target cost per unit} = \text{₹ 5} * (1 - 25\%) = \text{₹ 3.75}$$



Target costing has the advantages listed below:

- By using ABC, target costing offers a better way to test various cost scenarios and specific information on the expenses associated with developing a new product.
- Target costing shortens the product development cycle.
- Target costing significantly boosts the profitability of new products by encouraging cost-cutting while preserving or enhancing quality. Target price also encourages consumer demands, which makes it more well-liked than competing products.
- Target costing is also used to project future costs and offers encouragement to hit cost targets.
- Target costing is used to manage expenses prior to the company incurring any manufacturing expenditures, which saves a significant amount of time and money. Target costs can also be continuously employed to keep costs under control throughout the whole production life cycle.

8.9. VALUE CHAIN ANALYSIS

With highly competitive environment, the organizations are aiming to be 'customer driven' i.e. customer satisfaction is priority one. One of the key tool in the hands of the management to achieve this aim is value chain analysis.

Value Chain Analysis 'is a strategic managerial tool to assess and review the various business functions in which utility is added to the products or services'.

Michael Porter first proposed the concept of a value chain in 1985 to illustrate how customer value builds up along a chain of processes that result in a final good or service.

The internal procedures or actions carried out by a business "to create, produce, promote, distribute, and support its product," according to him, comprise the value chain. According to him, "a firm's value chain and the manner in which it carries out certain operations are a reflection of its history, its strategy, its method to achieving its plan, and the underlying economics of the activities themselves."

Porter divided business activities into two categories: primary, line, and support activities. The conversion of inputs into outputs, as well as delivery and post-sale support, are the main



operations. In other words, they cover tasks like order processing, distribution, and the transformation of inputs into finished goods. They also cover communication, pricing, and channel management, as well as installation, maintenance, and part replacement.

The activities that assist primary activities are known as support activities. They include the following and are handled by the organization's staff functions:

1. Procurement—acquiring assets as well as raw materials, suppliers, and other consumables.
2. Each value chain activity requires specific technical knowledge, processes, and inputs.
3. Human resource management, including hiring, promoting, and placing employees as well as providing them with feedback and rewards.
4. The organisational framework of the company, including general management, planning, finance, accounting, legal, public affairs, and quality management.

The value chain for a typical organization is shown in Figure 8.1.



Figure 8.1 Value Chain Analysis for a Business

Support Activities may be Human Resource; Finance; Information Technology

The value chain breaks down the company into each of its unique strategic activities. Value chain analysis looks at how customer value can be increased or expenses can be reduced across the company's operations, from new product creation to distribution.

The main inquiries are:

- I. Is it possible to minimise expenditures in this activity while keeping revenue value constant?
- II. Is it possible to raise profits while maintaining the same costs in this activity?
- III. Is it possible to minimise assets while maintaining costs and profits in this activity?
- IV. Most crucially, is it possible to complete steps 1, 2, and 3 all at once?



The business unit can get a competitive edge in terms of cost and revenue differentiation by methodically analysing expenses, revenues, and assets in each activity.

All of the aforementioned roles play a part in carrying out a company's competitive strategy, and each must create its own strategy in order to do so. Here, a process' or function's strategy refers to what it will specifically strive to accomplish. A company's planned portfolio of new items is laid out in a product development strategy. Additionally, it determines whether the development work will be done internally or externally. A marketing and sales strategy outlines the market segmentation, product positioning, pricing, and promotion plans. The type of raw material procurement, material transportation to and from the business, product manufacture or operation to provide the service, and distribution of the product to the customer are all determined by a supply chain strategy, along with any follow-up services and a specification of whether these processes will be carried out internally or externally. Given that businesses are rarely fully vertically integrated, it is crucial to understand that the supply chain strategy outlines both the internal processes that the business should optimise and the roles that each supply chain entity should perform. The overall structure of the supply chain as well as what are commonly referred to as "supplier strategy," "operations strategy," and "logistics strategy" are all included in supply chain strategy.

8.10. LIFE CYCLE COSTING

Every cost matters when you run a small business. If you make bad choices about what to buy, it can cost your business more money than it needs to and hurt your bottom line over time. Life cycle costing is something you should do before buying new assets for your business.

The life cycle cost, also called the whole-life cost, of an asset affects how a business budgets, prices its products, and makes decisions.

What is costing over the life cycle?

Life cycle costing, also called whole-life costing, is a way to estimate how much you will spend on an asset over the course of its useful life. Whole-life costing takes into account the costs of an asset from the time you buy it until you get rid of it.

When you buy an asset, you are making a financial commitment that goes beyond the price tag. Think about a car as an example. The price of the car is only one part of how much it will cost over its whole life. You also need to think about the costs of car insurance, interest, gas, oil changes, and any other repairs the car might need. If you don't plan for these extra costs, it can set you back.



Costs add up when you buy, use, and take care of a business asset. Whether you're buying a car, a copier, a computer, or stock, you should think about and plan for how much the asset will cost you in the future. Costing for the whole life cycle refers to getting a better idea of how much a new asset will cost your business when you do a life cycle cost assessment.

Lifecycle costing example:

Your business needs a new copier.

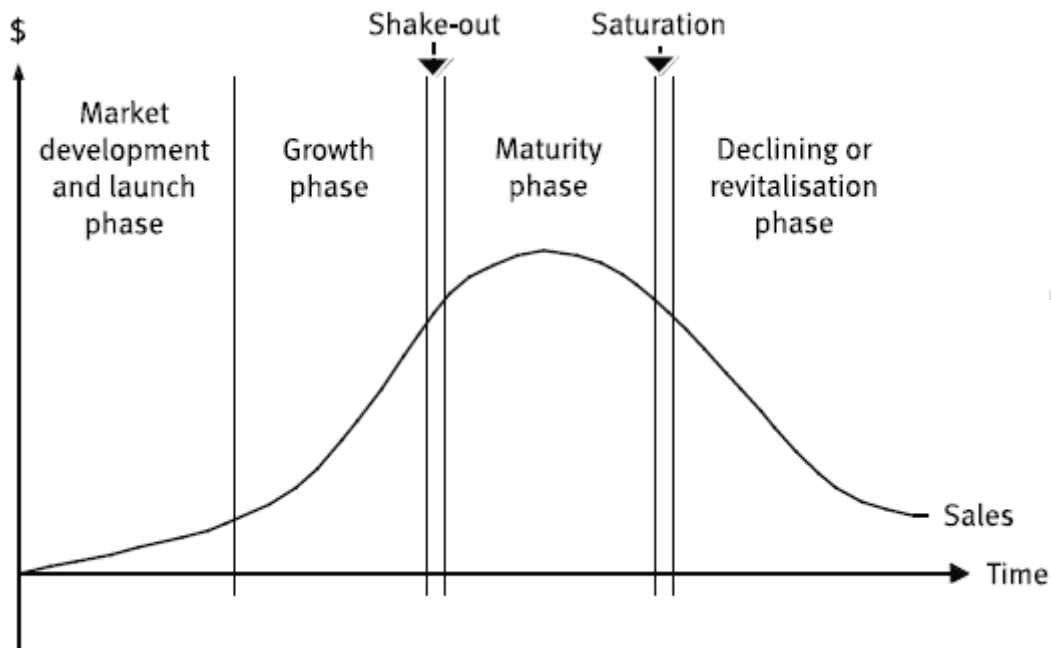
- Price of copier: ₹ 2,500.
- Installation and delivery cost: ₹ 75.
- Operating cost: You expect to spend ₹ 1,000 on ink cartridges and paper during its lifetime. You estimate ₹ 300 in copier electricity use.
- Maintenance: You estimate ₹ 450 to fix the copier.
- Financing: Your store credit card charges 3.5% per month for the copier. Next month, you pay off the printer, owing ₹ 87.50 in interest ($\text{Rs.}2,500 \times 3.5\%$).
- Depreciation: You estimate ₹ 150 in annual copier depreciation.
- Disposal: You estimate that an independent contractor will charge ₹ 100 to remove the copier from your firm.

The copier costs ₹ 2,500, but its life cycle might cost your organisation over ₹ 4,500.

Product Life Cycle Costing

The innovation of a new product and its degeneration into a common product is termed as the 'life cycle of a product'. Following are the five distinct phases in the life cycle of a product:

- Introduction
- Growth
- Maturity
- Saturation
- Decline

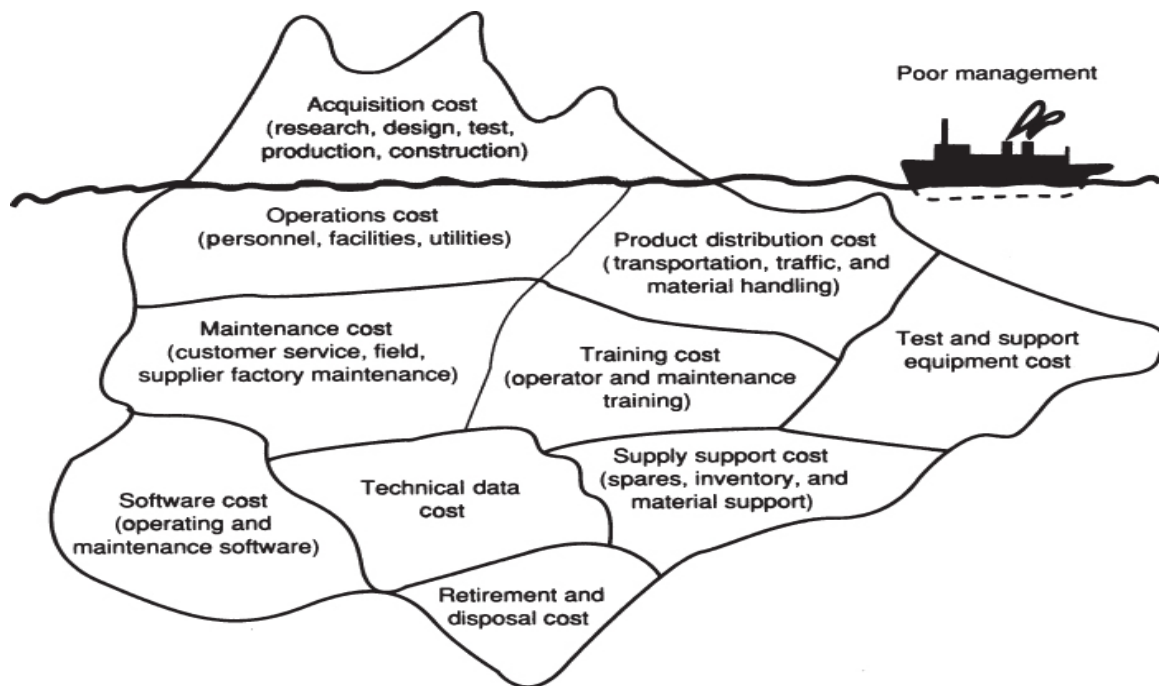


Project Life Cycle Costing

The term 'project life cycle cost' has been defined as 'it includes the costs associated with acquiring, using, caring of physical assets, including the feasibility studies, research, design, development, production, maintenance, replacement and disposal, as well as support, training and operating costs generated by acquisition, use, maintenance and replacement of permanent physical assets'.

The project life cycle costs of a capital asset can be grouped into three broad categories:

- Initial costs
- Operating costs
- Disposal costs



Project Life Cycle Cost Iceberg

8.11. JUST-IN-TIME (JIT)

With a just-in-time (JIT) inventory system, a business receives products as close as feasible to the moment they are actually required. As a result, if an auto assembly facility wants to install airbags, it doesn't maintain a supply on hand; instead, it gets them as the cars are put together.

Schonberger defines JIT as “to produce and deliver finished goods just in time to be sold, sub-assemblies just in time to be assembled into finished goods, fabricated parts just in time to go into sub-assemblies and purchased materials just in time to be transformed into fabricated parts”.

The just-in-time (JIT) inventory system reduces stock and boosts productivity. Because manufacturers receive supplies and parts as needed for manufacturing and do not incur storage costs, JIT production techniques reduce inventory costs. Furthermore, in the event that an order is cancelled or not filled, manufacturers are not left holding extra inventory.

A vehicle manufacturer that runs with minimal inventory levels but significantly relies on its supply chain to deliver the parts it needs to produce automobiles on an as-needed basis is one



example of a JIT inventory strategy. As a result, the manufacturer only places an order for the parts needed to assemble the automobiles after receiving one. Companies need consistent production, excellent workmanship, faultless plant machinery, and trustworthy suppliers for JIT manufacturing to flourish.

Features of JIT:

The main features of JIT are as follows:

- Operates as a 'pull' system, producing on demand i.e. 'making to order'
- Uses small lot sizes and therefore, frequent production runs
- Aims to minimize set-up time
- Take steps to reduce process time
- Use a 'kanban' system to drive the usage of parts and control the flow of materials
- Uses planned production systems
- Uses process capability analysis
- Adopts TQM approach

Kaplinsky and Hoffman highlighted seven key elements of JIT as:

- Demand-driven production
- Multi-skill and multi-task work
- Flexibility in product and process
- Just in time production (Minimum inventory)
- Zero defect policies
- Giving responsibility back to the worker
- Worker involvement in technical improvements

8.11.a. Benefits of JIT Inventory Systems:

JIT inventory systems have a number of benefits over conventional methods. Short production runs enable firms to switch swiftly from one product to another. This technique also lowers expenses by reducing the requirement for warehousing space. Additionally, businesses spend



less on raw materials because they only purchase what they need to produce the products that have been requested.

8.11.b. Drawbacks of JIT Inventory Systems:

- The risk for supply chain disruptions is one of JIT inventory systems' drawbacks.
- The entire manufacturing line might be stopped if a supplier of raw materials experiences a problem and is unable to deliver the products on time.
- The delivery of finished items to customers may be delayed by an unforeseen sudden order for goods.

8.12. BACKFLUSH COSTING

Backflush accounting focuses on "post production issuing."

Backflush accounting is defined as *'a cost accounting system which focuses on the output of the organization and then work backwards to allocate costs between cost of goods sold and inventory'*

Product costing is postponed until things are finished under a Just-In-Time (JIT) operational environment. Backflush accounting records expenses after the events, then uses standard costs to "flush" out manufacturing costs. This eliminates expense tracking. Standard costs are used to assign costs to units when journal entries to inventory accounts are made. The backflushing procedure has two steps: one reports the created part to raise its amount on hand, and the other relieves the inventory of all component parts. Component part numbers and quantities-per are from the standard bill of material (BOM). This saves a lot compared to the old technique of a) issuing component parts one at a time, usually to a discrete work order, b) receiving the finished parts into inventory, and c) returning any unused components to inventory.

8.12.a. Features:

- I. Backflush costing is an accounting technique created to track expenditures under particular circumstances.
- II. Backflush costing is often referred to as backflush accounting.
- III. Companies that typically have short production cycles, commoditized products, and low or constant inventories use backflush costs.



IV. Backflush costing can be challenging to execute, and not all businesses can qualify to perform it.

The thorough tracking of expenses, such as raw material and labour costs throughout the manufacturing process, which is a component of traditional costing systems, is eliminated when costs are "flushed" to the end of the production run. This enables the company to streamline its expense tracking procedures, saving money on administrative and process costs, but it may also limit the amount of detail that the organisation retains regarding specific production and sales prices.

At the conclusion of the procedure, the entire cost of a production run is documented. Therefore, businesses that use backflush costing typically work backward, figuring out how much a product costs after it is sold, finished, or shipped. Businesses do this by putting a set price on the products they make. Companies must eventually acknowledge the variations between standard costs and actual costs because costs can occasionally vary.

The cost of a product is typically determined at numerous points along the production cycle. Backflush costing is intended to streamline accounting procedures while reducing costs for firms by getting rid of work-in-process (WIP) accounts.

8.12.b. Backflush Costing's pros and disadvantages

Theoretically, backflushing seems to be a reasonable solution to sidestep the numerous challenges posed by ascribing costs to goods and inventory. Companies can save time and money by not documenting costs during the various production steps. Backflush costing is an accounting technique that businesses may utilise when looking for methods to cut their bottom lines, but it isn't always simple to put into practise.

Backflushing, however, is not always an option for businesses and can be difficult to execute. Additionally, backflush costing organisations lack a sequential audit record and may not always adhere to generally accepted accounting principles. These are two major drawbacks of this costing system.

Businesses that employ backflush costing should typically fit all three criteria:

Short production cycles: Products that require a lot of time to manufacture shouldn't be costed backwards. It is harder and harder to appropriately assign standard costs as time goes on.



Customized goods: Since the fabrication of customised goods necessitates the development of a distinct bill of materials for each item created, the technique is not appropriate for this task.

Low or stable amounts of material inventory are present: The majority of production expenses will flow into the costs of goods sold when inventories, or the variety of finished items maintained by a company, are low rather than being postponed as inventory charges.

8.13. SUMMARY

- The unit covers Activity based costing, Target costing, Value chain Analysis, Throughput costing, Life Cycle Costing, Backflush costing
- Value chain analysis assesses customer value.
- A corporation must price a new product based on comparable products on the market.
- Target costing lets a corporation set product prices, costs, and margins in advance.
- Theory of constraints fosters dialogue and appreciation for cost-cutters, who are typically seen as reactionary and non-value-adders.
- Life cycle costing costs the cost object—product, project, etc.—over its predicted lifespan. It describes a system that tracks and collects costs and revenues and attributes to cost objects from inception to abandonment.
- Traditional cost accounting systems report cost object profitability weekly, quarterly, and yearly. Life cycle costing does not. Life cycle costing tracks product-by-product cost and revenue over numerous calendar months.
- Backflush accounting focuses on "post production issuing."

8.14. GLOSSARY

- *Activity-based costing (ABC)* assigns overhead and indirect costs—such as salaries and utilities—to products and services.
- *Backflushing* is used in perpetual inventory systems. Periodic inventory management is still used by small organisations with few goods.
- *Cost management* estimates, allocates, and controls project costs.
- *JIT inventory management* connects supplier raw-material orders with production schedules.
- *Life Cycle Costing* Life cycle costing costs the cost object—product, project, etc.—over its predicted lifespan. Describes a system that tracks and aggregates cost object costs and profits from inception through abandonment.



- *Target costing* Market-driven design entails calculating a product's cost and designing it to match it.
- *Tooling*: Tooling up for production can entail establishing a production line costing several millions of rupees, manufacturing expensive jigs, buying special purpose machine tools, or otherwise making a substantial expenditure.
- *Traditional cost* accounting reports cost object profitability regularly, quarterly, and annually.
- *Value Chain Analysis*: The value chain is a company's internal procedures to "create, develop, sell, deliver, and support its product".

8.15. SELF ASSESSMENT QUESTIONS

1. Briefly explain the main difference between a job-order cost system and a process cost system.
2. What is Activity based costing? Give examples of cost drivers commonly used to allocate overhead costs to products and services.
3. What do you mean by Value chain analysis?
4. Explain the main differences between traditional and activity-based costing systems?
5. What are advantages of JIT inventory system? How does JIT helps decision making?
6. What is Target costing? How does it benefit? What are the stages of target costing?
7. Write short notes on:
 - Theory of constraints
 - Backflush costing
 - Throughput accounting

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LESSON 9

PERFORMANCE MEASUREMENT- BALANCED SCORECARD

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STRUCTURE

- 9.1 Learning Objectives
- 9.2 Introduction
- 9.3 Performance Measurement
 - 9.3.1 Traditional Performance Measurement Techniques
 - 9.3.2 Strategic Management Model
- 9.4 Balanced Scorecard
 - 9.4.1 Meaning of Balance in Balanced Scorecard
 - 9.4.2 Balanced Scorecard Example
 - 9.4.3 Characteristics of Good Balanced Scorecards
 - 9.4.4 Requisites of Balanced Scorecards
 - 9.4.5 Perspectives or Factors in Balanced Scorecards
- 9.5 Performance Drivers and Weighting Performance Measures
- 9.6 Summary
- 9.7 Glossary
- 9.8 Answers to In-text Questions
- 9.9 Self-Assessment Questions
- 9.10 References
- 9.11 Suggested Readings



9.1 LEARNING OBJECTIVES

In this lesson we will learn the concept of performance measurement, various traditional performance measurement techniques and the limitations of these techniques. We will also be going to learn the meaning of balanced scorecard, perspectives of scorecard. This chapter will also teach us the characteristics of good balanced scorecards and requisites of the balanced scorecards.

After studying this lesson, students will be able to:

- Understand the Performance Measurement.
- Explain the Traditional Performance Measurement Techniques.
- Get acquainted with Strategic Management Model.
- Explain the meaning, characteristics, requisites, factors, or perspectives of Balanced Scorecards.
- Learn Performance Drivers and Weighting Performance Measures.

9.2 INTRODUCTION

Performance measurement is observing the spending plans or focusing on genuine outcomes to lay out how well the business and its workers are working overall and as individuals. Performance measurements can connect with short-term goals (for example cost control) or long-term measures (for example consumer loyalty).

A balanced scorecard is an essential organization's performance management that helps organizations distinguish and work on their internal operations to help in improving their external outcomes. It estimates past execution information and furnishes organizations with criticism on the most proficient method to pursue better choices later.

9.3 PERFORMANCE MEASUREMENT

Comparing performances to established criteria in companies is how performance measurement is defined. Performance evaluation is the methodical procedure used to assess an



organization's efficiency and effectiveness. Measurements serve as the yardsticks that inform us of our performance and motivate us to improve. Measuring involves observing how people move and rating their performance in order to continuously improve. Performance measurement is prepared to embrace change that helps organisations achieve the necessary level of quality. Although measurement sounds simple and uncomplicated, it is a challenging and time-consuming process.

D.S. Sink in his article 'Accomplishing World Class Quality and Productivity Management; the Role of Measurement remarks:

Measuring is an art. In the long term, the vast majority of people who analyse the task of developing measuring frameworks come to this conclusion. In fact, despite a worrying fact, even those who are regarded as experts quickly admit that measurement is hard. Measurement is difficult, disappointing, challenging, important, and handled improperly.

9.3.1 Traditional Performance Measurement Techniques:

The customary way to deal with performance depends on data and procedures accessible in financial accounting, cost accounting and management accounting. The conventional methods utilized by organizations are basically financial measures like ROI, RI, net benefit, EPS, and so forth. The conventional methods are backward looking. That is, they focus around past financial performance rather than on how administrators are making future shareholder value.

Limitations of Traditional Performance Measurement:

- a) **Short-term Focused-** Every activity is directed towards the present moment. Many organisations collect information that is purely functional and financial. Numerous financial and functional measurements can be found in all enterprises. We can understand the organization's overhead costs, salaries, and benefits, as well as a few other numbers derived from the accounting system. One of the reasons organizations struggle to endure over an extended period of time is their singular attention on the present. These organizations succeed for a brief period of time before failing and eventually going out of business. Any organisation should think about the following long-term measures:
 - i. Consumer loyalty
 - ii. Employee satisfaction



- iii. Item/administration quality
- iv. Public responsibility measures

- b) **Outdated and Irrelevant Principles-** The requirements of the modern business environment must be taken into consideration because all traditional measures are frequently based on out-of-date and unnecessary criteria.
- c) **Focus on Cost and Revenue Data, Less on Process-** Performance measures place more emphasis on cost and revenue data while putting less emphasis on the process. It frequently provides irrelevant or false information. Financial outcomes that are the primary focus of performance measures have passed the point at which meaningful corrective action can be taken.
- d) **Lack Activity and Process Analysis-** Performance measures lack the examination of movement and interaction that is essential to choose worth-added and non-worth-added movement and interaction. Business companies must determine whether processes are capable of meeting customer requirements repeatedly.
- e) **Based on Tracking Single Dimensions of Performance-** Performance measures are dependent on the following discrete performance components and do not provide an integrated or thorough understanding of performance. Administrators frequently learn that they are ill-equipped to assess the effectiveness of their system implementation since performance is only reviewed in clearly defined areas.
- f) **Encourage Competition and Discourage Teamwork-** Traditional performance measurements promote rivalry and discourage cooperation. Instead of comparing each specialty unit's performance to its own performance and goals, performance reports typically compare the performances of two specialty units. This is a common technique to discourage teamwork. The individual in charge takes pride in their position and has no desire to share any information with the other specialist units or sectors because they like their job. When employees are informed of their position in respect to their co-workers, the biggest threat arises. Teamwork is destroyed when people try to measure themselves against others, whether they are ranked one or fifteen.



The majority of performance appraisal frameworks also include elements that encourage competitiveness while discouraging representative groupings from working together. In many systems, people, not groups, are judged. Additionally, individuals, not organisations, receive promotions and raises. A typical but harmful strategy in an organisation seeking to promote a sense of participation and sharing is focusing solely on individual performance proportions.

Johnson and Kaplan (1987) have voiced their concern as follows:

The organization's financial detailing framework generates the current administration accounting data, which is beyond the point of no return, excessively collected, and too deformed to even comprehend being applicable for the preparation and control decisions of the chiefs.

Afterward, Kaplan refers explicitly to current business conditions which utilize standards such as TQM, JIT, Design for Manufacture (DFM) and Flexible Manufacturing System (FMS) finished up:

Existing frameworks for cost and performance estimation gave little inspiration to help organizations' attitude to incorporate TQM, JIT, DFM, and FMS ideas into ongoing, continuous improvement exercises. In certain occurrences, the customary financial exhibition measures hindered the improvement exercises.

This worry demonstrates the dire requirement for taking a gander at better approaches for finding progress wherever it is made without fundamentally evaluating any result in financial terms.

Qualities of this new way to deal with estimating organizational performance are ideas like the accompanying:

- a) Less is better - focus on estimating the crucial few key factors as opposed to the numerous variables.
- b) Measures ought to be connected to the variables required for progress: key business drivers.
- c) Measures ought to be a blend of past, present, and future to guarantee that the organization is worried about each of the three viewpoints.
- d) Measures ought to be based on the necessities of clients, investors, and other key partners.



- e) Measures ought to begin at the top and stream down to all degrees of workers in the organization.
- f) Various records can be consolidated into a solitary list to give a superior in the general evaluation of performance.
- g) Measures ought to be changed or possibly changed as the climate and methodology change.
- h) Measures need to have targets or objectives laid out that depend on research as opposed to inconsistent numbers.

9.3.2 Strategic Management Model:

In performance measurement, the challenge is estimating the appropriate variables and learning to ignore other interesting data that does not help us advance to the next level in the model. To start, we characterize what an organisation does and what the future goal is. The firm should then identify the techniques and crucial success variables it needs to concentrate on to stand out from rivals. The organisation also determines key business requirements on which it should concentrate at this stage in order to maintain its success.

Company basics are typically matters on which all business organisations must concentrate, such as benefit, development, or guidelines. A fundamental component of a business system is selecting the main achievement elements for a company so that it can concentrate on the designated performance areas. These may be advantages they will continue to exploit or flaws that need to be fixed. The actions, or metrics, are derived from the major success factors and business fundamentals. Clear objectives or goals should be established for each measurement once the organization has identified the significant measures on its overall scorecard.

Research-based objectives should help the organisation realise its overarching goal. It is important to check that each aim is cohesively related to the others so that a strong showing on one metric doesn't result in a decline in performance on another. Following the identification of the objectives or targets, activity plans that will enable their accomplishment should be identified. Finally, to ensure that the exercises and performance are in line with the objectives and aims, they must be monitored and controlled. It is also anticipated that performance reports and follow-up reports contain relevant and useful information.



INTEGRATED PERFORMANCE MEASUREMENT



IN-TEXT QUESTIONS

6. The performance measurement is the systematic assignment of numbers to the _____ and results in the organization.
7. The traditional performance measurement is short-term focused. True/False.
8. Performance measures focus more on cost and revenue data. Yes/No.
9. Traditional performance measurement is not outdated. True/False.
10. Traditional performance measures encourage _____ and discourage teamwork.



9.4 BALANCED SCORECARD

Balanced Scorecard is a procedure of performance estimation created by Robert Kaplan, a Harvard Professor and David Norton, an expert.

Kaplan and Norton remark on Balanced Scorecard (BSC) as follows:

The Balanced Scorecard (BSC) gives managers the tools they need to look for future significant accomplishments. The Balanced Scorecard translates an organization's strategy and mission into a comprehensive set of performance projections that provide the groundwork for a key projection and the board framework. The fair scorecard places a strong emphasis on reaching financial objectives while also taking into account the presentation-related factors that influence these objectives. According to four adjusted points of view—financial, client, internal business processes, and learning and development—the scorecard measures authoritative performance. The BSC gives organisations the ability to monitor financial results while also monitoring their progress in developing the capacities and acquiring the illusive resources they require for long-term growth.

9.4.1 Meaning of Balance in Balanced Scorecard:

As per Atkinson, Banker, Kaplan, and Mark Young', to be adjusted, performance measurement frameworks should meet two necessities:

1. In other words, the performance measurement framework should screen both the organization's presentation and what the board accepts are the drivers of performance on the organization's essential goals. They should reflect the comprehension organization might interpret reasons for the successful performance of the organization's essential goals. This is the most important aspect of adjustment.
2. The most fundamental views or distinguishing characteristics of organisational performance should be quantified by the performance measurement framework. These viewpoints offer the organisation its remarkable abilities to achieve its primary objective. This is the general requirement for adjustment.

The balanced scorecard's main component is a set of performance estimates that businesses use to monitor their progress toward both mandatory and optional goals. In this view, the planning and procedure of the company characterise the focus and scope of the fair



scorecard as well as the connections the business should forge with its personnel, suppliers, and the community in order to achieve long-term success with its targeted clients.

9.4.2 Balanced Scorecard Example:

System: To continuously improve and adapt to our present environment in order to be the leading organisation in our sector. Regarding the development of investor and client esteem, employee learning and development, and our outstanding corporate citizenship, we shall evaluate progress.

Balanced Scorecard Example:

	Objectives	Goals	Indicators	Initiatives
Financial Perspective	<i>Increase Revenue</i>	<i>Increase net revenue by 10%</i>	<i>Financial Statements</i>	<i>Develop new credit policies for distributors</i>
Customer Perspective	<i>Have a high average customer rating</i>	<i>Increase the value of each purchase by 15% on average</i>	<i>Value of invoices for each individual sale</i>	<i>Improve the product mix and create combo deals</i>
Internal Process Perspective	<i>Offer a choice of sales channels</i>	<i>Transfer at least 30% of sales to new sales channels</i>	<i>% of sales per channel</i>	<i>Implement telemarketing and an online store</i>
Learning and Growth Perspective	<i>Have a skilled sales force</i>	<i>Train 100% of the sales team</i>	<i>Number of certificates acquired by the team</i>	<i>Develop a partnership with a business selling online courses</i>

9.4.3 Characteristics of Good Balanced Scorecards:

For balanced scorecards to be effective and helpful, the following traits must be present:

a) **Focus on Cause-and-Effect Relationship-** A balanced scorecard should highlight an organization's process by putting an emphasis on the circumstances and logical linkages between the results. Accept that Hindustan Unilever Ltd. wants to spend as little as possible while advancing development. The balanced scorecards should specify clear objectives and



gauge performance from a "learning and development point of view" that could advance internal business procedures. Thus, they would lead to greater consumer loyalty, a larger market share, higher worker wages, and greater shareholder profit.

b) Strategy translated to Coherent and linked set of Understandable and Measurable Operational Targets- By converting the process into a logical and connected set of understandable, achievable, and quantifiable functional targets, balanced scorecards should aid in the communication of the methodology developed to all members of a company. In order to implement the organization's system, directors and representatives take actions while taking the scorecard into consideration. It is preferable over fostering scorecards at the division and office levels to work with decisions and actions as per scorecards.

c) Emphasis on Financial Objectives and Measures- When evaluating how well a company is performing financially, the balanced scorecard focuses a significant emphasis on financial measurements and objectives. Although development, quality, and customer loyalty are frequently prioritised by business executives, they may not always result in tangible benefits. Non-financial indicators are seen as an essential component of a strategy or plan to attain and enhance future financial performance in a balanced adjusted scorecard. When correctly paired in modified scorecards, a variety of non-financial performance criteria serve as predictors of future financial performance.

d) Critical Measures Only- The balanced scorecard reduces the number of measures used by focusing only on the most fundamental ones. Avoiding a proliferation of measures focuses on those that are essential for the successful execution of procedure.

e) Suboptimal Trade-offs- The scorecard illustrates the sub-optimal trade-offs that managers may make if they don't take both functional and financial indicators into account. For instance, a company that prioritises innovation could achieve unmatched short-term financial results by cutting back on R&D expenditures. A balanced adjusted scorecard would demonstrate that decisions may have been made that harmed the future in order to achieve the short-term financial performance. Financial performance on the basis that R&D spending and R&D yield, a proactive aspect of that presentation, have decreased.

9.4.4 Requisites of Balanced Scorecards:

In order to fit the organization's primary goals, a balanced scorecard requires a suitable organising structure and an understanding of organisational processes. However, developing and incorporating balanced scorecards for performance measurements are challenging tasks.



Prior to adopting the balanced scorecard, organisations must meet the requirements listed below.

- a) **Management should Define Organization's Goals and Objectives-** The executives should describe the main objectives of the company. This is often advantageous because the majority of benefit-seeking businesses have a clear objective in mind, namely to grow shareholder value. The board should describe how leaders should accomplish each of these goals in order to find companies that have fundamental aims that include both social and owner wealth goals. Legislative bodies are examples of non-profit organisations where the board should clearly state its objectives.
- b) **Organization's understanding about Stakeholders and Processes-** The company needs to understand how stakeholders and processes contribute to its key objectives. Many managers admit that this is dangerous. For instance, it is unclear from the organisational behaviour literature if increased employee motivation actually results in improved worker and benefit performance. Even if they work on large, high-quality projects, many businesses genuinely don't understand how value affects performance and prefer to speak in platitudes, such as "quality isn't a problem; you need quality just to play the game."
- c) **Development of Secondary Objectives by the Organization-** The company should support a number of secondary objectives that drive the achievement of primary objectives. Perhaps the most challenging and important stage in implementing the balanced scorecard is this one. This assignment must be completed with matching processes and results. The organization should invest resources to support the methods it believes will produce results. This project seeks answers to questions like how much should be invested on consumer loyalty, representative preparedness, quality improvement, or superior strategy frameworks. Such decisions should be made in light of an understanding of how increased expenditure further develops process outcomes, such as further established customer loyalty, which in turn improves the performance of the organization's key objectives.
- d) **Development of set of Measures to Monitor Performance on both Primary and Secondary Objectives-** The organisation should develop a number of metrics to monitor performance on both primary and secondary goals. This is management accounting's typical task. The question of where to find the relevant variable is brought up in this phase. How does the organisation gauge the model's commitment or inspiration to the



organisation? These performance indicators are crucial because they bring methodology into sharp focus because the acts that people are instructed to supervise are what will determine their performance. If the organisation chooses a bad set of policies, it will lead to poor performance. Consider, for example, that the company, lacking the ability to assess motivation, equates motivation with lavish incentive money and measures inspiration by the amount of motivator compensation it provides to employees. However, compensation for motivational forces may actually have a negligible long-term effect on inspiration.

- e) **Development of set of Processes with the Attendant Implicit and Explicit Contracts with Stakeholders-** To achieve those crucial objectives, the organisation should support a number of processes and the associated implicit and explicit contracts with partners. The balanced scorecard's suggested level of complexity is much higher than what is typically done, despite the fact that this administrative necessity is unquestionably acknowledged. For instance, many managers adopted the maxim "value at any cost" in light of the events of the 1980s. Directors would evaluate the costs and benefits of proposals to go to the next level of excellence under the balanced scorecard.
- f) **Specific and Public Statements must be made by Organizations-** The organization should express its beliefs about how processes lead to results in a clear and open manner. Responsibility is based on public pronouncements, specific commitments to courses of action, and anticipated outcomes. They address a part of the management risk in this way since the board's shortcomings can be scrutinized more closely. This level of risk can bother a lot of top managers. However, owners might find these candid statements enlightening.



CASE STUDY

A Case Study of a National Bank

A national bank believed a few years ago that the Internet would revolutionize the way banks dealt with their customers and would force the bank to become a more agile and customer-focused organisation. As a result, the bank replaced its previous scoring system, which was 90% geared toward financial execution, with a fair scorecard.

Three "mark of appearance" metrics were highlighted on the scorecard, and these were (i) Customer Fulfilment List and a Proportion of Consumer Loyalty.

(ii) A percentage of representative opinion and confidence is listed under employee relations.

(iii) Comparative execution of a competitive position-conveyance strategy.

Required: Why did the bank include non-financial indicators and a fair scorecard in its new execution estimation framework?

9.4.5 Perspectives or Factors in Balanced Scorecards:

The balanced scorecard consists of a number of performance goals and outcomes that relate to the four performance components of financial, customer, internal process, and innovation. It believes that businesses depend on a variety of partner groups, including employees, suppliers, clients, local communities, and investors. The balanced scorecard displays how well a firm does at setting goals and interacting with shareholders. Shareholders can occasionally have a range of needs. Employees, for instance, depend on an organisation for their business. Investors depend on a company to keep up with their bets. The company needs to balance such conflicting needs. Therefore, the purpose of a balanced scorecard is to assess how well a business is performing in light of the needs of its stakeholders.

The majority of firms use four points of view or four categories of performance measures. The organization's system and activities are evaluated from a financial standpoint to



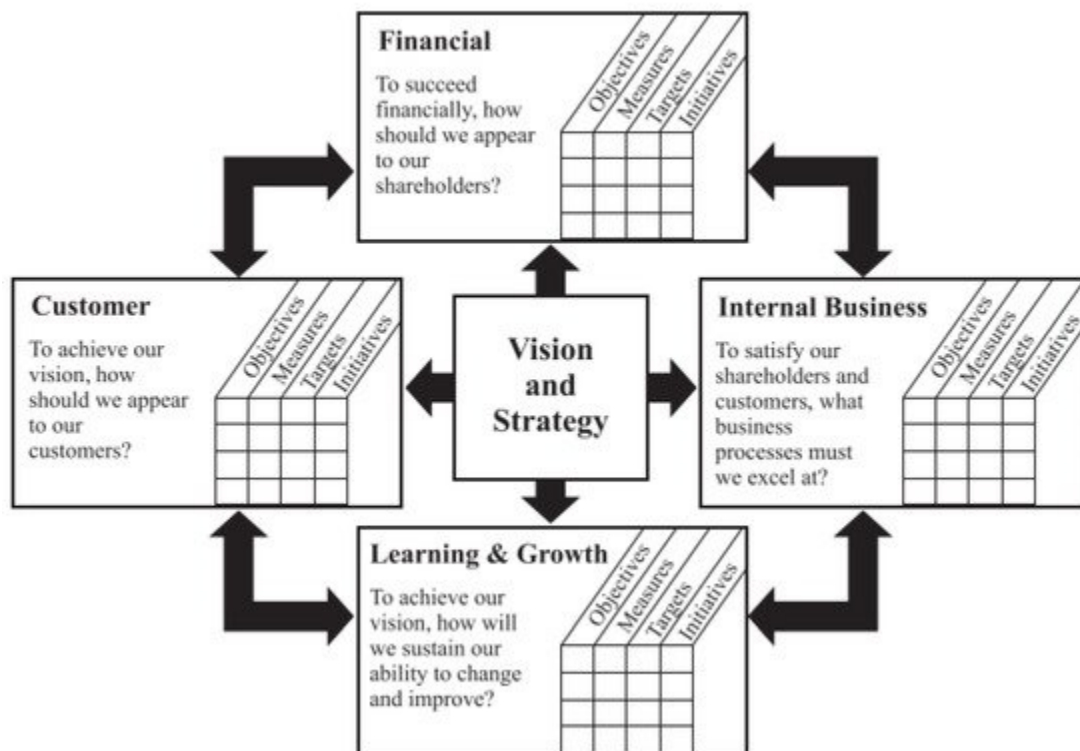
see if they benefit investors. The financial perspective shows how well the approach and activities help to work on the organization's financial well-being for companies that try not to have investors. The perspective of the client shows how the organization's methods and endeavours benefit clients. The internal business and creation process viewpoint displays the ability of the internal business processes to raise client value and further the development of investor wealth. The framework for development and long-term development is strong, as shown by the learning and development perspective. Through its four perspectives, the balanced scorecard system demonstrates its power by providing a comprehensive view of corporate value.

These four viewpoints have been briefly discussed underneath:



**ACTIVITY**

Produce is transported by Mahindra & Mahindra Trucking from farms to markets. According to the entity's mission statement, "We strive to be the industry leader in cost-effective and timely supply of produce," its managers made the decision to establish a balanced scorecard. For each of the four perspectives in the balanced scorecard for Mahindra & Mahindra Trucking, provide two alternative performance measurements.

Balanced Scorecard Framework*

**i) Financial Perspective**

Since for-profit firms use financial execution measures like net gain and return on investment, the balanced scorecard makes use of these. Financial performance indicators provide a common vocabulary for analysing and examining businesses. Financial institutions and investors are two examples of people that donate assets to businesses, and they heavily rely on financial execution criteria when deciding whether to lend money or provide reserves. Financial measures that are properly developed can provide a comprehensive view of an organization's success.

Financial indicators by themselves do not provide progress-motivating forces. Financial measures are vital but cannot serve as a guide or aid in adding value to performance because they only reflect the past and not the future.

As per Brown,' a sound way to deal with financial estimation is to ensure that your information base incorporates three sorts of data:

- i. Historical Data: How did we in all actuality do last month, last week, this year, last year, etc?
- ii. Current Data: How are we doing at present, today?
- iii. Future Data: How will we be doing in the following couple of months or years?

From a financial perspective, a business exists to generate wealth for its owners. A company can monitor who is winning and how successfully it is generating wealth by using yield metrics or other verifiable financial measures. Because they are based on events that have already occurred, this information is always past tense: our net profit for the year compared to last year, our deals income this year compared to last year, and our usual offer value this month compared to last month. These are historical indicators of company performance. Any financial information that is included in a report for investors or other partners would typically be considered to be authentic information.

The amount of money the company has on hand or the total value of its resources in relation to its liabilities are additional aspects of financial data. This accounts for a respectable amount of an organization's overall financial health. These financial metrics should provide an answer to the question, "How are we performing today?"



The third type of financial data needed for a comprehensive set of measurements is used to predict how the company will display its finances in the future. These projections are used to project future asset and responsibility needs. The amount invested in innovative work relative to deal income or benefit is another typical future-focused financial assessment. Organizations usually cut back on these expenses during difficult times, which can make them contract their future for the aim of short-term financial profits. If the company intends to expand into untapped or emerging market segments, growth in deals from a certain region or industry may also be a financial indicator for the future.

ACTIVITY

Imagine a car dealership decided to stop paying sales commissions to employees and instead offer a salary with bonuses for good customer satisfaction ratings. What issues could arise financially for the dealership, in your opinion?

CASE STUDY

A business manager delivers the following phrase: "The alliance enhances the worth of investors, as shown by the financial perspective of the decent scorecard. I work with two organisations: a sanctuary believe that does not have investors and a private firm that is an organisation. Although the fair scoring seems fine to me, the financial perspective is plainly unnecessary for these two associations."

Required: How would you respond to this claim?

ii) Customer Perspective

Managers understand the client and market segments in which the specialty unit will compete as well as the proportions of the specialty unit's performance in these targeted segments from the perspective of the client as seen through the lens of the Balanced



Scorecard. This viewpoint frequently includes a few fundamental or traditional indicators of the effective outcomes from a thoroughly developed and applied process. Consumer loyalty, client maintenance, gaining new clients, client benefit, and market share in targeted areas are all included in the key result measures.

However, the customer's perspective should also include details of the offers that the company will provide to customers in particular market segments. The target specific drivers of core client results speak to the essential elements that influence a client's decision to switch providers or remain loyal to their current ones. Clients may value, for example, short lead times and timely delivery, a steady flow of innovative goods and services, or a supplier prepared to anticipate their changing needs and capable of developing new goods and strategies to meet those demands. The client point of view gives specialist unit managers the ability to describe the market- and client-based methodology that will produce the majority of future financial returns.

In many businesses, the primary measurement group of client outcomes is standard. The primary estimation category includes indicators of:

- i. Share of the overall industry
- ii. Client maintenance
- iii. Client procurement
- iv. Consumer loyalty
- v. Client benefit





CASE STUDY

A Case Study of Household Products Division, a maker of kitchen dishwashers

The Household Products Division, which manufactures kitchen dishwashers, is led by Ashok Dhawan, who just saw the division's fair rating for 2016. Amit, the division's administrative bookkeeper, is summoned right away to his office for a meeting. "I believe that the consumer loyalty and representational fulfilment percentages are very low. These figures are based on an erratic sample of emotional assessments conducted by various supervisors and client delegates. My personal experience is that we are doing particularly well in both of these areas. I believe that by revealing such low scores for representative and customer loyalty, we are doing our organisation and ourselves harm until we do a thorough assessment of employees and clients at some point in a year. At the division commanders' meeting in a month, these results will make us seem bad. We wish to increase these figures. Even though Amit is aware that the representative and customer loyalty scores are hypothetical, his method for the current year was the same as his past methods. He was aware from the comments that he had asked that the scores take into account the suffering of representatives due to the most recent work regulations and the despair of clients due to delayed deliveries. He also understood that these problems will be resolved in due course.

Required:

1. How about the Household Products Division's respectable scorecard include random measurements of representative fulfilment and customer loyalty? logically explain.
2. How should Amit to react?

Source: Lal, J. (2017). *Advanced Management Accounting (Text, Problems & Cases)*



iii) Internal Business Process Perspective-

Managers understand the fundamental internal business processes that the organisation needs to flourish from this perspective. These procedures give commercial entities the ability to:

- Communicate the offers that will entice and retain customers in specific market categories.
- Meet investor expectations for great financial returns.

Any firm can achieve greatness if its processes are managed to produce reliable products and services. The correct procedures being followed correctly results in consistent levels of product and service quality. Finding the proper process components to measure and establishing guidelines that are appropriate for the performance levels of each process measure are difficult tasks. Edge estimations that are even more present-focused are driven by process and functional measurements. These are the measurements that are frequently and probably regularly observed.

Even some interaction elements are observed to ensure the development and supervision of great goods and services. Excellent process or functional measure execution results in high-quality goods and services, which, in turn, produce thrilled or satisfied customers, who then encourage repeat business and support an organization's long-term survival and success.

Process measures provide the data necessary to predict and manage the nature of goods and services. When a problem with products or services arises, the root cause is typically found by looking at the process data.

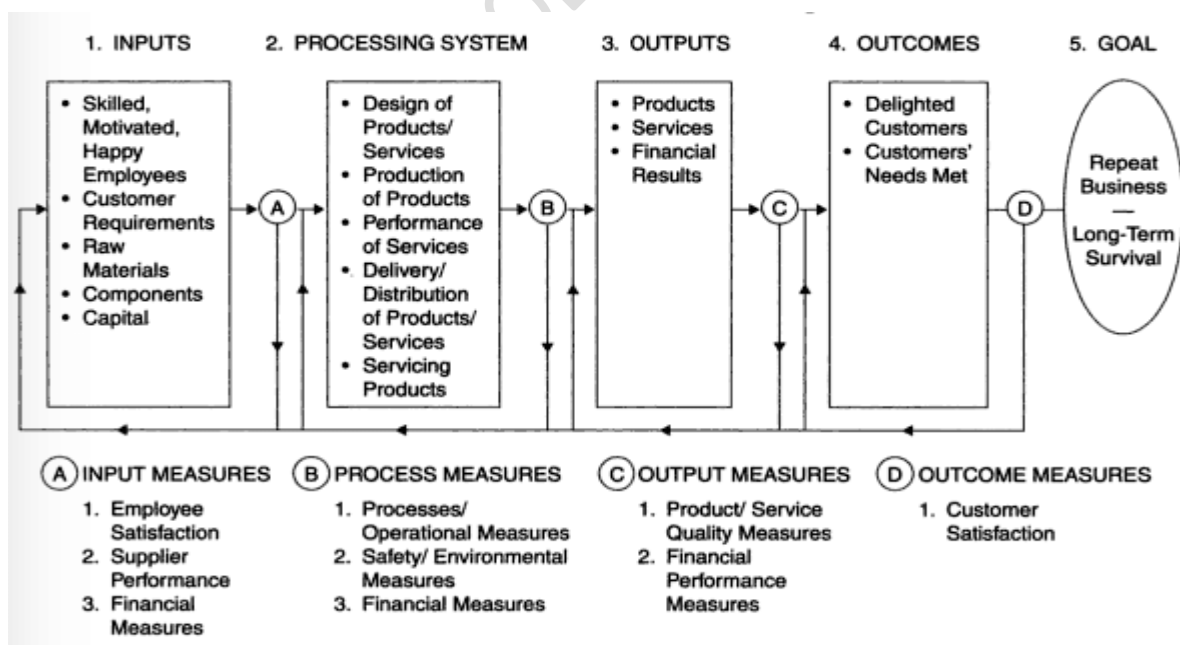
For all organisations, results and outcomes matter. Truth be told, they might be overwhelmingly important. However, it is also important to consider how those achievements are achieved in the process measures.

According to Brown, successful companies gauge their operational outcomes and business processes in the following ways:

- a) **Cycle Time-** Process duration for all key cycles is estimated.
- b) **Rework Time-** Revise time as well as expenses are followed for key creation and administration conveyance processes.
- c) **Key Measures of Productivity-** Key proportions of efficiency are recognized and followed for significant process in the organization.



- d) **Identification of Key Measures-** Key processes have been recognized in each unit, capability, and division of the organization, and handle measures have been characterized for each vital process.
- e) **Correlation of Process Measures-** Process measures furnish with the information expected to foresee and control the quality of items and administrations.
- f) **Setting of Standards or Goals-** Guidelines or objectives are set for all key process measures, and those norms depend on benchmark organizations and client prerequisites.
- g) **Preventive Approach-** Process measures elevate a preventive way to deal with accomplishing reliably high-quality products and services.
- h) **Development of Safety Index-** The organization has fostered a general security record that is followed no less than once a month and comprises of a few result estimates like lost-time mishaps, as well as various preventive or social measures.
- i) **Future-Oriented Process-** A couple of future-situated process measures are followed that will assist with guaranteeing long-term survival and achievement.

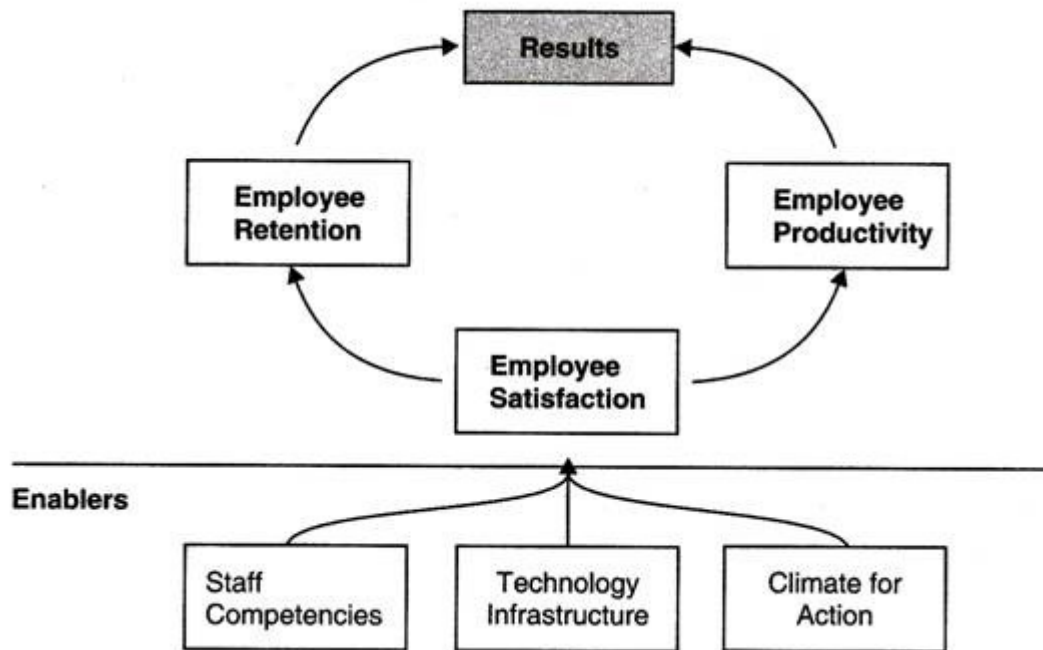




iv) Learning and Growth Perspective

For incentive purposes, the learning and growth viewpoint concentrates on the abilities of individuals. Managers would be liable for creating worker capacities. Key measures for assessing managers' performance would be worker satisfaction, worker maintenance, and employee efficiency.

- a) **Employee Satisfaction:** Employee fulfilment perceives the significance of worker assurance for further developing efficiency, quality, consumer loyalty, and responsiveness to circumstances. Managers can measure employee fulfilment by sending reviews, talking with workers, or on the other hand noticing employees at work.
- b) **Employee Retention:** Firms focused on holding workers perceive that employees develop organization-specific intellectual capital and give an important non-monetary resource to the organization. Moreover, firms cause costs when they should find and recruit great ability to replace individuals who leave. Firms measure worker maintenance as the inverse of employee turnover-the percent of individuals who leave every year.
- c) **Employee Productivity:** Employee efficiency perceives the significance of output per employee. Employees make actual results (i.e., miles driven, pages delivered, or lawns cut), or monetary results (i.e., income per employee or benefits per worker). The number of credits handled per credit official each month would give a straightforward proportion of efficiency for loan officers at a bank.

**Core Measurements****ACTIVITY**

Government agencies and social service organisations, for example, have financial systems that budget expenses as well as track and manage actual spending. Explain why these organisations ought to think about creating a balanced scorecard of metrics for performance monitoring and reporting. What other viewpoints should this balanced scorecard of measurements include?



CASE STUDY

A Case Study of Hero Honda Bikes Company

The phrase "The financial point of view Hero Honda Bikes (HHB) needs to carry out a competent scorecard" is provided by a business manager. Its mission statement is, "We manufacture top-notch, durable bicycles at rock-bottom prices." The substance's rigorous process entails continuously improving the utility, dependability, and quality of its bicycles while holding competition-level demonstrations. The material now produces three different types of trailblazing bicycles through three separate units that are coordinated around the product offered for each type. Engineers are now making progress on the designs for the assembly system for the fourth bicycle line improvement, which includes a finished blueprint. HHB operates an online store where bicycle shops can place orders for customised items and sells directly to them.

Required:

- (a) Describe the fair scorecard's execution cycle at HHB.
- (b) Describe the four perspectives of the fair scorecard and list at least one execution goal for each perspective that HHB should consider.
- (c) Choose one execution goal for each viewpoint, while keeping in mind that there may be two or more potential measures. Understand the relationship between each activity and the work done on the financial execution.
- (d) Outline the benefits and drawbacks of implementing a fair scorecard for HHB.



IN-TEXT QUESTIONS

11. The External Business perspective is a part of balanced scorecard. True/False
12. Employee retention, employee productivity and employee_____ is the part of learning and growth perspective.
13. The Financial perspective is a part of balanced scorecard. True/False
14. In Internal perspective of balanced scorecard _____time for all key process are measured.
15. Financial perspective of balanced scorecard studies historical data, current data and _____data.

9.5 PERFORMANCE DRIVERS AND WEIGHTING PERFORMANCE MEASURES

Performance Drivers:

Results metrics and performance drivers should be mixed in a well-balanced scorecard. Without execution drivers, result measures cannot explain how the results are to be achieved. They also don't provide a quick indication of how well the strategy is being used. However, performance drivers such as process lengths and Part-Per-Million (PPM) imperfection rates without result measures might enable the specialty unit to achieve short-term functional improvements but will fail to reveal whether the functional improvements have been translated into increased business with both current and new clients and, in the end, to improved financial execution. The results (incidental results) and execution drivers (driving marks) of the specialist unit's process should be properly balanced in a balanced scorecard.



ACTIVITY

The "Balanced Scorecard" strategy attempts to give management information to aid in the creation and implementation of strategic policy. It emphasises the necessity of giving the user a set of data that covers all pertinent performance areas impartially and objectively.

Requirements:

- (i) Describe in basic terms the primary type of information that a manager would need to use this method of performance measurement;
- (ii) Comment on three specific examples of performance metrics that might be utilised by a business in the service sector, such a consulting firm.

Four Perspectives: Are they Sufficient

The reasonable scorecard's four points of view should be viewed as a layout rather than a restriction. There is no quantitative hypothesis to show that four points of view are both necessary and sufficient. The organization's owners and capital contributors are identified on each scorecard through financial goals and metrics. Since customers are essential to achieving the financial goals, client measures are also included on each scorecard (from the client's perspective). When exceptional performance along this aspect can prompt advancement execution for clients and investors, objectives and measures for workers appear on the reasonable scorecard.

Organizations almost never employ less than four points of view, although in some cases, at least one additional viewpoint may be necessary due to market conditions, a speciality unit's system, and other factors. For instance, some managers take into account the interests of other important partners, such as suppliers and the neighbourhood. The internal business process viewpoint of the company should be combined with result and execution driver metrics for provider connections at the point when connections are crucial for the strategy driving forward



client and financial execution. Targets and metrics for that perspective also become an essential component of an organization's scorecard when exceptional natural and local area performance is the system's focal point.

Weighting Performance Measures:

For each of the four points of view or elements, the organisation using a reasonable scorecard will construct three to five performance metrics. The actions are then linked to the organization's method for advancement. The method for weighing various performance estimations is problematic for those who create adjusted scorecards. Assigning a set weight to each presentation metric (for example, 15% of the overall presentation score will be based on customer loyalty) ignores adaptability when assessing performance and fails to take into account challenges that arise unexpectedly during the display period.

For instance, while it is typical for planners to give consumer loyalty a weight of 15%, a particular division did outstanding work to increase consumer loyalty. Such execution should be rewarded by senior administration more than the 15% weighting suggests. According to research, the use of adaptability might lead to concerns about bias. For instance, shifting workloads to execution measurements after the exhibition time frame and combining emotional execution assessments are two examples.



CASE STUDY

A Case Study of Rastogi & Co.

New Delhi's Rastogi & Co. is a legal practise. The company has a very informal and laid-back management style that has previously worked effectively for it. Rastogi & Co., however, has not been gaining new customers as quickly as more competitive legal firms. Mahesh, the managing partner, learned about the balanced scorecard when he recently attended a conference on performance monitoring in legal companies. He believed it might be a useful tool for Rastogi & Co., one that would let the company maintain its ethos while still acting more fiercely to attract new clients. The following strategic objectives were determined by Mahesh to be compatible with the firm's score values and to offer a framework for monitoring the firm's progress toward its objectives:

Financial

- (a) To steadily increase the firm's revenues and profits.

Customer

- (a) To understand the firm's customers and their needs.
- (b) To value customer service over self-interest.

Internal Business Process

- (a) Encourage knowledge sharing among the legal staff.
- (b) To communicate with each other openly, honestly, and often.
- (c) To empower staff to make decisions that benefit their clients.

Organisation Learning

- (a) To maintain an open and collaborative environment that attracts and retains the best legal staff.
- (b) To seek staff diversity.

Required:

- (i) Develop at least one measure for each of the strategic objectives listed.
- (in) Explain how Rastogi & Co. can use this balanced scorecard to evaluate staff performance.
- (ii) Should staff compensation be tied to the scorecard performance measures? Why or why not?



IN-TEXT QUESTIONS

17. A good balanced scorecard is the one which have outcome measures. True/False
18. The balanced scorecard contains ____ number of perspectives.
19. A good balanced scorecard is not necessarily contained performance drivers. True/False.
20. Customer _____ plays a huge role in weighting performance measures.
21. The four perspectives of the balanced scorecars should be considered as a template. Yes/No.

9.6 SUMMARY

We have learned about balanced scorecards and performance measurement in this lesson. The reasonable scorecard is a management tool designed to turn an organization's primary goals into a series of hierarchical performance goals that can then be estimated, checked, and modified as necessary to ensure that an organization's primary goals are achieved.

The monetary accounting measurements that businesses often use to monitor their primary goals are insufficient to keep businesses on track, which is a key justification for the balanced scorecard approach. Financial results provide information about what has already happened, not about where the business is or should be heading. By adding additional variables that evaluate performance in areas like customer loyalty and product development to monetary indicators, the reasonable scorecard framework hopes to provide partners with a more comprehensive picture.

9.7 GLOSSARY

Correlation: The relationship between two factors or variables under study.

**9.8 ANSWERS TO INTEXT QUESTIONS**

1. Performances	9. Cycle
2. True	10. Future
3. Yes	11. True
4. False	12. Four
5. Competition	13. False
6. False	14. Satisfaction
7. Satisfaction	15. Yes
8. True	

9.9 SELF-ASSESSMENT QUESTIONS

6. In what way customer perspective is important in balanced scorecard? [Source: Lal, J. (2017). *Advanced Management Accounting (Text, Problems & Cases)*]
7. What problems arise if any, from monitoring and rewarding senior executives by a combination of financial and non-financial measures? [Source: Lal, J. (2017). *Advanced Management Accounting (Text, Problems & Cases)*]
8. When implementing balanced scorecard, why do some managers use a different term to describe it. [Source: Lal, J. (2017). *Advanced Management Accounting (Text, Problems & Cases)*]
9. Discuss the importance of balanced scorecard for a not-for-profit organization. [Source: Lal, J. (2017). *Advanced Management Accounting (Text, Problems & Cases)*]



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9.11 SUGGESTED READINGS

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LESSON 10

INVENTORY MANAGEMENT

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STRUCTURE

- 10.1 Learning Objectives
- 10.2 Introduction
- 10.3 Inventory Management
 - 10.3.1 Meaning and Types of Inventories:
 - 10.3.2 Meaning of Inventory Management
 - 10.3.3 Significance of holding inventory
 - 10.3.4 Objectives of Inventory Management
 - 10.3.5 Factors affecting the level of Inventory
- 10.4 Cost associated with Goods for Sales
- 10.5 Tools and Techniques of Inventory Management and Control
 - 10.5.1 Determination of Stock Levels
 - 10.5.2 ABC Analysis
- 10.6 Economic Order Quantity (EOQ) Decision Model
- 10.7 Just in Time (JIT)
 - 10.7.1 Features of JIT
 - 10.7.2 Elements involved in JIT
 - 10.7.3 Advantages of JIT
 - 10.7.4 Disadvantages of JIT
- 10.8 Method of Inventory Valuation
 - 10.8.1 Cost Price Method



- 10.8.2 Average Price Method
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- 10.11 Answers to In-Text Questions
- 10.12 Self-Assessment Questions
- 10.13 References
- 10.14 Suggested Readings

10.1 LEARNING OBJECTIVES

After studying this lesson, you will be able to understand:

- Meaning and definition of Inventory
- Objective and Management of Inventories
- Tools and techniques of Inventory management and control
- Method of Inventory valuation.

10.2 INTRODUCTION

In this lesson we will understand the meaning of inventory and inventory management, the need and the objective of holding inventories, factors affecting the level of inventory, tools and techniques of inventory management and methods of inventory valuation. Every organization which is into production, trading, sale and service of a product will necessarily hold stock of various physical resources to aid in future consumption and sale. The organizations hold inventories for various reasons, e.g. speculative purposes, functional purposes, physical necessities etc.



10.3 INVENTORY MANAGEMENT

10.3.1 Meaning and Types of Inventories:

Inventory is the assets a business intends to sell to customers for profit. Inventory describes the stockpile of the item(s) a business is selling as well as the individual items that make up the item. To put it another way, the inventory is utilised to indicate the total amount of the tangible assets that are:

- held for sale normally as part of operations.
- in the production phase for such a transaction.
- To be currently consumed in the production of goods or services to be available for sale

The inventory may be classified into three categories:

Raw materials and supplies: It refers to the unfinished goods used in the process of manufacturing.

Work in Progress: It describes semi-finished goods which are not 100% complete but some work has been done on them.

Finished Goods: It refers to the goods on which all work has been completed and they are ready for sale.

10.3.2 Meaning of Inventory management:

Inventory management is the technique of managing and controlling the ordering, storage, and use of components that a business employs in the production of the goods it sells. Inventory management is a part of supply chain management which regulates the movement of products from producers to warehouses and from these locations to points of sale. Inventory control entails effectively managing the money spent on supplies, raw materials, work-in-progress, and finished goods.

10.3.3 Significance of holding inventory:

One of a company's most valuable assets is regarded as its inventory. Inventory management must be precise, effective, and proactive. Every business needs inventory to guarantee that the production process runs smoothly, to lower the ordering cost of inventory, to take advantage of quantity discounts, to avoid missing out on sales opportunities, to maximise and optimise



plant capacity, and to reduce the total price. As a result, inventory must be maintained in an appropriate quantity and is therefore necessary. However, the idea of Just In Time (JIT), which is an inventory strategy used by businesses to boost productivity and cut waste by acquiring products only as they are required in the production process, is gaining popularity. JIT lowers the inventory costs but require producers to forecast demand accurately.

10.3.4 Objectives of Inventory Management

Maintaining right level of inventory is the objective of inventory management to prevent excess or shortfall of inventory. Inventory management systems reduce the cost of carrying inventory and guarantee a steady supply of raw materials and finished goods throughout the cycle of business operations. The objectives can be separated into the two categories listed below:

- **Operating objectives:** They are related to the operating activities of the business like purchase, production, sales etc.
 - a. To ensure a steady supply of materials.
 - b. To guarantee a continuous flow of production.
 - c. To reduce the risks and losses incurred due to inventory shortages.
 - d. To ensure enhanced customer services.
 - e. Reducing the risk of stockouts.
- **Financial Objectives:**
 - a. To reduce the capital investment in the inventory.
 - b. To reduce the cost of inventories.
 - c. Economy in the purchase.

Inventory management places a strong emphasis on reducing the negative effects of having excess inventory in addition to the goals. The following effects resulted from holding surplus inventory:

- Unnecessary investment of funds and reduction in profit.
- Increase in holding costs.
- Loss of liquidity.
- Deterioration in inventory



10.3.5 Factors affecting the level of inventory

The level of inventory should be appropriate. There are several factors which determine the appropriateness level of inventory. Some of the important factors are explained below:

- **Nature of Business:** Whether a retail business, a wholesale business, a manufacturing business, or a trading business, the level of inventory will depend on the nature of business.
- **Inventory turnover:** Inventory turnover discusses the quantity and frequency of sales of inventory. It directly affects the amount of inventory a businesses need to maintain.
- **Product type:** The goods sold by the businesses could be either durable or perishable goods. Consequently, maintaining the inventory is required.
- **Economics of production:** The volume of inventory retained is also influenced by the size at which manufacturing is done. A company might operate on a huge scale to take advantage of the economies of production.
- **Inventory Costs:** The business will incur additional operating expenses as more inventory is kept on hand. Inventory retained must be balanced against the entire cost of inventory, which includes purchase cost, ordering cost, and holding cost.
- **Financial position:** The supplier's credit terms can occasionally be rigid and the credit period can be quite short. The inventory must then be maintained in accordance with the company's financial status.
- **Duration of Operating cycle:** If the operating cycle duration is long, it will also take a long time to realise the money from the sale of inventory. As a result, the managed inventory should match the operational cycle's time and the need for working capital.
- **Management Attitude:** The top management may embrace the idea of zero inventories or hold a high level of inventories. Accordingly, the inventory policy will be designed for the business.

10.4 COST ASSOCIATED WITH GOODS FOR SALES

Companies must effectively manage costs that fall into the following six categories in order to effectively manage inventories and increase net income:



- **Purchasing costs** include the price of incoming freight as well as the price of goods purchased from suppliers. Generally, the largest cost category for goods for sale is comprised of these costs. Purchase costs are impacted by discounts for different purchase order sizes and supplier payment terms.
- **Ordering costs** occur during the preparation and issuance of purchase orders, the acquisition and inspection of the ordered goods, and the matching of invoices received, purchase orders, and delivery records to determine payments. The price of getting purchase approvals is included in the ordering costs, along with any additional fees for special processing.
- **Carrying costs** arise while holding an inventory of good for sale. The opportunity cost of the investment tied up in inventory and the other cost associated with storage such as insurance, rent of warehouse, obsolescence and spoilage all are included in carrying costs.
- **Stockout costs** arises when a business runs out of a specific item that customers are demanding. In order to satisfy that demand, the business must act quickly to replenish inventory or suffer the costs of not meeting it. In order to address a stockout, a business may expedite an order from a supplier, which can be costly due to additional ordering and transportation costs. Or the stockout might result in the company losing sales. The opportunity cost of the stockout in this instance consists of the contribution margin lost on the unrealized sale as well as any contribution margin lost on upcoming sales as a result of unfavourable customer behaviour.
- **Quality costs** incurs when a product or service's features and characteristics do not meet customer requirements. The four types of quality costs are as follows: (prevention costs, appraisal costs, internal failure costs, and external failure costs)
- **Shrinkage Cost** are caused by employee fraud, theft by outsiders, misclassifications, and clerical errors. Shrinkage is measured by the difference between the cost of the inventory when physically counted and the cost of the inventory recorded on the books in the absence of theft and the other incidences. Shrinkage is a key indicator of management effectiveness.

10.5 TECHNIQUES OF INVENTORY MANAGEMENT AND CONTROL

An efficient control system for inventories is necessary for effective inventory management. Proper inventory management not only aids in resolving the urgent liquidity issue, but also



boosts profits and significantly lowers the company's need for working capital. The following are crucial methods and tools for managing and controlling inventory:

1. Determination of Stock Levels.
2. Determination of Economic Order Quantity
3. A.B.C. Analysis
4. VED Analysis
5. Just in Time Inventory

10.5.1 Determination of Stock Levels:

Both carrying too much, and too little inventory is detrimental for the business organisation. A low inventory level will result in frequent stock-outs and high ordering costs, while a high inventory level will result in unnecessary capital ties up. A company must therefore maintain an ideal level of inventory to ensure that inventory costs are kept to a minimum while also preventing stock-outs, which could lead to sales loss or a halt in production. Different stock levels are discussed in this circumstance.

(a) Minimum Level: This represents the amount that must always be on hand. The work will stop due to a lack of supplies if stocks fall below the minimum level. When determining the minimum stock level, the following factors are taken into consideration.

Lead Time: A purchasing company needs some time to process the order, and a supply company needs time to carry out the order. Lead time refers to the period of time needed to process the order before it is executed.

Rate of Consumption: It is the average consumption of materials in the factory. Utilizing past performance and production plans, the rate of consumption will be determined.

Nature of Material: The minimum level is also influenced by the nature of the inventory. A minimum amount of stock is not necessary for materials that are only needed for special orders from customers.

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

(b) Re-ordering Level: A new order is sent to obtain materials when the quantity of materials reaches a specific level. Prior to the materials reaching the minimum stock level, the order is sent. The level of reordering is fixed between the minimum and maximum level. When determining the reorder level, the rate of consumption, the number of days needed to replenish the stock, and the maximum amount of material needed on any given day are all taken into consideration.



Re-ordering Level = Maximum Consumption x Maximum Re-order period.

(c) Maximum Level: It is the quantity of materials beyond which a firm should not exceed its stocks. Overstocking occurs if the quantity exceeds the maximum level allowed. Overstocking should be avoided by a business as it will increase material costs.

Maximum Stock Level = Re-ordering Level+ Re-ordering Quantity -(Minimum Consumption x Minimum Re-ordering period).

(d) Danger Level: It is the level beyond which materials should not fall in any case. If danger level arises then immediate steps should be taken to replenish the stock even if more cost is incurred in arranging the materials. If materials are not arranged immediately there is possibility of stoppage of work.

Danger Level = Average Consumption x Maximum reorder period for emergency purchases.

(e) Average Stock Level

The average stock level is calculated as such:

Average Stock level = Minimum Stock Level + $\frac{1}{2}$ of re-order quantity

Illustration 1:

In a manufacturing company, a material is used as follows:

Re-order quantity	=	3,600 units
Maximum consumption	=	900 units per week
Minimum consumption	=	300 units per week
Normal consumption	=	600 units per week
Re-order period	=	3 to 5 week

Calculate: a) Re-order level; b) Minimum stock level; c) Maximum stock level.

Solution:

Reorder level = Maximum consumption $\times$ Maximum re-order period
= 900×5 = **4,500 units**

Minimum Stocks level = Re-order level – (Normal consumption $\times$ Normal re-order period)
= $4500 - (600 \times 4)$ = **2100 units**



Note: Normal re-order period is the average period.

$$\begin{aligned}\text{Maximum Stock Level} &= \text{Re-order level} + \text{re-order quantity} - (\text{Minimum consumption} \times \\ &\quad \text{Minimum re-order period}) \\ &= (4500 + 3600) - (300 \times 3) = \mathbf{7,200 \text{ units}}.\end{aligned}$$

Illustration 2:

In a manufacturing company, a material is used as follows:

Maximum consumption	-	12,000 units per week
Minimum consumption	-	4000 units per week
Normal Consumption	-	8000 units per week
Re-order quantity	-	48000
Time required for delivery	-	Minimum : 4 weeks, Maximum : 6 weeks

Calculate : a) re-order level, b) Minimum level, c) Maximum level; d) Danger level and e) Average stock level.

Solution:

$$\begin{aligned}\text{Reorder level} &= \text{Maximum consumption} \times \text{Maximum re-order period} \\ &= 12000 \times 6 = \mathbf{72,000 \text{ units}}\end{aligned}$$

$$\begin{aligned}\text{Minimum Stocks level} &= \text{Re-order level} - (\text{Normal consumption} \times \text{Normal re-order period}) \\ &= 72,000 - (8000 \times 5) = \mathbf{32,000 \text{ units}}\end{aligned}$$

$$\begin{aligned}\text{Maximum Stocks level} &= \text{Re-order level} + \text{Re-order quantity} + (\text{Minimum consumption} \times \\ &\quad \text{minimum re-order period}) \\ &= 72,000 - 48,000 - (4000 \times 4) = \mathbf{1,04,000 \text{ units}}\end{aligned}$$

$$\begin{aligned}\text{Danger Level} &= \text{Average consumption} \times \text{Maximum re-order period for} \\ &\quad \text{emergency purchases} \\ &= 8000 \times 2 \text{ week} = \mathbf{16000 \text{ units}}\end{aligned}$$

$$\text{Average Stock Level} = \text{Minimum level} + \frac{1}{2} (48000) = \mathbf{56,000 \text{ units}}$$

10.5.2 ABC Analysis

ABC (Always Better Control) analysis is believed to have originated in General Electric Company of America. It is based upon the classification of inventory for selection control. It measures the monetary value i.e., cost significance of each inventory/material in relation to total cost and inventory value. The logic behind this kind of analysis is that the management



should study each item of stock in terms of its usage, lead time, technical or other problems and its relative money value in the total investment in inventories. Critical, or high value, items require very close attention, while low value items require the least amount of expense and effort when it comes to inventory control.

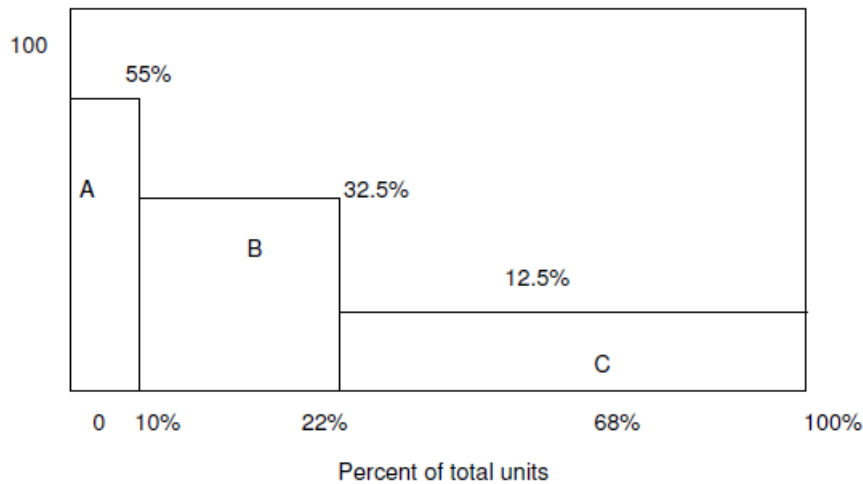
Under ABC analysis, the various stock items can be ranked according to their average material investment or according to their annual rupee usage. Materials segregation or inventory control involve several crucial steps, including:

- (i) Find out how much of each stock item will actually be used in the future for the review and forecast period.
- (ii) Determine the price per unit for each item.
- (iii) Determine the total project cost of each item by multiplying its expected units to be used by the price per unit of such item.
- (iv) Beginning with the item with the highest total cost, arrange different items in order of their total cost as computed under step (iii) above.
- (v) Express the units of each item as a percentage of total costs of all items.
- (vi) Compute the total cost of each item as a percentage of total costs of all items.

If it is convenient different items may be classified into only three categories and labelled as A, B, and C respectively depending upon whether they are high value items, middle value items or low value items. If need be, percentage of different items may be plotted on a chart. The entire working of ABC analysis may be explained with the help of the following simplified example:

ABC Analysis

Items	Unit	% of total	Cost per unit	Total Cost ₹	% of total cost ₹
1	400	4	50.00	20,000	25.0
2	600	6	40.00	24,000	30.0
3	1,000	10	14.00	14,000	17.5
4	1,200	12	10.00	12,000	15.0
5	2,800	28	2.00	5,600	7.0
6	4,000	40	1.10	4,400	5.5
	10,000		100.0	80,000	100.0



Graphical Presentation of ABC Plan

VED Analysis: Vital, Essential, and Desirable (VED) analysis states that highest control must be over vital items, medium control over essential items and least control is inferred over desirable items.

SDE Analysis: SDE stands for Scarce, Difficult and Easy. Highest control is exercised over scarce items, medium control over difficult items and least control over easily available items.

10.6 ECONOMIC ORDER QUANTITY [EOQ]

Economic Order Quantity [EOQ]

The two fundamental problems in material control are how much of a given item should be ordered at once and when to place the next order. The objective is to determine the ideal order size before choosing an economical ordering quantity. Considerations like material carrying costs and the ordering cost associated with placing purchase orders must be taken into consideration while determining the ideal order size; the total cost (ordering + storing cost) be minimised. The costs associated with carrying material include interest on the capital used to purchase the material stores, rent for the storage space, salaries and wages for the department in charge of keeping the stores, any loss from theft and deterioration, costs associated with store insurance, stationery and other supplies used by the stores, taxes on inventories, etc.



Ordering costs may include the rent for the office space that purchasing department occupies, the salaries and wages of its employees, the depreciation on its equipment and furniture, postage, telegraph, and telephone bills, the stationaries, and other consumables it needs, any travel expenses incurred, the costs of inspection etc.

Assumption of Economic Order Quantity

The following formula determines the economic ordering quantity, which is the quantity for which the cost of holding plus the cost of purchasing is minimum:

- The EOQ model assumes only ordering and carrying cost.
- At each reorder point, same quantity is ordered.
- Consumption, ordering costs, and carrying costs are all well known. It is also certain how long it will take to fulfil a purchase order from the time it is placed.
- The order quantity has no impact on the purchasing cost per unit. Due to the assumption that the purchase price is the same regardless of the order size, purchasing costs are irrelevant when determining EOQ.
- There are no stockouts. This assumption is based on the idea that managers keep enough inventory to prevent stockouts because the costs of stockout are so high.
- Managers only take quality and shrinkage costs into account when determining the size of a purchase order to the extent that these costs have an impact on ordering or carrying costs.

Calculation of EOQ

EOQ is that quantity at which total relevant cost is minimum

Total relevant costs = Relevant ordering costs + Relevant carrying costs

We use the following notion:

D = Total demand in units for a specific period (e.g., 1 year)

Q = Size of each order

Number of purchase orders per period (one year) = $\frac{\text{Demand in units for a period (one year)}}{\text{Size of each order}} = \frac{D}{Q}$



The average inventory in units = $\frac{Q}{2}$, because each time the inventory goes down to 0, an order for Q units is received. The inventory varies from Q to 0 so the average inventory is $\frac{0+Q}{2}$

P = relevant ordering cost per purchase order

C = Relevant carrying cost of one unit in stock for the time period used for D (one year)

For any given quantity Q

$$\text{Annual relevant ordering costs} = \left(\begin{array}{c} \text{Number of} \\ \text{purchase orders} \\ \text{per year} \end{array} \times \begin{array}{c} \text{Relevant ordering} \\ \text{cost per} \\ \text{purchase order} \end{array} \right) = \left(\frac{D}{Q} \times P \right)$$

$$\text{Annual relevant carrying costs} = \left(\begin{array}{c} \text{Average inventory} \\ \text{in units} \end{array} \times \begin{array}{c} \text{Annual} \\ \text{relevant carrying} \\ \text{cost per unit} \end{array} \right) = \left(\frac{Q}{2} \times C \right)$$

$$\text{Annual relevant total costs} = \begin{array}{c} \text{Annual} \\ \text{relevant ordering} \\ \text{costs} \end{array} + \begin{array}{c} \text{Annual} \\ \text{relevant carrying} \\ \text{costs} \end{array} = \left(\frac{D}{Q} \times P \right) + \left(\frac{Q}{2} \times C \right)$$

The EOQ model is solved using calculus but the key intuition is that relevant total costs are minimized when relevant ordering costs equal relevant carrying costs.

To solve EOQ we set

$$\left(\frac{Q}{2} \times C \right) = \left(\frac{D}{Q} \times P \right)$$

Multiplying both sides by $\frac{2Q}{C}$ = we get $Q^2 = \frac{2DP}{C}$

$$Q = \sqrt{\frac{2DP}{C}}$$

Where,

Q = EOQ

D = Annual units' consumption during the year

P = Cost of placing an order (Ordering costs).



C = Annual cost of storage of one unit (Carrying costs).

The above formula indicates that EOQ increases with increase in D (Annual consumption) and/or P (Ordering Cost).

The graphical representation of EOQ is given below:

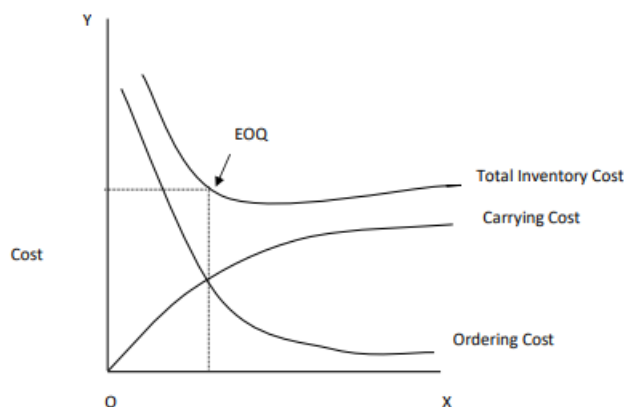


Figure 10.1

In the figure 10.1 ordering cost, carrying cost and total cost are plotted on y-axis and quantity on x-axis. The EOQ is achieved when the Ordering Cost is equal to Carrying Cost. At EOQ level the total inventory cost is minimum.

Example 10.1: ABC Ltd is an independent stationary store that sells pen. ABC Ltd purchases the pen from XYZ Ltd at Rs 14 a package (each package contains 20 pens). All the incoming freight is bear by XYZ Ltd. No inspection is necessary at ABC Ltd because XYZ Ltd supplies quality pens. ABC Ltd annual demand is 13,000 packages, at a rate of 250 packages per week. ABC Ltd requires a 15% annual rate of return on investment. The purchase-order lead time is two weeks. Relevant ordering cost per purchase order is Rs. 200. Other relevant cost of insurance, materials handling. Breakage, shrinkage and so on pe year is 3.10.

Solution

Weekly consumption = 250

Cost of placing an order = 200

Annual carrying cost (per unit) = required annual return on investment + other relevant carrying cost
 $= 0.15 \times 14 + 3.10 = 5.20$



Calculate the EOQ.

Solution

$$EOQ = \sqrt{\frac{2D \times P}{S}}$$

Where U = Annual Consumption in units = 250*52 = 13,000

P = Cost of Placing an order = 200

S = Annual Carrying cost per unit = 5.20

$$EOQ = \sqrt{\frac{2(13000) \times 200}{5.20}} = 1000 \text{ units.}$$

Calculation of number of orders in a year = $\frac{13000}{1000} = 13$ orders

$$\begin{aligned} \text{Calculation of Relevant Total Cost:} &= \left(\frac{D}{Q} \times P\right) + \left(\frac{Q}{2} \times C\right) \\ &= \left(\frac{13000 \times 200}{1000}\right) + \left(\frac{1000}{2} \times 5.20\right) \\ &= 2600 + 2600 = 5200. \end{aligned}$$

10.7 JUST IN TIME (JIT)

Using a just-in-time (JIT) inventory system, suppliers can place orders for raw materials that are directly in line with production schedules. By only ordering the goods they actually need for the production process, businesses can cut down on inventory costs while increasing efficiency and reducing waste. With this strategy, producers must precisely forecast demand.

The "nervous system" of lean JIT production, kanban regulates inventory movement and work-in-progress production. When it comes to reducing manufacturing waste brought on by overproduction, kanban is essential.

Push inventory tactics are used in more conventional mass production techniques and are based on the anticipated quantity of sales. The pull approach used by Kanban allows for greater production floor flexibility because a business can only generate items in response to genuine



customer requests. On a factory floor, Kanban uses cards—either paper or digital—to monitor the status of output. Kanban cards track the flow of inventory through the manufacturing process and can indicate when it's time to place an order for additional stock.

10.7.1 Features of JIT

- The just-in-time (JIT) inventory system is a management technique that reduces inventory and boosts efficiency.
- JIT manufacturing is also known as Toyota Production system (TPS) because Toyota, a car manufacturer, adopted JIT system in the 1970s
- To prevent work-in-process overcapacity, JIT is frequently used in conjunction with the scheduling system known as kanban.
- The JIT production process depends on consistent output, excellent craftsmanship, no equipment failures, and trustworthy suppliers for its success.
- The Motorola and IBM terms for the JIT system are short-cycle manufacturing and continuous-flow manufacturing, respectively.

10.7.2 Elements involved in JIT

Continuous improvements:

- Addressing core issues and everything that does not improve the product.
- Creating mechanisms to locate issues with manufacturing and related problems.
- A layout focused on the product such that movement of materials and parts consume minimum time.
- Quality control at source to ensure every worker is solely responsible for the quality of their own produced output.

Eliminating waste:

One of the primary goals of the Just In Time system is waste reduction. This requires efficient inventory management across the whole supply chain. There are seven types of waste:

- Waste from product defects.
- Waste of time.



- Transportation waste.
- Inventory waste.
- Waste from overproduction.
- Processing waste.

10.7.3 Advantages of JIT

- The manufacturers can easily move from one product to another
- JIT reduces the costs by minimizing the warehouse needs.
- The businesses spend less on raw materials because they only purchase what they need to produce the products that have been ordered.
- Less working capital is needed because, with this management approach, only essential stocks needed for manufacturing are acquired.
- By setting a minimum reorder level and only placing orders for new stock when that level is reached, this approach also benefits inventory management.
- The organisations' overall ROI (Return On Investment) is high as a result of the aforementioned low level of stocks held.
- Since this strategy relies on a demand-pull model, all goods produced would be sold, making it simple to account for unforeseen changes in demand.
- Due to the erratic and unstable nature of market demand today, JIT is appealing.
- In order to reduce rework costs and inspection costs, JIT places a strong emphasis on the "right-first-time" principle.
- JIT can lead to higher productivity and higher-quality products.
- A JIT system promotes better communication along the manufacturing chain.

10.7.4 Disadvantages of JIT

- The JIT approach states that there should be ZERO tolerance for errors, which makes rework challenging in practise because inventory is kept to a minimum.
- JIT implementation requires a high reliance on suppliers, whose performance is out of the manufacturer's control.



- JIT lacks buffers, which can lead to production line idling and downtime, which would be detrimental to both the financial situation and the production process.
- Given that there won't be any extra finished goods on hand, the odds of failing to fulfil an unexpected rise in orders are quite high
- Depending on the frequency of transactions, transaction charges would be relatively significant.
- Due to the frequent delivery, JIT may have some unfavourable environmental implications because more transportation would be needed, which would increase the use and cost of fossil fuels.

Example of JIT

Toyota Motor Corporation, which is renowned for its JIT inventory system, only orders parts in response to new car orders. The company started using this technique in the 1970s, but it took 20 years to get it just right. Sadly, a fire at the Japanese-owned automotive parts supplier Aisin severely damaged its ability to produce P-valves for Toyota's vehicles in February 1997, threatening to put an end to Toyota's JIT inventory system. Toyota had to halt production for a few days because Aisin is the only supplier of this component, and its weeks-long shutdown caused that.

As a result, other Toyota parts vendors were forced to temporarily close their doors because the automaker was no longer in need of their components. This fire consequently cost Toyota 160 billion yen in revenue

JIT in Service Industries

It is possible to use JIT purchasing and production processes in the service sector as well. For instance, more than a third of the expenses at most hospitals are related to inventory, supplies, and the labour costs. Eisenhower Memorial Hospital in Palm Springs, California, decreased its inventory and supplies by 90% in just 18 months by introducing a JIT purchasing and delivery system. To produce hamburgers, McDonald's has utilised JIT production techniques. Previously, McDonald's precooked a batch of hamburgers that were kept warm under heat lamps until orders were placed. The discarding of the hamburgers in cases where it didn't sell within a specified time period resulted in significant inventory holding costs and spoiling costs. Also, the longer the hamburgers lay beneath the heat lamps, the worse their quality became. Finally, clients who ordered a hamburger with a particular request (such one without cheese) had to wait for the burger to cook. Today, McDonald's is able to cook hamburgers just when



they are ordered, considerably decreasing inventory holding and spoilage costs. This is made possible by the use of new technology (including an inventive bun toaster) and JIT production processes. Most significantly, JIT has increased consumer satisfaction by enhancing hamburger quality and slashing the time required for special orders.

$$\text{Kanbans} = \frac{D \cdot L(1 + \alpha)}{\text{EOQ}}$$

Where D = Daily Demand

L = Lead Time

A = Safety Stock

Illustration 3:

Calculate the number of Kanbans needed at the ABC company for the following two products, produced in a factory that works eight hours per day, five days per week.

	Product 1	Product 2
Usage	300/week	150/week
Lead time	1 week	2 week
Container size	20 units	30 units
Safety Stock	15 percent	0

Solution

	Product 1	Product 2
Daily Demand (D)	300/5	150
Lead time (L)	5 days	10 days
EOQ	20 units	30 units
Kanbans = $\frac{D \cdot L(1 + \alpha)}{\text{EOQ}}$	17.25 = 18 Cards	50 Cards
Total number of Kanban in the system	18+50 = 68 Cards	

10.8 METHOD OF INVENTORY VALUATION

When materials are issued to production department, a difficulty arises regarding the price at which materials issued are to be charged. The same type of material may have been purchased in different lots at different times at several different prices. This means that actual cost can take on several different values and same method of pricing the issue of materials must be selected.



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

I. Cost Price Methods	II. Average Price Method	III. Notional Price Methods
(a) Specified Price	(a) Simple Average	(a) Standard Price
(b) First-in First-out (FIFO)	(b) Weighted Average	(i) Current Standard
(c) Last-in First-out (LIFO)	(c) Periodic Simple Average	(ii) Basic Standard
(d) Highest-in First-out (HIFO)	(d) Moving Simple Average	(b) Inflated Price
(e) Base Stock	(e) Moving Weighted Average	(c) Market Price
		(i) Replacement Price
		(ii) Realisable Price

10.8.1 COST PRICE METHOD

a) Specified Price (Identifiable Method)

Sometimes materials are bought to be used in a specific job or problems can be found with a specific receipt. The actual purchase price may be levied in these circumstances. When prices are stable or when the materials are covered by price control orders, this method can be used. This technique only has a few applications.

b) First-in First-out (FIFO) Method

It is based on the assumption that materials issued first are those that were purchased first. It uses the price of first batch of materials purchased for all issues until all units from this batch have been issued and so, the materials in stock are valued at the cost of the most recent purchases since they are issued at the oldest cost price listed in the store's ledger account. Although normally materials would be expected to move out of stock on approximately a FIFO basis because oldest stocks are typically used up first, it should be noted that the assumption of FIFO is only for accounting purposes, i.e., the physical flow of materials need not necessarily be in the order of the flow of costs.

Example:

Receipts:	12 March	100 kgs. @ Rs 10.00 per kg.
	22 March	150 kgs. @ Rs 9.00 per kg.
Issues	23 March	200 kgs. Will be valued as follows:
		100 kgs. @ Rs 10.00 per kg.



100 kgs. @ Rs 9.00 per kg.

Balance

50 kgs @ 9.00 per kg.

Advantages:

- This approach is beneficial because it prioritises the oldest units while keeping inventory up to date.
- This method is logical along with easy to use and understand.
- This method helps in inter and intra-firm comparisons
- Valuation of inventory and cost of finished goods is consistent and realistic

Disadvantages:

- The cost of production is independent to the current prices.
- The production cost is underestimated if prices are rising. However, if the rate of stock turnover is high, the inventory will reflect current prices. The effect of current market prices is not revealed in issues when prices are rising.
- When multiple lots are bought at different levels of price, the true picture is not presented. Calculation became challenging.
- The pricing of material returns is difficult.
- High inflation makes it difficult to replace used materials; FIFO does not address this issue.
- Usually more than one price has to be adopted for a particular issue.
- Cost comparisons between two batches of production becomes difficult when issues are priced differently.

c) Last -in First out (LIFO) Method

The principle adopted is that the production only uses materials that have recently been purchased. The inventory is valued using the oldest costs. As the method applies the current cost of materials to the cost of units, it is also known as the replacement cost method. This method is crucial for matching costs and revenues in the process of determining income.

Example:

Receipts:	12 March	100 kgs. @ Rs 10.00 per kg.
	22 March	150 kgs. @ Rs 9.00 per kg.
Issues	23 March	200 kgs. Will be valued as follows:
		150 kgs. @ Rs 9.00 per kg.



50 kgs. @ Rs 10.00 per kg.

Balance

50 kgs @ 10.00 per kg.

Advantages:

- When there are few transactions, it is easy to use.
- It is a good method of avoiding tax.
- It is a systematic method. It matches current costs with current revenues in a better way.
- It illustrates real income during periods of price inflation
- It minimises unrealised inventory gains and losses and tends to stabilise reported operation profits especially when the industry is prone to sharp price fluctuations.

Disadvantages:

- When rates of material receipts are highly fluctuating, the method becomes complicated.
- More than one price may have to be adopted for an issue.
- Cost of different batches vary greatly, making inter-firm and intra-firm comparison difficult.
- The stocks require to be adjusted during falling prices.
- Unless purchases and sales occur in equal quantities the current costs cannot be easily matched with current revenue.
- The company can time the purchases to cause high or low costs thus changing reported income at will.
- Existing profit sharing and bonus can be affected by an accounting change. Employees will have difficulty in understanding the cause for these changes.

d) Highest in First-out Method

The inventory is valued at the lowest feasible price, and the most expensive materials are issued first. The procedure calls for thorough documents. It is typically applied to cost-plus contracts or monopoly goods. The creation of a hidden reserve occurs when stocks are undervalued.

e) Base Stock Method

A certain minimum stock of a material is always carried and is priced at the original cost (usually at the lowest purchase price). The portion of stock above this level is issued and priced under any one of the methods.

The disadvantage of this method is that the stock may be undervalued and hence the computation of return on capital will not be reliable.



10.8.2 Average Price Method

a. Simple Average Method

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

Example:

Receipts:	12 March	100 kgs. @ Rs 10.00 per kg.
	22 March	150 kgs. @ Rs 9.00 per kg.
Issues	23 March	200 kgs. Will be valued as follows:
		200 kgs. @ Rs 9.50 $[(10+9)/2]$ per kg.
Balance		50 kgs @ 9.50 per kg.

b. Weighted Average Method

In this approach, the average price is determined after accounting for both total quantities and total costs. Every time a purchase is made, it is calculated by multiplying the cost of the purchase by the cost of the stock on hand, then adding the quantity received to the stock on hand. To calculate the value, divide the total cost by the total quantity. This approach prevents price changes, minimises the number of calculations, and provides a stock price that is reasonable.

Example:

Receipts:	12 March	100 kgs. @ Rs 10.00 per kg.
	22 March	150 kgs. @ Rs 9.00 per kg.
Issues	23 March	200 kgs. Will be valued as follows:
		200 kgs. @ Rs 9.40 $[(10*100 + 9 *150)/250]$ per kg.
Balance		50 kgs @ 9.40 per kg.

Advantages:

- It is rational and consistent.



- The issues and inventory are not affected by changes in the prices.
- The values of the inventory reflect the actual costs.

Disadvantages

- It requires a significant amount of clerical work.
- It is cumbersome and difficult when prices vary frequently
- It is not realistic as it is not the actual price.

(c) Periodical Simple Average Method

Some business may price materials by taking average of the prices of all receipts during a period, e.g., a month, a week, etc. for the subsequent period. Only those prices - relevant to the period is taken into account. Both closing stock and purchases made during the time are considered.

Illustration 4:

The prices of the receipts during the week are Rs 8, Rs 9, Rs 10, Rs 11. The periodic simple average will be:

$$\begin{aligned} &= \text{Total Prices of Material} / \text{Total number of Price} \\ &= (8+9+10+11)/4 = \text{Rs } 9.5 \end{aligned}$$

Disadvantages:

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

(d) Periodic Weighted Average Method

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

Example: If the total receipt during a week is 100 kg. costing Rs 2500, the periodic weighted average will be

$$= \text{Rs } 2,500/100 = \text{Rs } 25 \text{ per kg.}$$

Advantages:

- (i) It reduces the Clerical costs
- (ii) It is useful in process costing.



(iii) The issue price is not affected by short-term fluctuations.

Disadvantages:

- (i) At the end of the accounting period, heavy clerical work is involved.
- (ii) Violent fluctuations are ignored till the end of the period.
- (iii) Closing stock can be erroneously valued and nil stock may have a residual value.

(e) Moving Simple Average Method

In this method, periodic simple average prices are further averaged. The moving average is calculated by dividing periodic average prices by the total number of periods taken. The period chosen should cover the period in which the material is issued. The closing stock's value could be overvalued or undervalued. In times of rising prices, the issue price calculated is lower than the period's average prices, and vice versa.

Example:

Month	Periodic Average Price	Moving Average Price
April	2.50	
May	2.60	2.60
June	2.70	2.72
July	2.85	2.85
August	3.00	3.03
September	3.25	

(f) Moving weighted Average Method

The material issue price is computed by dividing the total of the periodic weighted average prices for a number of periods by the total number of such periods.

10.8.3 Notional Price Methods**(a) Standard Price Method**

For a given time period, the price of issues for each item is predetermined, taking into account all the variables that affect price, such as market trends and transportation costs. For each material, standard prices are determined. The standard price is maintained for all issues and inventories. Periodically, these should be revised. Standard could be basic or current standard. The basic standard is set for an extended period of time and provides the best price. It aids in planning ahead. The current standard keeps product costs updated to reflect current market



trends. Contrarily, basic standards support the analysis of production cost trends over time period.

The difference between standard and actual is transferred to the purchase price variance account.

Advantages:

- (i) It simplifies accounting as only quantities are recorded.
- (ii) Inconsistency is avoided since only one rate is adopted.
- (iii) It helps to determine purchase efficiency. If actual cost is more than the standard then there is unfavourable purchasing efficiency and vice versa.
- (iv) It is simple to operate.
- (v) It provides stability to the costing system.

Disadvantages:

It does not reflect the actual or expected cost but only a target.

(b) Inflated Price Method

The inflated price includes carrying costs, evaporation losses, etc. It seeks to recover the full cost of the materials purchased.

(c) Market Price Method

Materials may be provided at replacement price. The price of identical materials in the market at any given time is the replacement cost.

Advantages:

- (i) It measures results correctly and accurately as current revenues are matched against current costs.
- (ii) It differentiates between holding gains and operating gains.
- (iii) A realistic and competitive selling price can be determined.

Disadvantages:

- (i) In the absence of a market price, replacement price cannot be determined.
- (ii) As it is not based on actual cost, they may increase the confusion and complication in accounting.

The replacement price is used in respect of items used in manufacturing whereas the realisable price is used for items kept in stock. The realisable price is useful for calculating the issue price of obsolete and slow-moving stores. If issues are priced at current market price, price reduced



due to bulk purchases, are not reflected. The market price method introduces elements of uncertainty and involves excessive classical labour to maintain records of latest prices for various items.

IN-TEXT QUESTIONS**(True/False)**

1. In ABC technique, A items are those which are used in largest quantities
2. Value of closing stock under FIIFO and LIFO methods is the same.
3. Reorder level is equal to normal consumption * normal reorder period.
4. When the price are showing a raising tendency, FIFO method results in higher profits
5. There is an inverse relationship between carrying cost and ordering cost.
6. The JIT production process depends on consistent output, excellent craftsmanship, no equipment failures, and trustworthy suppliers for its success.

10.9 SOLVED PRACTICAL QUESTIONS

Q.1 Following is the information by ABC Ltd. Related to first week of December 2013:

The transactions in connection with the materials are as follows:

Days		Receipts	Issues
	Units	Rate per unit	(units)
1st	40	15	
2nd	20	16.5	
3rd	-		30
4th	50	17.1	-
5th	-		20
6th	-		40

Calculate the cost of materials issued under (i) FIFO METHOD; (ii) LIFO method; and (iii) Weighted average method of issue of materials and value of closing stock under the above methods.

**Solution:**

- (i) Cost of materials issued and value of closing stock under FIFO Method

	Rs.	Rs.
December 3, 2013. issued 30 units @ Rs 15 per unit		450
December 5, 2013: issued 10 units @ Rs 15	150	
issued 10 units @ Rs 16.50	<u>165</u>	315
December 6, 2013: issued 10 units @ Rs 16.50	165	
Issued 30 units @ 17.10	<u>513</u>	678
Closing stock: 20 units @ 17.10		342

- (ii) Cost of materials issued and value of closing stock under LIFO Method:

	Rs.	Rs.
December 3, 2013. issued 20 units @ Rs 16.50	330	
issued 10 units @ Rs 15.00	<u>150</u>	480
December 5, 2013: issued 20 units @ Rs 17.10		342
December 6, 2013: issued 30 units @ Rs 17.10	513	
Issued 10 units @ 15.00	<u>150</u>	663
Closing stock: 20 units @ 15.00		300

- (iii) Cost of materials issued and value of closing stock under Weighted Average Method:

	₹
December 3, 2013: issued 30 units = $\frac{40 \times ₹15 + 20 \times ₹16.50}{40 + 20}$ i.e. 30 x ₹15.50	465
December 5, 2013: issued 20 units @ Rs. 16.50 $\frac{i.e., 30 \times ₹15.50 + 50 \times ₹17.10}{30 + 50}$	330
December 6, 2013: issued 40 units @ Rs. 16.50	660
Closing stock: 20 units @ Rs. 16.50	330

Q.2 From the following you are required to prepare a statement showing the issues made under LIFO method:

Date Opening Balance 100 units at ₹10 each

1 Received 200 units at ₹10.50 each



2 Received 300 units at `10.60 each

4 Issued 400 units to Job A vide MR No. 3

6 Issued 120 units to Job B vide MR No. 4

7 Received 400 units at `11 each

10 Issued 200 units to Job C vide MR No. 5

12 Received 300 units at `11.40 each

13 Received 200 units at `11.50 each

15 Issued 400 units to Job D vide MR No. 6

Solution:

Receipts					Receipts					Balance		
Date	P.O. No	Qty	Rate	Amt	Date	M.R. No	Qty	Rate	Amt	Qty.	Rate	Amt
										100	10.00	1000
1st		200	10.50	2100						100	10.00	1000
										200	10.50	2100
										100	10.00	1000
2nd		300	10.60	3180						200	10.50	2100
										300	10.60	3180
					4th	3	(400)					
							300	10.60	3180	100	10.00	1000
							100	10.50	1050	100	10.50	1050
					6th	4	(120)					
							100	10.50	1050	80	10.00	800
							20	10.00	200			
7th		400	11.00	4400						80	10.00	800
										400	11.00	4400
					10th	5	200	11.00	2200	80	10.00	800
										200	11.00	2200
12th		300	11.40	3420						80	10.00	800
										200	11.00	2200
										300	11.40	3420
13th		200	11.50	2300						80	10.00	800
										200	11.00	2200



										300	11.40	3420
										200	11.50	2300
					15 th	6	(400)			80	10.00	800
							200	11.50	2300	200	11.00	2200
							200	11.40	2280	100	11.40	1140

CLOSING STOCK : 380 Units, Value: 4140

Q3. Prepare a statement showing the pricing of issues, on the basis of (a) Simple Average, and (b) Weighted Average Methods from the following information pertaining to material 'X'.

Date

- 1 Purchased 100 units @ `10.00 each.
- 2 Purchased 200 units @ `10.20 each.
- 5 Issued 250 units to Job A vide MR No. 1
- 7 Purchased 300 units @ `10.50 each
- 10 Purchased 200 units @ `10.80 each
- 13 Issued 200 units to Job B vide MR No. 2
- 18 Issued 200 units to Job C vide MR No. 3
- 20 Purchased 100 units @ `11.00 each.
- 25 Issued 150 units to Job D vide MR No. 4

Solution:

a. Simple Average Method

Receipts					Receipts					Balance	
Date	P.O. No	Qty	Rate	Amt	Date	M.R. No	Qty	Rate	Amt	Qty	Amt
1 st		100	10.00	1000						100	1000
											3040
2 nd		200	10.20	2040						300	
					5 th	1	240	(10+10.20)/2	2525	50	515
											3665
7 th		300	10.50	3150						350	
											582
10 th		200	10.80	2160						150	5



												3725
					13 th	2	200	(10.2+10.5+10.8)/3	2100	350		1595
					18 th	3	200	(10.5+10.8)/2	2130	150		2695
20 th	100	0	11.0	1100						250		1060
					25 th	4	150	(10.80+11.00)/2	1635	100		
Closing Stock : 100 units, Value Rs 1060												

b. Weighted Average Method

Receipts					Receipts					Balance		
Date	P.O. No	Qty	Rate	Amt	Date	M.R. No	Qty	Rate	Amt	Qty.	Rate	Amt
1 st		100	10	1000						100	10.00	1000
2 nd		200	10.2	2040						300	10.31	3040
					5 th	1	240	10.13	2533.30	50	10.31	515
7 th		300	10.5	3150						350	10.45	3665
10 th		200	10.8	2160						150	10.58	5825
					13 th	2	200	10.58	2116.00	350	10.58	3725
					18 th	3	200	10.58	2116.00	150	10.58	1595
20 th		100	11	1100						250	10.74	2695
					25 th	4	150	10.74	1611.00	100	10.74	1060

Closing Stock: 100 Units Value 1073.70

Note: Rate1 = 3040/300 = 10.13, Rate2 = 3656.70/350 = 10.45

Rate3 = 5816.70/550 = 10.58, Rate4 = 2684.70/240 = 10.74

Q4. The following data pertain to material X:

Supply period 4 to 8 months

Consumption rate:

Maximum 600 units per month

Minimum 100 units per month



Normal 300 units per month

Yearly 3600 units

Storage costs are 50% of stock value, ordering costs are Rs 400 per order, price per unit of material Rs 64

Compute: i) Re-order level ii) Minimum stock level. iii) Maximum stock level
iv) Average stock level.

Solution

$$EOQ = \sqrt{\frac{2DP}{S}}$$

Where U = Annual Consumption in units = 3600

P = Cost of Placing an order = 400

S = Annual Carrying cost per unit = $0.5 \times 64 = 32$

$$EOQ = \sqrt{\frac{2(3600) \times 400}{32}} = 300 \text{ units.}$$

Reorder level = Maximum consumption $\times$ Maximum re-order period
= $600 \times 8 = 4,800 \text{ units}$

Minimum Stocks level = Re-order level – (Normal consumption $\times$ Normal re-order period)
= $4800 - (300 \times 6) = 3000 \text{ units}$

Note: Normal re-order period is the average period. = $(4+8)/2 = 6 \text{ months}$

Maximum Stock Level = Re-order level + re-order quantity – (Minimum consumption $\times$ Minimum re-order period)
= $(4800 + 300) - (100 \times 4) = 4,700 \text{ units.}$

Average Stock Level = (minimum level + maximum level)/2 = $(3000+4700)/2 = 3850 \text{ units}$



10.10 SUMMARY

- Inventory control is the systematic control and regulation of purchase, storage and usage of materials in such a way as to maintain an even flow of production and at the same time avoiding excessive investment in inventories.
- ABC analysis is a value based system of material control, in which materials are analysed according to their value so that costly and more valuable materials are given greater attention and care.
- Economic Ordering Quantity (EOQ) is that size of the order which gives maximum economy in purchasing any material and ultimately contributes towards maintaining the material at the optimum level and at minimum cost.
- The just-in-time (JIT) inventory system is a management technique that reduces inventory and boosts efficiency.
- JIT manufacturing is also known as Toyota Production system (TPS) because Toyota, a car manufacturer, adopted JIT system in the 1970s
- Materials are issued to production department on cost price, average price or notional price methods.

10.11 ANSWERS TO INTEXT QUESTIONS

1. False	4. True
2. False	5. True
3. False	6. True

10.12 SELF-ASSESSMENT QUESTIONS

5. XYZ Ltd requires 10,000 units of a product during the year. The cost of ordering is Rs. 50 and the carrying cost per unit is Rs 3 per year. Lead time of an order is 7 days and the company will keep a safety stock of three days usage.
You are required to calculate the following:



- a. Minimum Inventory
- b. Maximum Inventory
- c. Average Inventory
- d. Re-order Point
- e. Economic Order Quantity

6. Laxmi enterprise manufacture a product “ABC” The following particulars are collected for the year 2016:

- a. Annual demand of ABC – 1000 units
- b. Cost of placing an order Rs. 100
- c. Annual carrying cost per units Rs. 10
- d. Normal Usages 100 units per week
- e. Minimum usage 50 units per week
- f. Maximum usages 150 units per week
- g. Re-order period 2 to 6 weeks

Calculate the following:

- a. Re-order Quantity
 - b. Re-order Level
 - c. Minimum Level
 - d. Maximum Level
 - e. Average stock level.
7. What do you mean by minimum level, maximum level and re-order level? How are they fixed?
8. Discuss the advantages and disadvantages of FIFO and LIFO methods of pricing. Under condition of rising prices which of these methods would you recommend and why?
9. Briefly describe the various methods of pricing the material issues.
10. Explain the weighted average method of pricing. How it is different form normal average method.
11. X Ltd. has purchased and issued the materials in the following order:

Unit

Unit Cost `



1st January	Purchased	300	3
4th January	Purchased	600	4
6th January	Issued 500		
10th January	Purchased	700	4
15th January	Issued	800	
20th January	Purchased	300	5
23rd January	Issued	100	

Ascertain the quantity of closing stock as on 31st January and state what would be its value (in each case) if issues were made under the following methods: (i) Average cost. (ii) First-in First-out. (iii) Last-in First-out. (Weighted average = `2,218/-; FIFO `2,300/-; LIFO `1,900/-)

10.13 REFERENCES

- Cost and Management Accounting, Study Material Module 1 Paper 2, The institute of Company Secretaries of India
- Arora, M. N. (2016). Cost And Management Accounting, Penguin Random House.

10.14 SUGGESTED READINGS

- Arora, M. N. (2016). Cost And Management Accounting, Penguin Random House.
- Maheshwari, S. N., & Mittal, S. N. Cost Accounting: Theory and Problems. Shree Mahavir Book Department.



LESSON 11

PERFORMANCE MEASUREMENT AND EVALUATION

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STRUCTURE

- 11.1 Learning Objectives
- 11.2 Introduction
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- 11.17 Self-Assessment Questions
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11.1 LEARNING OBJECTIVES

After studying this chapter, you will be able to:

- Describe how performance measurement and control systems contribute to the creation of value, the implementation of strategies, and the monitoring of performance to enhance strategies.
- Examine both conventional and unconventional methods of performance measurement.
- Determine non-financial performance indicators, interpret them, and make suggestions for ways to raise the performance
- Explain the causes and issues caused by short-termism and the financial manipulation of results, and offer strategies to promote a long-term perspective.
- Compute and evaluate performance measures relevant in a divisionalized organisational structure, including return on investment, residual income, and economic value added.
- Examine and assess performance, and make recommendations for ways to enhance both financial and non-financial performance.

11.2 INTRODUCTION

It is essential to measure and evaluate performance because it enables management to assess how well the business is performing in relation to both prior years and its competitors.

Responsibility accounting is the process of gathering, compiling, and disclosing financial information in which each manager is responsible for particular costs, revenue, or assets of the company. The information is about the decision centers throughout the organization. It is also known as profitability accounting or activity accounting.

Responsibility accounting is appropriate where top management has delegated decision-making authority. According to the principle of responsibility accounting, a manager's effectiveness should be assessed based on how effectively they handle the matters that fall under their direct control. Performance measurement is directly linked to the organisational structure of a business.



11.3 RESPONSIBILITY CENTRES AND ITS PERFORMANCE

According to Deakin and Maher ‘a responsibility centre is a specific unit of an organisation assigned to a manager who is held responsible for its operation and resources’.

CIMA London has defined Responsibility Accounting as “a system of management accounting under which accountability is established according to the responsibility delegated to various levels of management and management information and reporting system instituted to give adequate feedback in terms of the delegated responsibility. Under this system, division of units of an organization under specified authority in a person are developed as a responsibility centre and evaluated individually for their performance. A good system of transfer pricing is essential to establish at the performance and results of each responsibility centre. Responsibility accounting is thus used as a control technique:”.

To enhance the application of responsibility accounting in decision-making, it is essential for an organisation to attach a level of responsibility (decentralised power/s) to different divisions/departments and designate as either of cost, profit, revenue or investment centre.

Cost or Expense Centres

Cost or Expense Centres are responsibility centres where the manager ‘has control over the costs’ (other than those of capital nature) owing to function, for which he/ she is responsible. For example, the paint department in an automobile firm. Performance report of cost centre is focused on budgeted and actual costs (cost in term of quantity of input resource (may be money, material, man- hours) to appraise the performance. Cost variances are relevant measures.

Revenue Centres

Revenue Centres are the responsibility centres where the manager has ‘control over the generation of revenue from operation’ with no responsibility for costs. To illustrate, booking counter of any Airline Company is revenue centre.

The key measures used to appraise performance are sales variances.

Profit Centres

Profit Centres are the responsibility centres where the manager of such a centre or division has ‘control on both revenue and costs’ (other than those, which are of capital nature) earned out of and incurred on. Thus, performance is measured in terms of the difference between the



revenues and costs/assets assigned to the division respectively. To illustrate, the facility of canteen can be considered as the profit centre.

Investment Centres

Investment Centres are the responsibility centres where the manager has responsibility for not just the revenues and costs relating to the centre, but also the assets that cause these costs and generate these revenues and the investment decisions relating to disposal and acquisition of assets.

The performance of an investment centre can be measured by appraising profit/return in relation to investment base of centre, ROI, RI, and EVA are some prominent financial performance measures.

Investment centre can be referred to as strategic business units (SBUs). Mind it each division is not SBU. For being SBU capabilities to work independently and in isolation are essential.

11.4 PERFORMANCE MANAGEMENT SYSTEM

Performance management shall be considered as an essential aspect of management accounting. Performance management may be seen as four-stage solution to take any organisation towards sustainability.

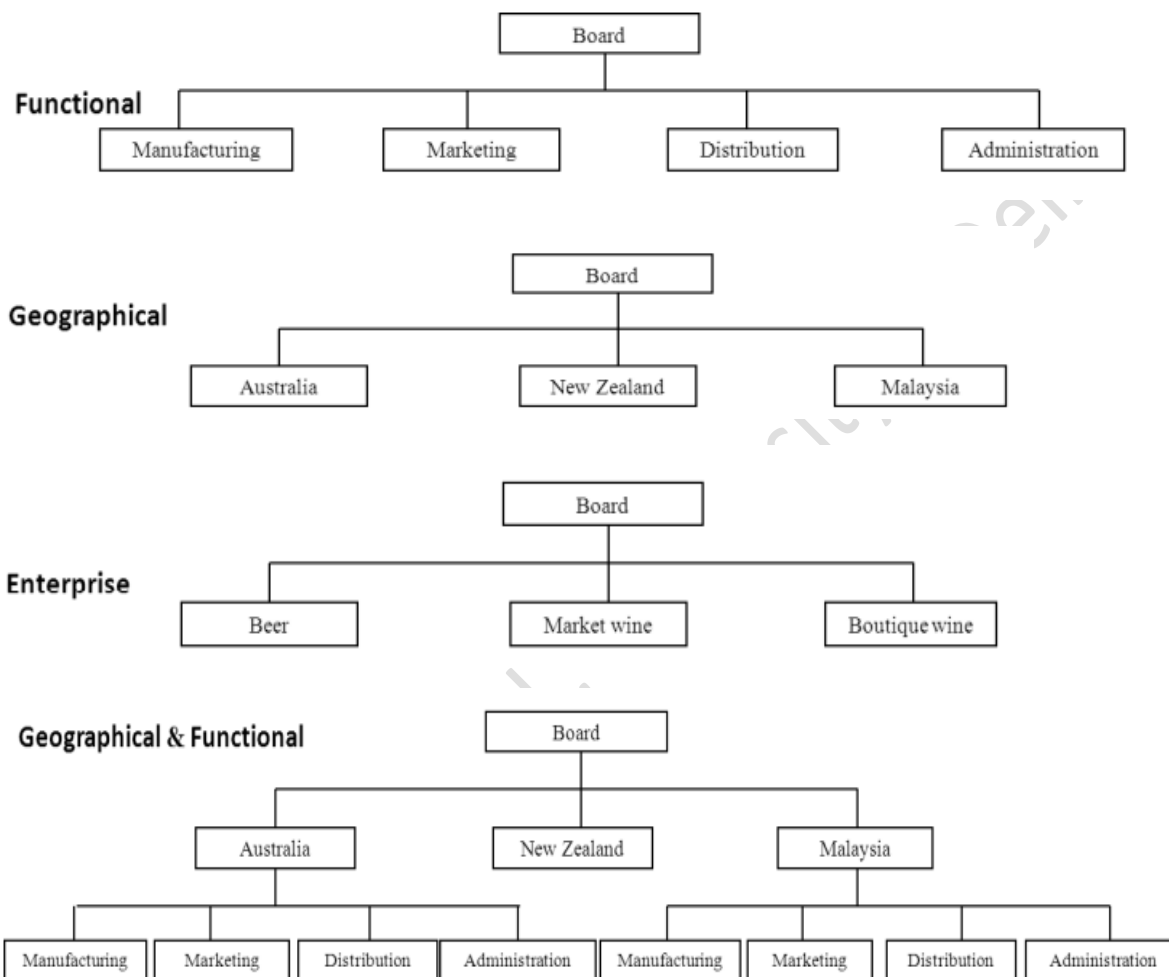
Aspects related to the first two phases are already covered in the previous heading, now it's turn to study the performance measure (both financial and non-financial), based upon which performance can be measured.

11.5 DIVISIONAL PERFORMANCE MEASURES

Performance management system plays a key role in deploy strategy, but it has a prerequisite and that is; measure the existing performance. As already mentioned in the first section of this chapter that performance measurement is directly linked to the organisational structure. If organisation is divisionalised then performance also needs to be measured at the division level for each division. It is obvious, that to measure the performance of division certain performance measures or indicators need to be established.



The division can be on the basis of functional, geographical, enterprise, geographical & functional.



It is important here to note that if any organisation opt for divisional structure, then there are verities of issues, which need to be addressed while establishing performance measures to determine performance. These issues are such as inter-dependence of divisions, goal congruence, allocation of costs of shared services or head office, and internal transfer pricing policy and etc. These factors affect the divisional performance substantially.

A good performance measure should–

- Provide the divisional manager a justifiable incentive to make decisions that are in the best interests of the entire business (goal congruence).



- Only include elements for which the divisional manager is liable.
- Recognise both short-term and long-term organizational goals.

The issues of evaluating the performance of divisions in multinational companies arises due to:

- The differences in economic, legal, political, social, and cultural environments in different countries.
- In some nations, the government may impose restrictions and set a ceiling on product prices.
- Costs of materials, labour, and infrastructure, as well as the availability of skilled labour and materials, may vary widely between nations.
- Divisions that operate in various nations maintain track of their performance in various currencies.

11.6 PROS AND CONS OF THE USE OF PERFORMANCE

David Otley, Jane Broadbent, and Anthony Berry suggest the pros and cons of the use of performance measures the benefits are–

- Develops agreed measures of activity.
- Define and clarifies the objectives of the organization.
- Helps in the setting targets for managers.
- Greater understanding of the process.
- Facilitate comparison between divisions.
- Promotes accountability to stakeholders.

Poorly designed performance management system (where performance measures are not appropriately chosen and applied) may result in wrong signaling. Wrong signals may lead to inappropriate action and decisions; hence it is important to identify and overcome the problems associated with the use of performance measures.

11.7 FINANCIAL PERFORMANCE MEASURES

In order to be a sustainable business, the essentials are profitability, survival, and growth. Since the financial performance measures/indicators, can be considered as best indicators of



profitability and easy indicators of growth and survival (solvency and liquidity); hence must be part of performance measurement metrics. These are–

Return on Investment Method (ROI)

The American company DuPont was the first to recognise the importance of taking into account the level of investment as well as the income from such investment when evaluating the performance of the investment centre in the 1920s. Since then, many businesses have begun focusing on a division's return on investment (ROI) rather than just its absolute size of profits.

The DuPont technique emphasises that any action that boosts return on sales or investment turnover leads to a rise in ROI. When keeping the other two variables constant, ROI rises with:

1. increases in revenues,
2. decreases in expenses, or
3. declines in investments

“ROI expresses divisional profit as a percentage of the assets employed in the division. Assets employed can be defined as total divisional assets, assets controllable by the divisional manager or net assets.”

ROI is a widely used metric, making it the perfect tool for comparing corporate divisions of similar size and operating in related industries. But it also has limitations. It's possible that divisional ROI can be increased by actions that will lower the overall ROI of the company, and vice versa, actions that decrease divisional ROI may improve the situation for the company as a whole.

In other words, evaluating divisional managers on the basis of ROI may not encourage goal congruence. (it's already mentioned in the beginning of topic 'Divisional Performance Measures' that certain issues will arise due to establishing measures at a divisional level which need to be addressed and goal congruence is one among these)

$$\text{ROI} = (\text{Profit margin} / \text{Investment}) \times 100$$

$$\text{ROI} = (\text{Net Profit} / \text{Sales}) \times (\text{Sales} / \text{Capital Employed}) \times 100$$

	Division A	Division B
Available Investment Project	₹40 lacs	₹40 lacs



Controllable Contribution	₹4.4 lacs	₹3.2 lacs
Return on the Proposed Project	11%	8%
Presently the ROI of Divisions	14%	6%
Overall Cost of Capital is	9%	

The manager of division "A" is unwilling to invest the additional Rs. 40 lacs because the proposed project's return is 11%, which would cause a decrease of the current ROI of 14%.

The manager of division "B," on the other hand, would like to invest the Rs. 40 lacs. because the proposed project's 8% return is higher than the division's current ROI of 6% and would boost the divisions ROI.

Decisions made by the managers of the two divisions would not be in the company's best interests. Only projects with a ROI greater than the cost of capital (9%) should be approved by the company; however, the manager of division "A" would reject a potential return of 11%, while the manager of division "B" would accept a potential return of 8%.

Residual Income Method (RI)

To overcome some of the dysfunctional consequences of ROI (lack of goal congruence), the residual income approach can be used for the purpose of evaluating the performance of divisional managers.

“Residual income is excess of controllable profit over a predetermined organisation-wide minimum hurdle rate (cost of capital charge) on the investment controllable by the divisional manager. So higher the residual income means better the performance.”

Residual income can be characterised as the divisional profit contribution less a cost of capital charge on the total amount invested in assets used by the division for assessing the division's economic performance.

There is a greater probability that managers will be encouraged to act in the company's best interests as well as their own if residual income is used to gauge the managerial performance of investment centres.

A typical divisional residual income statement is shown below:



Particulars	Details	Amount (Rs.)
Sales		xxx
Less: Variable Costs		xxx
CONTRIBUTION		xxx
Less: Controllable fixed costs		xxx
Controllable Profit		xxx
Less: Interest on controllable investment		xxx
Controllable residual income		xxx
Less: Uncontrollable cost (allocated head office charges)	xxx	xxx
Less: Interest on uncontrollable investment	xxx	xxx
Net Residual Income		xxx

Returning to our previous example in respect of the investment decision for divisions A and B, the residual income calculations are as shown further;

	Division A (in ₹ lacs)	Division B (in ₹ lacs)
Proposed Investment	₹40.00	₹40.00
Controllable Contribution	₹4.40	₹3.20
Cost of Capital (9%)	₹3.60	₹3.60
Residual Income	₹0.80	– ₹ 0.40

If both managers accept the project, this calculation shows that division "A" residual income will increase and division "B" residual income will decrease. As a result, the manager of division "A" would make an investment, as opposed to the manager of division "B," who would not. The best interests of the business as a whole are served by these actions.



The residual income cannot be used as a comparison tool for divisional performances of various sizes because it is an absolute measure. It is obvious that a large division is more likely than a small division to generate a higher residual income.

For each division, targeted or budgeted residual income levels that are in line with asset size and market conditions should be established in order to make up for this shortfall.

Advantages of Residual Income

- When investments that generate returns above the cost of capital are made and those that generate returns below the cost of capital are eliminated, the residual income will increase.
- Due to the ability to apply a different cost of capital to investments with various risk profiles, residual income is more adaptable.

Disadvantage of Residual Income

The drawback of Residual Income is that it does not facilitate comparisons between investment centres, nor does it relate the size of a centre's income to the size of the investment.

Differences between ROI and RI are shown below:

Particulars	ROI	RI
Emphasis	Percentage Ratio	Money Amount
Involves same rate of return for all assets?	Yes	No
Profit / Loss	Relates to capital	It is residual

Example ROI vs RI

The department A of XYZ Ltd has the following profit, capital employed and imputed interest charges of 13% on the operating assets.

Operating profit	30000	
Operating assets		100000
Imputed interest (13%)	13000	
Return on investment		30%
Residual Income	17000	



Lets' assume that the department has proposed an additional investment of 10000, which will increase the operating income in department A by 1500 . The effect of the investment would be:

Operating profit	31500	
Operating assets		110000
Imputed interest (13%)	14300	
Return on investment		28.64%
Residual Income	17200	

The manager A is made responsible for the performance of department A. He would be interested for additional investment of 10,000 if he had to judge on the basis of Residual Income as there would be marginal increase of 200 from 17,000 to 17,200, but if the same investment is judged on ROI basis then he would resist the additional investment as ROI is reduced by 1.36% from 30% to 28.64%.

The marginal investment offers a return of 15% (1,500 on the additional investment of 10,000), which is above the cut-off rate of 13%. The overall divisional performance will be reduce as the the original ROI was 30%. To summarize, any additional investment which offers an annual accounting rate of return of less than 30% would reduce the overall performance.

11.8 ECONOMIC VALUE ADDED (EVA)

EVA is a performance measurement system that aims to overcome the limitations of other divisional performance measures which are based upon accounting profit. The major shortcomings of relying upon accounting profit include–

- Profit disregards the cost of equity capital. Companies can only become wealthy when they produce a return greater than the return demanded by equity and debt investors. The cost of debt financing is considered in the financial statements when calculating profit, but the cost of equity financing is not taken into account.



- Profits calculated in accordance with accounting standards are susceptible to manipulation by accountants and do not accurately reflect the wealth that has been created..

An alternate to accounting profit is economic profit and EVA is a measure of economic profit.

Calculation of EVA

Economic profit is measured by economic value added. The Economic Value Added is calculated as the difference between the Net Operating Profit After Tax (NOPAT) and Opportunity Cost of Invested Capital. This opportunity cost is calculated by multiplying the capital employed by the Weighted Average Cost of Debt and Equity Capital (WACC).

$$\text{EVA} = \text{NOPAT} - \text{WACC} \times \text{Capital employed}$$

Where- NOPAT means net operating profit after tax. This profit figure shows profits before taking out the cost of interest.

Two approaches to adjusting for interest are taken.

- Subtract the adjusted tax charge from the operating profit. Since the tax charge includes the interest tax benefit, it should be adjusted. Since the interest is a tax-deductible item, having interest in the income statement means that the tax charge is lower. Since we are taking the cost of interest out of the income statement, it is also necessary to subtract the tax benefit of it from the tax charge. To do this, multiply the interest by the tax rate, and add this to the tax charge, or
- Start with profit after tax, and add back the net cost of interest. This is the interest charge multiplied by $(1 - \text{rate of corporate tax})$.

11.9 LIMITATIONS OF EVA

- EVA is also, an absolute measure hence not free from shortcomings like comparison between performances of enterprises of different size is not possible, and
- Largely based upon historical data.



11.10 NON - FINANCIAL PERFORMANCE MEASURES

Financial measures, as previously mentioned, have a number of flaws that make them unsuitable for a system of effective performance management, especially when used in isolation. These flaws include a short-term orientation, historical nature, internal focus only (which does not comprise the entire picture), and window dressing. A balance between financial and non-financial measures must be maintained because profitability is crucial in relation to stability (so that financial performance can be measured, but in the context of long-term viability).

The following non-financial control measures should also be considered for evaluation of divisional:

- Market position
- Productivity
- Product leadership
- Personnel department
- Employee attitudes
- Public responsibility
- Balance between short-range and long-range goals

Tools like balanced scorecard, performance pyramid, building block model, and performance prism is capable to serve the purpose because these encompass non-financial performance measures apart from financial performance measures.

11.11 BALANCED SCORECARD

Information has become a crucial component in the business world today, and it is essential for gaining a competitive edge over competitors. A company cannot survive in the information age's competitiveness by making only huge capital investments in cutting-edge technology for its physical assets or by exercising excellent financial asset and liability management. Both manufacturing and service entities need new capabilities to succeed in the information age. An organisation must be able to mobilise and exploit its intangible or invisible assets in order to succeed. This is because managing and investing in physical, tangible assets alone is not sufficient.



Intangible assets enable an organisation to:

- Maintain and further development in customer relationships to maintain the loyalty of current clients and to effectively and efficiently serve new client/market segments.
- Introduce goods and services in accordance with the preferences of the targeted market and customer segments
- Produce personalised, high-quality goods and services economically in a short period of time.
- Mobilise employee skills and motivation in order to improve and maintain consistency in the evaluation of process capabilities, quality, and response times.
- Implement data bases, information technology, and efficient management information systems.

Balanced scorecard is a method that divides an organization's performance into four categories: financial, customer, internal, and innovative. The four dimensions take into account both long-term and short-term objectives while recognising the interests of shareholders, customers, and employees.

Kaplan and Norton classified performance measures into four business 'perspectives':

Financial Perspective: "How Do We Look to Shareholders?"

In this step, the manager of a division or unit connects the division's or unit's business objectives to the company's overall corporate strategy. Financial performance measures exhibit whether the company's execution of its strategy is generating revenue and profits. Managers inquire "How do we look to shareholders" during strategic planning to identify key performance measures from this perspective.

Corporate strategy and strategic initiatives are examined from the financial perspective to see feasibility of these initiatives of being met. The financial objectives chosen at the onset of the balanced scorecard implementation should serve two purposes:

- To provide definite performance that was expected at the time of strategies selection.
- To provide a focus for objectives and appropriate measures in each of the other three perspectives.

Customer Perspective: "How Do Customer View Us?"

Companies identify the markets and customer segments in which they compete as well as the ways in which they add value to these markets and customers during this stage. Managers



recognise the distinguishing characteristics that set one business unit or product apart from others. Depending on the market segment or the customer, the lead indicator may change. For instance, on-time delivery becomes a lead indicator if a customer values it. Various customer considerations, such as the following, are examples of lead indicators:

- On-time delivery
- On-site service
- After sales support
- Defects per order
- Cost of the product
- Free shipments etc.

By delivering quality as per the customer demand and need, business units can improve outcome measures such as customer satisfaction, retention, acquisition and loyalty.

Internal Business Perspective: “At What Must We Excel?”

Companies identify at this stage the procedures and actions required to accomplish the set objectives at the stage of the financial and customer perspectives. By reevaluating the value chain and making the necessary adjustments to the current operating activities, these goals may be accomplished. If a company's financial goal is to maintain net earnings and after-sales service can boost customer retention, internal business perspective must improve after-sales services to meet customer demands in order to preserve net earnings. For instance, offering toll-free customer support lines and establishing service centres in all major cities are two ways to accomplish this goal.

Learning and Growth Perspective: “How Do We Continue to Improve and Create Value?”

The learning and growth perspective helps businesses identify the initiatives and support systems needed to foster long-term growth and meet the goals outlined in the first three perspectives. The three main sources of organisational learning and growth are as follows:

- People i.e. employee capabilities
- Systems i.e. information system capabilities and
- Organisational procedures i.e. motivation, empowerment and alignment.

Since the balanced scorecard aims to boost long-term performance, managers may invest in short-term resources, but this shouldn't have an impact on the performance of the business unit.



An improved long-term financial performance should be the end result of using the balanced scorecard strategy. Since the scorecard accords equal weight to relevant non-financial measures, it ought to deter short-termism, which results in spending reductions on new product development, human resource development, etc., all of which are ultimately harmful to the company's future prospects.

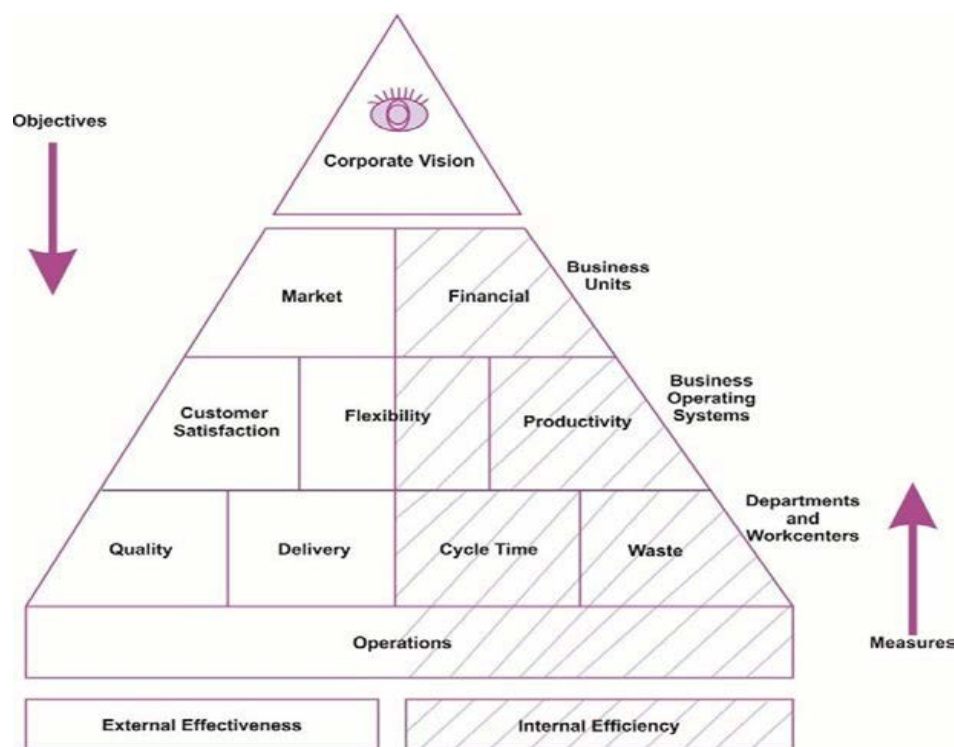
Why Balanced Scorecard fails to provide for the desired results?

The following are some reasons why Balanced Scorecards sometimes fail to provide for the desired results–

- Managers mistakenly think that since they already use non – financial measures, they already have a Balanced Scorecard.
- Senior executives misguidedly delegate the responsibility of the Scorecard implementation to middle level managers.
- Company's try to copy measures and strategies used by the best companies rather than developing their own measures suited for the environment under which they function.
- There are times when Balanced Scorecards are thought to be meant for reporting purposes only. This notion does not allow a Business to use the Scorecard to manage Business in a new and more effective way.

11.12 PERFORMANCE PYRAMID

K. F. Cross and R. L. Lynch, in the year 1989 publish an article 'The SMART way to define and sustain success.' In this article they suggest Strategic Measurement Analysis and Reporting Technique (SMART) which is popularly known as performance pyramids due to 4 level hierarchy applied in the framework.



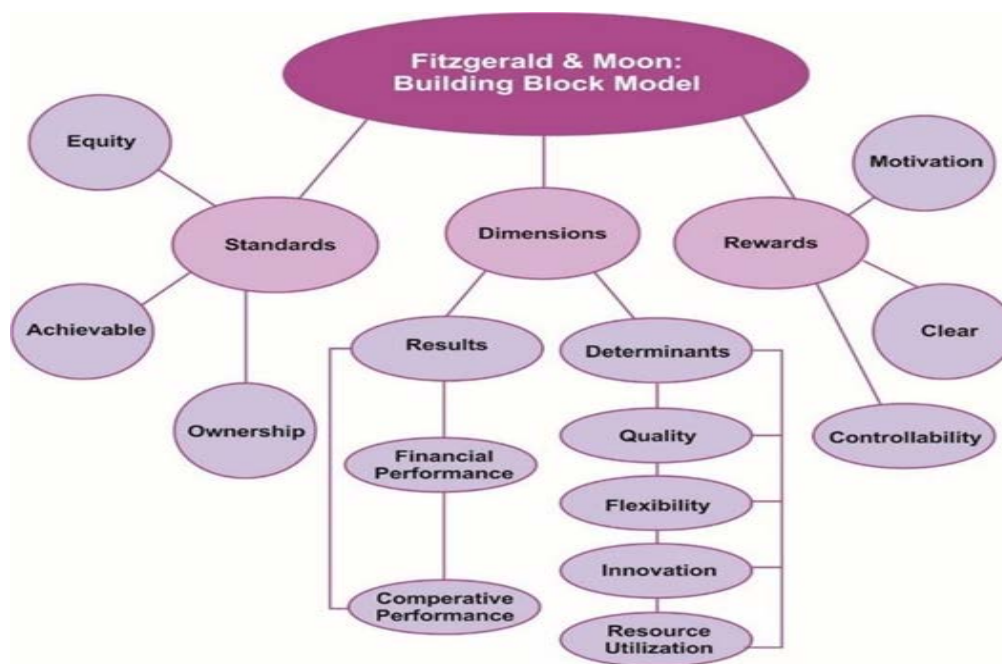
The attractiveness of this framework is that it integrates the business' strategic objective with operational performance dimensions, consider the internal efficiency vis-à-vis external effectiveness. Performance pyramid contains the hierarchy of financial and non-financial performance measures divided in following four levels–

L-1	Through corporate vision, organisation defines how the long-term success & competitive advantage will be attained.
L-2	In order to achieve corporate vision, the initial focus is on the attainment of CSFs related to market and finance at SBU or division level.
L-3	Market and financial strategies become a guiding force to achieve a strategic objective, which includes Customer Satisfaction, Increased Flexibility and High Productivity.
L-4	Operational performance dimensions such as Quality, Delivery, Cycle Time and Waste etc. will be used as status check to strategic objective designated at level 3.



11.13 THE BUILDING BLOCK MODEL

Fitzgerald and Moon proposed a Building Block Model which suggests the solution of performance measurement problems in service industries. But it can be applied to other manufacturing and retail businesses to evaluate business performance. It is based on the three building blocks of dimensions, standards, and rewards.



Dimensions- Dimensions are the goals for the business, i.e. the CSFs and suitable measures must be developed to assess each performance dimension. They are further divided into two sub-categories.

Determinants- These are performance areas which influence the results. These are.

- **Quality-** Consistently delivering goods and services is what quality is. The eyes of the customer should be used to evaluate quality. The level of benefits that customers anticipate from a product is its quality. A product's quality ought to be adequate for the price paid.



- **Flexibility:** This quality refers to the ability to adapt to changes in the factors affecting business performance. For instance, the capacity to handle a spike in sales demand.
- **Innovation-** The ability of a company to create new goods and methods of operation. like environmentally friendly (recyclable) product packaging.
- **Resource Utilization-** It is the capacity to utilise resources to accomplish business goals. Business assets should be used in the best possible way and for the intended purpose. For instance, only loading delivery vans with approved goods and using them to their fullest capacity.

Results- It reflects the success or failure of determinants identified above.

- **Financial Performance-** In monetary terms, financial performance provides a quick indication of the state of the business as a whole. You can use these to identify area of strengths and weaknesses. It might also highlight other previously noted areas that are important for business success.
- **Competitive Performance-** How do they compare to their rivals? How do they differ from their rivals? For instance, offering products with higher quality than rivals and products with unique features from rival products.

Standards- These are the measures used, i.e. the KPIs, should have the following characteristics:

Equity- All areas of the business should have performance measures that are equally challenging. A business division receiving relaxation causes the perception of unfair treatment, which reduces productivity.

Ownership- Everyone should be able to accept the performance measure. Instead of forcing measures upon employees, they should be identified with them. Ownership in this context refers to taking accountability for the outcomes.

Achievable- Performance measure should be realistic. Ex, using actual results for the competitors to set as target. Employee will not be motivated to achieve targets if consider them impossible.

Rewards- To ensure that employees are motivated to meet standards, the standards need to be clear and linked to controllable factors. Reward schemes should possess the following characteristics:



Motivation- The design of the reward scheme should encourage employees to meet the company's objectives. If sales growth is desired than bonuses can be tied to performance indicators, such as an increase in the number of units sold over the previous year.

Clear- Employees should be informed in advance of the rewards programme. How will their performance be evaluated and what kind of performance will be rewarded?

Controllability- Employees should only be rewarded or penalized of the result over which they have some control or influence.

11.14 PERFORMANCE PRISM

The creators of Performance Prism, Andy Neely and Chris Adams, noted that the more well-known Balanced Scorecard framework only pays attention to shareholders and customers. An approach to performance management called the Performance Prism aims to successfully satisfy the needs and demands of all stakeholders. This is in contrast to value-based management, which puts the needs of shareholders first, as well as the performance pyramid, which tends to focus on customers and shareholders.

- Instead of using the organization's strategy as the foundation for developing performance measures, it starts with the needs of the stakeholders.
- It recognises the need to work with stakeholders to ensure that their needs are met.

There are five 'interrelated facets' to the Performance Prism which lead to key questions for strategy formulation and measurement design:

Stakeholders Satisfaction: The businesses needs to concentrate on who the stakeholders are?. What are the stakeholders' needs and desires.

Strategies: What strategies will the businesses need to implement in order to satisfy the needs and wants of the stakeholders?

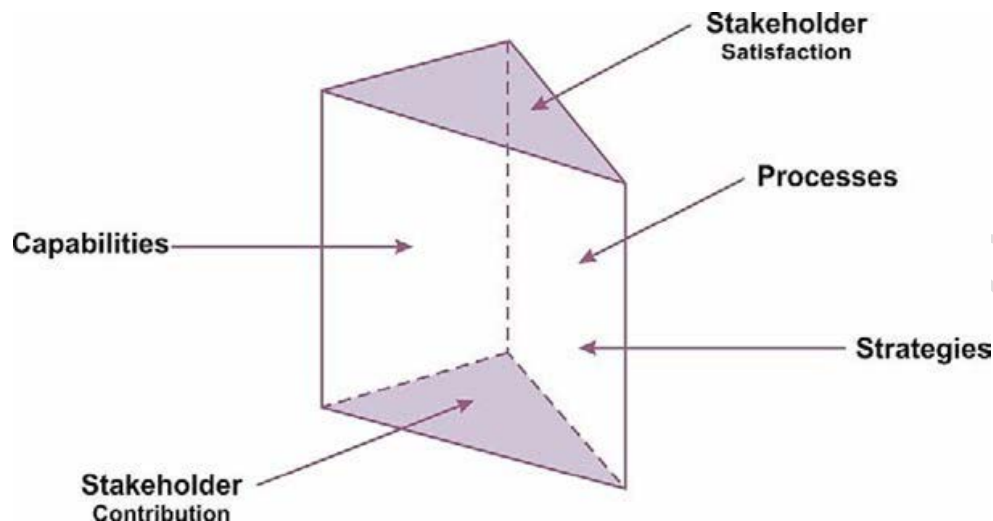
Processes: What are the necessary processes required for satisfying the above strategies?

Capabilities: What capabilities is the businesses going to need in order to run and improve the process?

Stakeholders Contributions: It also considers what the management needs from its stakeholders in terms of contributions.



Comprehensiveness of Performance Prism



The Performance Prism enables organisations to create strategies, operational procedures, and performance measure geared to the unique requirements of all significant stakeholder groups. The Performance Prism enables an organisation to more directly address the risks and opportunities in its business environment by adopting a broad stakeholder perspective that includes regulators and business communities. It is easier to communicate with stakeholders and implement a strategy when measures are developed using the PP for each important and relevant stakeholder.

11.15 TRIPLE BOTTOM LINE (TBL)

British business author John Brett Elkington in year 1994 coined the term TBL. But the origin of concept actually lies in Brundtland report by World Commission on Environment and Development, (now known as Brundtland Commission) published in year 1987, in which Sustainable Development is explained as is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

It is also important here to note that United Nations Conference on Environment and Development taken place in year 1992, gave stress on sustainable development.



To measure performance of business decision in economic terms we consider only one bottom line i.e. profit, but to consider sustainability of business decision there are three bottom lines i.e. People, Planet and Profit (also known as dimensions of TBL).



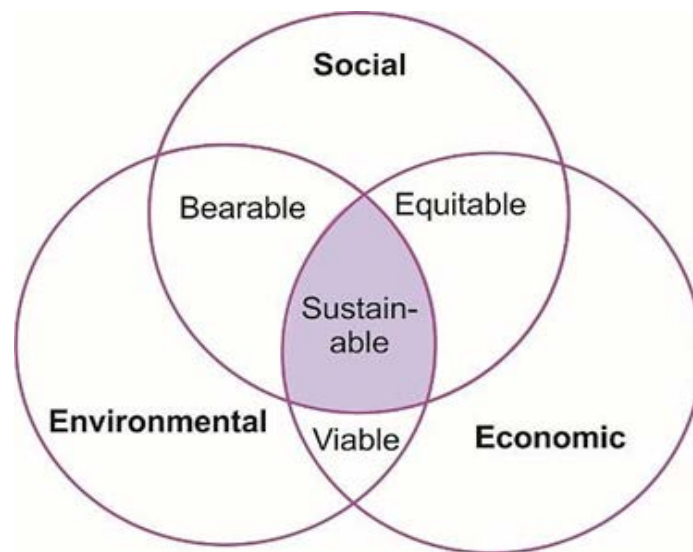
TBL truly extends the scope of traditional accountancy, to transform it into modern day sustainability reporting (which is beyond financial reporting because it considers social and environmental performance too). Some organisations even have separate business sustainability reporting system and they apply the standard of sustainability reporting pronounced by Global Reporting Initiative, Which is the independent, international organization that helps businesses and other organizations take responsibility for their impacts, by providing them with the global common framework (standards) to report those impacts.

Dimension (sets) of TBL

Planet, the environmental bottom line measures the impact on resources, such as air, water, ground and emissions to determine the environment impact and ecological footprints.

People, the social equity bottom line relates to corporate governance, motivation, incentives, health and safety, human capital development, human rights and ethical behaviour.

Profit, the economic bottom line refers to measures maintaining or improving the company's success in term of adding value to shareholders.



11.16 SUMMARY

Responsibility accounting is defined as the collection, summarization, and reporting of financial information where the accountability of certain costs, revenue or assets of firm is held by individual manager.

Cost or Expense Centres are responsibility centres where the manager 'has control over the costs' (other than those of capital nature) owing to function, for which he/ she is responsible.

Revenue Centres are the responsibility centres where the manager has 'control over the generation of revenue from operation' with no responsibility for costs.

Profit Centres are the responsibility centres where the manager of such a centre or division has 'control on both revenue and costs' (other than those, which are of capital nature) earned out of and incurred on.

Investment Centres are the responsibility centres where the manager has responsibility for not just the revenues and costs relating to the centre, but also the assets that cause these costs and generate these revenues and the investment decisions relating to disposal and acquisition of assets.

Financial Performance Measures

- Return on Investment (RoI)



- Residual Income (RI)
- Economic Value Added (EVA)

Non - Financial Performance Measures

- Balanced Scorecard
- Performance Pyramid
- The Building Block Model
- Performance Prism
- Triple Bottom Line (TBL)

11.17 SELF-ASSESSMENT QUESTIONS

1. Explain the concept of Responsibility Accounting.
2. What are different Responsibility Centres.
3. Explain the different Financial Performance Measures.
4. Write a short note on:
 - i. Economic Value Added (EVA)
 - ii. Balanced Scorecard
 - iii. Performance Pyramid
 - iv. The Building Block Model
 - v. Performance Prism
 - vi. Triple Bottom Line (TBL)
5. Supply the missing data in the following table:

Particulars	Division A	Division B	Division C
Sales	Rs.60,000	Rs.75,000	Rs.1,00,000
Operating Income	(a)	Rs.25,000	(e)
Operating Assets	Rs.30,000	(c)	Rs.50,000
Return on Investments (ROI)	15%	10%	20%
Minimum required rate of return	10%	(d)	(f)
Residual Income (RI)	(b)	Rs.5,000	0

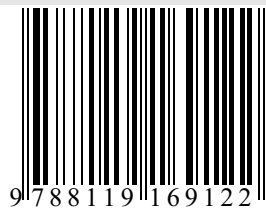


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