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FINANCIAL ACCOUNTING AND ANALYSIS

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LESSON 1

FUNDAMENTALS OF FINANCIAL ACCOUNTING

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STRUCTURE

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1.1 LEARNING OBJECTIVES

After reading this chapter, students will be able to understand:

- Basic concept of Financial Accounting, Accountancy and Book-keeping
- Relationship between Accountancy, Accounting and Book-keeping
- Difference between Book-keeping and Accounting
- Users of Accounting information both Internal and External.
- Merits and Demerits of Accounting.
- Basic Accounting terms and concepts
- Double Entry System of Book-keeping
- Fundamental accounting assumptions and Accounting principles.
- Accounting standards and International Financial Reporting Standards and their difference with each other.
- Basis of Accounting (Cash vs Accrual).

1.2 INTRODUCTION

As per the definition of Accounting given by the AICPA:

Accounting is an art of recording, classifying and summarising the transactions and events which are monetary and business related in a significant manner as per accounting rules and principles, transactions and events and interpretating the financial results.

Accounting aims to provide quantitative financial information economic and business entities about their financial position and performance so that users can use the information in making prudent economic decisions."

It is logical and sequential the process of identifying, collecting, recording, classifying, summarising and communicating financial information (monetary transaction and events related to business) to the users for their own customised judgment, analysis and decision-making.

1.3 OBJECTIVES OF ACCOUNTING

Accounting is done to achieve the following objectives:

1. **Keeping systematic, accurate, structured and complete records** of financial transactions and events in the primary and secondary books of accounts such as journal,

ledger as per specified accounting principles, rules and standards to avoid omission, error and fraud.

2. **Calculation of the profit earned or loss incurred** by a business during a particular accounting period to assess the financial results of business activities.

3. **Determination of the financial strength or position** of the business through a position statement known as balance sheet which shows the application of funds in the form of current and non current assets and and sources of funds in the form of Equity (Capital and Reserves and surplus & and External Liabilities).

4. **Providing useful accounting information to users** of financial information such as owners, prospective investors, suppliers, banks, employees and government authorities, regulators, customers etc who analyse and interpret them as per their own customised requirements such as investors use information for investment decisions, bankers use for taking lending decisions.

5. **Providing financial information to the management** to facilate them to take decisions regarding expansion, diversification, shutdown, etc. , prepare budgets and forecast the results and financial position so as to prepare projected financial statements.

6. **Safeguarding assets and detecting and preventing frauds** by maintaining regular and systematic accounting records of the business transaction and events relating to the acquisition and disposal of assets, earning revenue and incurring expenses.

1.4 MERITS/ADVANTAGES OF ACCOUNTING

The significance and importance of accounting can be considered through following points:

1. Provides information management facilitating them to make prudent economic decisions.

2. It help owners to compare results of current years with past results and with the results of others in same industry to identify trends and the factors which leads to changes and evaluate the competitive performance.

3. It provide information regarding financial position of the business enterprise through balance sheet which shows the application of funds in the form of assets and and sources of funds in the form of capital & and external liabilities.

4. It help in keeping accounting records in a structured, systematic, accurate and complete manner of financial business related transactions and events in the books of accounts as per specified generally accepted accounting principles, which is accepted by the regulators, authorities and courts as valid evidence to settle various litigations.

5. It help in correct determination of tax liabilities under various taxes such as Income tax, GST and Custom duties, etc.

6. It facilitates costing of products, job, activity and project so that proper pricing decision can be taken.

1.5 LIMITATIONS OF ACCOUNTING

Inspite of many advantages, accounting suffers from many limitations discussed below:

1. **Historical in nature:** Accounting is concerned with transactions and events are already occurred in the past. It does not provide a tool for future decision making. Further it does not shows the business assets and investments at their current market value as per the demand and supply of securities in the market or as per the current value prevailing for the assets in the relevant market because it does not take into account the effects of changes in price level.

2. **It ignores qualitative aspects:** It accounts and recognises only transactions and evenets which can be expressed in terms of money because of Money measurement concept. It does not consider qualitative aspects such as efficiency with which the management works, quality of operations, loyalty and sincerity of employees, customers satisfaction level, etc.

3. **It allows scope for window dressing:** i.e. It might involve manipulation in accounts to present a more favourable or unfavourable results and financial position than its actual position to serve the vested interests of the insiders.

4. **It is subjected to personal bias and judgment:** Since different people hold different opinions with respect to accounting estimates such as useful life of asset to determine amount of depreciation, provision for doubtful debts on the basis of likelihood of the default by the debtors, etc.

5. **It is based on concepts and conventions:** Since accounting is based on concepts and conventions which sometimes distort the disclosure of true and realistic financial position and results of a business enterprise. For example as per Historical Cost Concept, Fixed assets in balance sheet are shown at their purchase cost less depreciation and not at their current market value prevailing in the market if they are sold in the relevant market.

1.6 BOOK KEEPING

Book keeping is identification and recording of business transactions and events only. It is the recognition component of accounting syttem which involves the recording of monetary business transactions and events in a defined manner as per the standards and principles given in the relevant Financial Reporting framework.

It is concerned with only the recording part whereas accounting covers both the recording, summarizing, communicating and interpretation part of an accounting system.

The differences between Book keeping and Accounting can be described as under:

Basis	**Book keeping**	**Accounting**
Component	It is the recording phase involving recording of business transactions and events in journal and other accounting books.	It is much wider than book keeping as it covers recording, summarizing, communication, and interpretation part of an accounting system.
Stage of accounting	It is the first and primary stage and forms basis for accounting.	It is the secondary and subsequent stage, cover the part where the book keeping ends.
Nature/Skill or Knowledge requirement	It involves activities which are routine and clerical in nature and does not require any specialised skills or knowledge in their application.	It involves activities which are analytical in nature and requires specialised skills or knowledge of accounting ratios and other analytical tools.
Level of staff required	It is carried out by junior level employees called book-keepers	It is carried out senior level employees called accountants.
Depiction of Financial position	Financial position and performance cannot be determined on the basis of journal entries.	It provides the complete and summarised blue print of the financial position and performance of an entity.

1.7 COMPONENTS OF ACCOUNTING INFORMATION/ STATEMENTS

Accounting information can be break down into following components:

1. **Statement financial performance:** The statement of profit or loss (in case of companies)/ profit or loss account/ income statement (in case of non corporates) shows the net profit earned or loss incurred from business operations during a particular accounting period which is usually a financial year.

2. **Information relating to financial position:** Balance Sheet is a statement which shows the application of funds in the form of assets and and sources of funds in the form of capital & and external liabilities.

3. **Schedules and Notes to Accounts:** which forms the part of balance sheet and statement of profit and loss to give detailed information of various line items shown in balance sheet and income statement and significant accounting policies relating to recognition, valuation, classification and disclosures, which are used in the preparation and presentation of financial statements.

4. **Cash Flow Statement:** It shows the inflows and outflows of cash and cash equivalents from three activities operating, investing and financing.

1.8 BRANCHES OF ACCOUNTING

Accountimng can be classified into following sub fields:

1. **Financial Accounting:-** It is that subfield/branch of accounting which is aimed at generating General Purpose Financial Statements covering identification and recording of business transactions and events of financial nature (which can be expressed in monetary terms) in a systematic and significant manner as per generally accepted accounting principles, to ascertain the financial performance/results (profit earned or loss incurred) during the accounting period and to depict the financial position or health of the entitiy in the form of assets and liabilities.

2. **Cost Accounting:-** It is concerned with ascertaiment or calculation of total cost or per unit cost of object which can be goods produced or services rendered, job work performed or project undertaken.

3. **Management Accounting:-** It involves obtaining financial information to help the management in planning, orgainsing and controlling the operations by setting benchmarks and also facilitates in taking sound business decisions.

IN-TEXT QUESTIONS

1. Select the correct answer for the following multiple choice questions:
   (a) Accounting includes :
   (i) Identifying the transactions and events;
   (ii) Recording the transactions and events;
   (iii) Classying and summarizing the transactions and events;
   (iv) All of the above
   (v) None of the above

2. Please indicate if the following statement is true or false.
   (a) Accounting and Book Keeping are same and there is no difference between the two.
   (b) There is no scope for window dressing in Accounting.
   (c) Accounting is subject to personal bias and judgements.

3. Financial Accounting recognises only transactions and evenets which can be expressed in terms of…………..

4. As per ………………..concept fixed assets in balance sheet are shown at their purchase cost less depreciation and not at their current market value prevailing in the relevant market if they are sold as such.

5. ……………….shows the inflows and outflows of cash and cash equivalents from three activities operating, investing and financing

1.9 INTERESTED USERS OF ACCOUNTING INFORMATION AND THEIR NEEDS

There are various categories of stakeholder or users of financial information which are interested in determining the financial position and financial performance of the business.

Users	Category of User	Information need of the user
Internal	**Owners/Proprietor/ Shareholders**	Return on investment, Net profit, financial position of the company/business, growth rate.
	Management	Rate of return from different segments, products and investments.
	Employees	Profitability of the employer to bargain wages rates and bonus, dues (PF, ESI, etc.) are being deposited regularly.
External	**Potential investors**	Business and financial risk, EPS, future prospects of the business.
	Creditors/Suppliers	Short term liquidity: creditors are interested in knowing financial capability and ability of the business to pay its debts on time.
	Lenders	Repaying capacity, credit worthiness, short term liquidity and long term solvency.
	Tax Authorities	Assessment of income and expenses, tax dues, true and fair disclosure of accounting information.
	Others	Customers, researchers seek different in-formation for different own customised interests and reasons.

1.10 QUALITATIVE ASPECTS OF ACCOUNTING INFORMATION

Usefulness of accounting information for different interested users is determined on the basis of the following attributes of accounting:

1. **Reliability:** Financial information must represent the actual facts and can be verified through source documents (vouchers).

2. **Relevance:** Financial information must be readily available on the time when it is required for decision making and must play an important role in the economic decisions of users of information by helping them to form nearly correct prediction about the future Income and financial position.

3. **Understandability:** Information should be presented in such a manner such that the users can understand and interpret it with much ease and in a concise manner.

4. **Comparability:** Information should be presented and disclosed so that it can compared with entity's past year's figures (intra firm comparison) and other business's in the same industry (Inter firm comparison).

1.11 SOME IMPORTANT ACCOUNTING TERMS

Business Transaction: It refers to a business activity which involves exchange of money or money's worth between parties (buyer and seller). It can be measured in terms of money and changes the financial position of an entity e.g. purchase of goods would involve inflow of material and goods (asset) and outflow of cash (asset) or creating an obligation to pay (liability) towards the supplier at a future date. transaction can be:

1. **Cash transaction:** When the parties (buyer and seller) settle the transaction immediately by making payment in cash or by bank.
2. **Credit transaction:** when the payment is to be settled at a future date as per agreement or mutual consent between the parties.

Account: refers to a summarized record of all relevant transactions relating to a particular item at one place. It has two sides debit side and credit side. The left side of the account is known as debit side and the right side is known as credit side.

Capital: It is amount of resources invested by the owners into the business organisation either in the form of cash or cash equivalents or in kind or assets. The amount can be invested in the form of cash, goods, or any other asset. For Business Entity, capital is a liability towards the owners which is to be settled only in the event of closure or transfer of the business. In case of corporates it is called as share capital.

Drawings: It represents an amount of cash, goods or any other assets which the owner withdraws from business for personal use. e.g. if the life insurance premium of proprietor is paid from the business bank account, goods withdrawn for personal use. It will result in reduction in the owners' capital.

Asset: Asset is a resource controlled by the business entity from which probable future economic assets will flow to the entity by using it for generating future profits. Assets can be Tangible and Intangible.

Tangible Assets: are the assets which have some physical existence. They can be seen, touched and felt such as:

- Plant and Machinery
- Furniture and Fittings
- Land and Building
- Books and periodicals
- Computers and laptops
- Vehicles

Intangible assets: Assets which have no physical existence (cannot be seen or felt although they help to generate revenue in future) and whose value is determined and restricted by the rights and expected future benefits that their possession confers upon the owner such as

- Goodwill
- Patents
- Trade-marks
- Copyrights
- Brand equity
- Industrial designs
- Other intellectual property rights, etc.

Assets can also be classified into Current Assets and Non-Current Assets.

Current Assets – Asset which satisfies any of the following :

a. It is expected to be realised in, or is intended for sale or consumption in the company's normal operating cycle,

b. It is held primarily for the purpose of being traded ,

c. It is due to be realised within 12 months after the reporting date, or

d. It is cash or cash Equivalent unless it is restricted from being exchanged or used to settle a liability for at least 12 months after the reporting date.

Current Asset includes:

- Inventory
- Trade recievables (sundry debtors and bill recievables)
- Prepaid expenses
- Current investments
- Cash and cash equivalents
- Short term loans and advances

Non-Current Assets – All other assets which are not classified as current assets are non-current assets such as:

- Plant and Machinery
- Furniture and Fittings
- Land and Building
- Patent
- Trade-mark
- Copyright

Liability: It is the present obligation to be settled through outflow of economic resources. In other words it is the amount of money that the business owes to the other parties. E.g. when goods are purchased on credit, the entity will have an obligation to pay to the supplier the price of goods on an agreed future date or when a loan is taken from bank, there is an an obligation to pay interest and principal amount at a future specified date.

On the basis of the period of holding, liabilities or obligations can be further classified into long term (non-current liabilities) and short term (current liabilities).

Current liabilities – A liability which satisfies any of the following :

a. It is expected to be settled in the normal operating cycle,

b. It is held primarily for the purpose of being traded,

c. It is due to be settled within 12 months after the reporting date, or

d. The entity does not have an unconditional right to defer settlement of the liability for at least 12 months after the reporting date

Note: Terms of a liability that could, at the option of the counterparty, result in its settlement by the issue of equity instruments do not affect its classification.

Non-Current Liabilities – All other liabilities not classified as current liabilities shall be classified as Non-current liabilities such as:

- Debentures
- Public deposits
- Long term bank loan
- Inter corporate loans
- Long term loan from director

Internal Liability: It refers to owner's equity, i.e. all the amounts which proprietors are entitled such as:

- Capital
- General reserve
- Deneture redemption reserve
- Undistributed profits, etc.

Working capital: The assets which are held to maintain the flows of revenue from operation in the form of current assets such as:

- Cash required to pay for expenses or to the creditors
- Inventories required to smoothen production and sale
- Accounts receivables (debtors and bills receivable) to increase the sales .
- Cash at bank
- Prepaid expenses

The total of current assets constitute the working capital of a firm which is termed as Gross working capital.

Gross working capital = Total current assets = long term internal liabilities + long term debts + the current liabilities – Non current assets.

Net working capital is the excess of current assets over current liabilities. It is the amount of current assets that remain in a firm if all its current liabilities are paid. This aspect of working capital is a more realistic concept.

Working capital (net) = Current assets – Currents liabilities.

Receipts: It is the gross inflow of cash and cash equivalents to the entity. It can be further classified into:

1. **Revenue receipts**: these are the receipts which are occurred or received in the normal course of operations of business like amount received through sale of goods and services in the ordinary course of business.
2. **Capital receipts**: these are the receipts which are recieved from other than principle business operations like proceeds from long term investments or sale of fixed assets,.

Expenses: refers to costs incurred (the part of the expenditure whose benefit is already expired during the accounting period) by a business for earning revenue such as:

- Rent
- Wages
- Salaries
- Interest
- Depreciation
- Carriage

Expenditure: It is the amount of outflow of monetary resources or money or incurring a liability for acquiring any asset, goods or services. The expenditure can be further classified into 3 categories:

1. **Revenue Expenditure**: If the benefit of expenditure incurred is utilised within the accounting period in which they are incurred. For example: electricity, insurance, rent, carriage, interest, salary, etc.
2. **Capital Expenditure**: If benefit of expenditure is received or lasts for more than one accounting period, for example: construction of building, purchase of machinery, furniture, etc.
3. **Deferred Revenue Expenditure**: There are the expenditures which are revenue in nature but their benefit is utilised over a number of years. For example: huge Advertisement Expenditure, preliminary expenses, etc.

Profit: It the amount by which revenues exceeds their related expenses during an accounting period is called profit. Profit = Revenue - Expenses

Gain: It is a profit of non-recurring nature arising from events or transactions which are incidental to business but are not part of principle revenue generating activities of a business enterprise such as sale of fixed assets at a value more than written down value, appreciation in the value of an investment or asset, etc.

Loss: The excess of expenses incurred during an accounting period over its related revenues. Loss = Expenses – Revenue.

Goods: The tangible items in which the business mainly deal in the ordiary course of business. These are the items which are purchased for resale or for use as raw material in further production and are not held or intended for use in the business for administration purposes.

Purchases: procurement of goods by a business for the purpose of resale or for using them as raw material in further production. For a trader of goods, it refers to purchase of stock is trade and in case of manufacturing businesses it is purchase of raw materials and consumable supplies. Purchases may further be classified into cash purchases and credit purchases.

Purchase Return: When goods which are purchased are returned back to the suppliers because they are not as per specifications mentioned in the purchase order, are defective or due to any other reason.

Sales: It is the amount of total revenues earned from customers through sale of goods or rendering of services in the normal course of business. Sales may further be cash sales or credit sales.

Sales Return: When customer return the goods to the business entity due to any reason which can be defect in the goods, inappropriate quality, lack of attributes as specified by the customer.

Debtors: refers to the entities to whom the entity has sold goods or render services on credit and the amount is not completely paid and still to be received by the business entity. These are considered assets of the business, usually current assets.

Creditors/ Sundry Creditors: If the business buys goods/services from the suppliers on credit ie. the amount is not paid to the suppliers at the time of purchase and payment is deffered to a mutually agreed specified date in future. These are treated as financial obligations/liabilities for the entity (trade payables under current liabilities) which is to be paid usually within the normal operating cycle period.

Bill Receivable: It is a bill of exchange where by debtors (to whom goods are sold on credit) of the business undertakes to pay a certain amount mentioned therein a specified date. These are considered assets of the business, usually current assets.

Bill Payable: It is a bill of exchange where by the business undertakes to pay a certain amount mentioned therein a specified date to suppliers from whom goods are purchased on credit. These are considered liabilities for the business usually current liabilities.

Discount: It is the amount of rebate given by the seller of goods or servives to the purchaser. It can be further classified into:

1. **Trade Discount**: This discount is given to persuade or encourage the buyer to buy more quantity of goods. It is given in the form of agreed percentage of list price at the time of sale of goods. This discount is not recognised in the books of accounts as it is deducted in the invoice/cash memo and taxes like GST are imposed on after trade discount amount.
2. **Cash Discount**: This discount is given to encourage the debtors to pay their dues before the expiry of agreed credit period. This discount is recognised in the books of account as finance cost and charged to statement of profit and loss. It is given as percentage of the dues.

Account : It refers to a summarised record of all the transaction relating to particular head or accounting item at one place.

Income: Income is a very wider term profit as it includes not only profit but also the gains which are non recurring in nature. Income refers to the increase in the net wealth of a business enterprise over an accounting period.

Stock : It is the amount of total goods (raw material, work in progress, and finished goods) available for sale on a particular date.

Cost : It refers to amount of expenditures incurred (the expired portion of benefits) in manufacturing and processing goods to produce finished goods for sale in the ordinary course of bsuiness.

Voucher: It is documentary evidence of a transaction. For example, if goods are purchased for cash, the supplier provide a cash memo, if ggods are purchased on credit, the supplier issues an invoice, when the payment is made to creditors, receipt of payment is issued by the creditors.

Goods and Service Tax (GST) : GST is an indirect consumption tax which is levied on the supply of goods and service other than alcoholic liquor for human consumption. It is recovered from the buyer and paid to the appropriate government. It does not forms part of revenue or sales.

1.12 ACCOUNTING PRINCIPLES, CONCEPTS AND CONVENTIONS

The first and foremost objective of accounting is to provide general purpose financial information which is easily understandable, appropriate, relevant and reliable information about the financial results and position of the business to various users or stakeholders so that they can make sound and judicious financial and economic decisions. For this accounting records are to be maintained on the basis of uniform standards, rules and principles.

Generally Accepted Accounting Principles (GAAP): It is the collection of all the accounting principles, policies, concepts and conventions. GAAP provides the very base of Accounting.

GAAP refers to the rules, principles or guidelines with respect to recognition, valuation, classification, disclosures which are used for recording, classifying, summarising and reporting of business and financial transactions and events so as to bring standardisation, consistency and comaprability in the preparation and the presentation of financial statements.

These principles are evolved and developed over a long period of time based on the accounting experiences of the accountants, business-customs and practices, legal decisions, economic environment, etc. These are generally accepted and followed by the accounting practitioners and professionals working over a large geographical area in preparation and presentation of financial statements.

1.13 FUNDAMENTAL ACCOUNTING ASSUMPTIONS

Following are the assumptions used by default in preparation and presentation of financial statements, if these are followed and valid then entiry is not required to give any disclosure, disclosure is to be given only if any of the below assumption is invalid:

1. Going Concern Assumption: It is assumed that a business enterprise has an indefinite life or existence. Thus business will continue for long foreseeable period of timeand there is neither any intention to liquidate nor to scale down its operations or any of the undertakings significantly.

Implication and Relevance:

1. Distinction between capital expenditure and revenue expenditure can be made.
2. Classification of both assets and liabilities into current and non-current based on this assumption and definition of operating cycle.
3. Depreciation is charged on Property Plant and Equipment/fixed assets as on their acquisition they are capitalised in the balance sheet at book value (after deducting depreciation), irrespective of their current market value prevailing in the market.

2. Consistency Assumption: As per this assumption, accounting practices once selected and applied should be followed and applied consistently year after year. If the accounting policies are followed consistently then it will ensure meaningful analysis and comparison of the financial position as well as performance of the same business for a number of years known as intrafirm and interperiod comparison. It does not mean that practices and policies, once adopted, cannot be changed in the future. When a change is required and desirable as per the requirements of the changing circumstances, it can be changed but proper disclosures as per the applicable accounting standards are given in the financial statements along with its effect in statement of income (profit or loss) and Balance Sheet (change in the value of asset or liability). Any accounting policy may be changed if required by the change in governing law, reporting framework requirements or accounting standard applicable so as to make the financial information more relevant and transparent or to give better true and fair view of financial postion and performance.

Implication and Relevance: Helps the management and other stakeholders of financial information in decision-making by comparing the current year' financial information with the information of previous years.

3. Accrual Assumption: All revenues and related expenses are recorded/recognized as and when they are earned or incurred irrespective of whether the cash and cash equivalents are received or payment is made at the time of transaction or on a future date for example, if good are sold on credit (with credit given for two months) for Rs. 2,00,000 on 15th march. 2023 and all the risks and rewards incidental to ownership are transferred to the buyer, then the Sale is to be recorded on 15th march. 2023 and not on the date when cash is received after two months from the debtors.

In case of revenue expenses such as salary or rent, if at the end of the accounting period (31st march), salary for four months is due to the employees but not paid, such unpaid salary will be recorded in the current year as outstanding salary and the salary expense account will be debited and transferred to profit and loss statement for the year in which the salary is due, it is not charged to profit and loss statement in the next year when it will be paid to the employees.

Implication and Relevance: Earning of revenue and consumption of a resource (expenses) can be accurately matched with each other realting to a particular accounting period providing the accurate measurement of financial performance.

1.14 ACCOUNTING PRINCIPLES AND CONCEPTS

1. **Business Entity/Separate Legal Entity:** A business entity has a separate existence from its owners and management. According to this principle, business is treated as a separate legal entity, distinct from its owners and managers. Thus, transactions are recorded and analyzed, and the accounting records and financial statements are prepared and presented from the view point of business and not the owner or proprietor. The Proprietor/businessman is treated as a inside creditor (Internal liability) for his investment made in the business equal to the amount of capital in the form of cash or other assets invested by him in the business. Interest on capital is treated as an expense. If the private expenses of the owners are paid out of business's money, then it is treated as drawings leading to reductions in capital of the owners.

2. **Money Measurement:** As per this concept, only those transactions and events that can be measured or expressed in monetary terms are recorded and accounted for in the books of accounts of the business enterprise. Non-monetary events like hiring of a loyal and intelligent employee, death of an efficient employee, strikes by workers, disputes with customers etc., are not recognised and recorded because they can not be quantified in terms of money, even though they affect the operations of the business significantly.

   Limitations of Money Measurement Concept:
   1. It does not considers the qualitative aspect such as efficient and loyal human employees (assets), loyal and satisfied customers (assets) and dishonest and inefficient employees and workers (liabilities), strong and healthy relstionships with the suppliers.
   2. Since the value of money (currency) is fluactuating on account of inflation. To keep accounting records simple and understandable, transactions and events are recorded using a fixed measurement unit therefore carrying value does not matches with the changes in value of money over a period of time.

3. **Accounting Period Concept:** Even though we assume the business as Going Concern, but the users of financial information are interested in knowing the financial results at regular intervals, therefore as per this concept, the life of any business organisation is split into smaller periods (accounting period) so that its peformance can be evaluated and financial position can be determined at regular intervals of time.

   Accounting period refers to the interval of time, at the end of which financial statements comprising profit and loss account/or statement of profit and loss and the balance sheet with notes to accounts are prepared, so that the financial performance can be measured and financial position can be determined at regular intervals and decisions such as shutdown, continue, expansion can be taken to control the affairs on timely basis.

   Accounting period is generally a period of one year starting from 1^{st} april and end on 31^{st} march of next year.

   Relevance of the concept:
   1. Facilitates the classification of expenses into capital expenses and revenue expenses.
   2. Part of capital expenditure which is consumed during the current accounting period is charged to the Statement of profit and loss and the remaining unconsumed portion is recognised as an asset in the Balance Sheet.
   3. Compliance with taxation laws: According to the income tax provisions, income tax is computed on annual basis.
   4. Prompt corrective action can be taken by the management to improve th results and financials.

4. **Full Disclosure:** As per this concept, besides applicable legal provisions, all material facts and information related to the economic activities of the entity should be properly disclosed in the financial statements and the accompanying notes to accounts as per applicable financial reporting framework.

   The financial statements should act as a means of communicating and not escaping the material and relevant information. The objective of disclosure is to create better understanding and the users may be able to take sound financial decisions. For example following disclosures can be provided in the footnotes such as:
   1. Disclosure of Contingent liabilities such as pending claims and litigations of a very big amount against the business, Arrears of dividend on cummulative preference shares, etc.
   2. Change in the method of providing depreciation on fixed assets (Property Plant and Equipment).
   3. Market value of investment in securities and changes thereof.

5. **Materiality Principle:** Materiality is not defined in exact monetary limits but any item which influences the economic decisions of the users is considered as material. Disclosure of all material transactions and information is necessary but it does not mean that even figures of big amount which are irrelevant are to be mandatorily disclosed in

the financial statements. Therefore, items having insignificant effect or which are irrelevant to users is not required to be disclosed separately, it may be merged with other items. Materiality is a subjective item as an item may be material for one enterprise may not be material for another enterprise, e.g., an item of expense of Rs. 50,000 may be immaterial for an organisation having a turnover of Rs. 10,000 crores but it may be material for an enterprise having a turnover of just Rs. 10,00,000.

6. **Prudence/ Conservatism Principle:** As per this principle, prospective or anticipated future profit should not be recognised or recorded but all prospective future losses should immediately be recorded by making a provision for them. The aim of this principle is to protect overstatement of the profit and depiction of a realistic financial picture of the organisation. Where different alternative methods or policies of accounting on a particular subject matter or transaction are available, then the alternative having the least favorable effect on profit should be adopted in formulating and selection of accounting policies, for example:

    1. Stock should be valued at lower of cost or net realizable value (as per AS-2) .
    2. Provision should be made for future liabilities or expenses such as provision for doubtful debts and provision for taxation.

7. **Cost Principle:** The major concern is that at what value fixed assets should be recorded. As per this principle, fixed assets are recorded in the books of accounts at its original cost consisting of the cost of acquisition (purchase cost) and all the expenditure incurred for making the assets ready to use and bringing the asset to present location and condition (friegth, carriage, installation, commison on the purchase of fixed assets).

    For Example: Machinery is purchased for Rs. 4,50,000 and Rs. 60,000 was spent on the installation of machine and Rs 50,000 is paid as purchase commission, then machine is recorded at rs. 5,60,000 in the books of accounts and depreciation will be charged on this amount. If the market value of the machine in the relevant market increases to Rs. 6,00,000 due to price fluctuation, then the increased value due to market fluctuation will not be accounted for in the books of account. This cost of Rs. 5,60,000 is systematically reduced year after year by charging depreciation in the income statement and the assets are shown in the balance sheet at carrying value/book value (cost – accumulated depreciation).

8. **Matching Principle:** Accounting information is relevant if it provides true and accurate picture of financial performance, therefore as per this Matching concept, all expenses incurred by an enterprise during an accounting period are matched with the related incomes or revenues recognized during the same accounting period. It facilitates the accurate calculation of profit earned or loss incurred in a particular accounting period.

    The following accouting treatment are done due to matching principle:

    1. Calculation of Prepaid Expenses and recording them as assets.
    2. determination of Income received in advance from the customers as liabilities.

3. Determination of closing stock at the end of accounting period to reduce it from the cost of goods sold.
4. Depreciation charged on fixed assets (Property, Plant and Equipment) in a systematic manner as per their use in the business in earning revenue.

9. **Dual Aspect Principle:** Every business transaction has two aspects - a debit and a credit of equal amount. In other words, for every debit in an account there is a credit of equal amount in one or more accounts and vice-versa. This system of accounting is also known as "Double Entry System". This concept ensures that the two sides of the Balance Sheet i.e Assets (application of funds) side and Equity and Liability 9sources of funds) side always match and thereby following accounting equation will always holds true at any point of time.

   Accounting Equation is expressed as follows:

   Assets = Liabilities + Capital

   For Example : Sohan started business with cash Rs. 5,00,000. This transaction increases cash in assets side and capital in liabilities- side by Rs. 5,00,000.
   Assets (Cash) Rs. 5,00,000 = Liabilities Rs. 0 + Capital Rs. 5,00,000

1.15 BASIS OF ACCOUNTING

There are two basis of recording transactions and ascertaining profit or loss during the accounting period:

1. Cash Basis and
2. Accrual Basis

Cash Basis of Accounting: as per this basis transactions are recorded in the books of accounts by passing journal entires only on the receipt/ payment of cash and cash equivalents.

The Profit is calculated as the excess of actual cash receipts from sale of goods, services, other non operating incomes over actual cash payments or outflow of cash and cash equivalents for purchase of goods, wages, expenses such rent, electricity, salaries, interest etc. transactions like credit sale and credit purchases are not accounted for in the books of accounts.

No transaction is recorded when a payment or receipt is merely due i.e., outstanding expenses, accrued incomes are not recognised.

This method is in contravention to the matching principle.

Accrual Basis of Accounting: As per this accrual basis Revenue and expenses are recorded as and when they are incurred or earned. Income is recorded as Income when it is accrued (when transaction takes place, risk and reward incidental to ownership are transferred and obligation are performed) irrespective of whether corresponding cash and cash equivalents are received or not. Similarly, expenses are recorded when they are incurred or become due (when the benefit of the resource or facility is expired) and not when the cash is paid for them.

Items such as outstanding expenses, prepaid expenses, accrued income and income received in advance are identified and taken into account as assets and liabilities.

As per Companies Act 2013, all companies are required to maintain their accounts on accrual basis of accounting.

Basis	**Accrual Basis of Accounting**	**Cash Basis of Accounting**
Nature of Transactions	Both cash and credit transactions are recorded.	Only cash transactions are recorded.
Assessment of Profit or Loss	Profit or Loss is ascertained correctly due to complete record of transactions.	Correct profit/loss is not ascertained because it records only cash transactions.
Capital vs Revenue items	makes a distinction between capital and revenue items.	does not make a distinction between capital and revenue items.
Legal recognition	This basis is recognized under the companies Act.	This basis is not recognized under the companies Act.

1.16 ACCOUNTING STANDARDS

The accounting principles or GAAP (Generally Accepted Accounting Principles) have been developed in the form of concepts and conventions to bring comparability and uniformity preparation and presentation of financial statements. However they allow alternative accounting treatments for the same items.

Different organizations may adopt different accounting policies depending upon their requirements, industry, scale of operations for the same transaction or an entity may follow different accounting policies for different accounting periods. As a result, the financial statements become inconsistence and incomparable. So it was felt to prescribe minimum standards universally applicable, so that the accounting statements possess qualitative characteristics of reliability, relevance, understandability and comparability.

International Accounting Standard Committee (IASC) was set up in 1973 as a non profit international organisation to improve the financial reporting thrioughout the world. (now International financial Reporting Committee (IFRC)). The Institute of Chartered Accountants of India (ICAI) and the Institute of Cost and Management Accountants of India are also members of this committee.

ICAI set up the Accounting Standard Board (ASB) in 1977 to identify the areas in which accounting standards are to be developed. ASB prepares and submits a draft accounting standard to the Council of ICAI.

The Council of ICAI issues the draft AS for the comments by the Govt., industry, academicians and professionals etc. After due consideration on the comments received, the Council of ICAI notifies it for its use in the financial statements.

Accounting standards are written statements, issued by autonomous professional accounting bodies such as FASB, IASB, ICAI, etc specifying standardised rules and practices for preparing and presenting the financial statements.

1.17 OBJECTIVES OF ACCOUNTING STANDARDS

Accounting Standards are formulated and issued with the following objectives:

1. **To ensure Uniformity/Consistency** in slection and application of accounting practices and policies in preparation and presentation of financial statements by proposing standard accounting treatment.
2. **To improve reliability of financial Information:** Since the standards are of high quality and received large scale acceptance which create a sense of confidence and reliance among the users.
3. **To sagfeguard assets, prevent frauds and manipulation** by codifying the accounting policies, methods and practices which limits the scope of fraud and manipulation.
4. **To facilitate Auditors**: It helps auditors by providing standardised accouting procedure to audit the books of accounts.

1.18 INTERNATIONAL FINANCIAL REPORTING STANDARDS

IFRS refers to the accounting and financial reporting standards issued by International Accounting Standards Board (IASB), london. These standards are made to improve the financial reporting at the international level to help users throughout the world to gain better understanding of financial statements.

Financial Statements under IFRS framework: Following financial statements are prepared and presented under IFRS framework:

1. **Statement of financial position:** Balance sheet which includes the following components:
    a. Assets
    b. Liability
    c. Equity (Shareholder's fund)
2. **Comprehensive Income statement including other comprehensive income**: which includes the following components:
    a. Revenue
    b. Expense
3. **Statement of changes in Equity** showing transactions with the shareholders and change in their claim over the entity.
4. **Statement of Cash flow** showing inflow and outflow of cash and casdh equivalents from operating, investing and financing activities
5. **Notes to accounts and significant accounting policies** showing details od the line items in the Balance sheet and statement of compreshensive income.

Significant differences between IFRS (International Financial Reporting Standards iisued by IASB) and AS (Accounting Standards issued by ICAI)

1. IFRS are principle based, they consider the substance over legal form in the transaction while AS are rule based, they require inflexible accounting procedures to be followed based on legal form.
2. IFRS are based on Fair Value in that they require valuations should be based on fair value measures which ensure true realistic valuations while AS are based on Historical Cost in that they require Assets shoul;d be recognised initially at their historical cost.

1.19 SUMMARY

Accounting is a logical and systematic process of identifying, collecting, recording, classifying, summarising, interpreting and communicating financial information to the interested users.

Objectives of Accounting:

a) Keeping structured, systematic, accurate and complete records of business transactions and events.
b) ascertain the profit earned or loss incurred
c) ascertain the financial position
d) provide useful accounting information to users
e) provide financial information to the management
f) safeguard assets and detect and prevent frauds

Limitations of Accounting:

a) Historical in nature
b) Ignores Qualitative Aspects
c) Scope for Window Dressing
d) Subject to personal bias and judgment
e) Based on concepts and conventions

Subfields/Branches of Accounting

1. Financial Accounting
2. Cost Accounting
3. Management Accounting

Interested users of Accountings information:

Internal	Owners
	Management
	Employees
External	Potential investors
	Creditors/Suppliers
	Lenders
	Tax Authorities
	Others

Qualitative Characteristics of Accounting Information:

a) Reliability
b) Relevance
c) Understandability
d) Comparability

1.20 GLOSSARY

Accounting: Process of identification, recording, classifying, summarising, interpreting and communicating financial information.

Account: refers to a summarized record of all relevant transactions relating to a particular item at one place.

Accounting Standard: written policy documents issued by professional accounting body for preparation and presentation of financial statements.

Asset: Asset is a resource controlled by the business entity from which probable future economic assets will flow to the entity by using it for generating future profits.

Business Transaction: It refers to a business activity which involves exchange of money or money's worth between parties.

Expenses: amount of expenditure incurred (the benefit of which has already been expired) by a business for earning revenue.

Profit: The excess of operating sales/revenues over its related revenue expenses during an accounting year.

Liability: It is the present obligation to be settled through outflow of economic resources.

Working capital is the excess of current assets over current liabilities

IN-TEXT QUESTIONS

1. Select the correct answer for the following multiple choice questions:

   Accounting includes :

   (i) Identifying the transactions and events;

   (ii) (ii) recording the transactions and events;

   (iii) classying and summarizing the transactions and events;

   (iv) All of the above

   (v) None of the above

2. Please indicate whether each of the following statements is true or false.

a) Book Keeping and Accounting are one and the same thing.

b) There is no scope for Window Dressing in Accounting.

c) Accounting is subject to Personal bias and Judgements.

3. Financial Accounting recognises only transactions and evenets which can be expressed in terms of…………...

4. As per ………………..Concept Fixed assets in balance sheet are shown at their purchase cost less depreciation instead at current market value in the relevant which could be realised on their immediate sale.

5. ……………….shows the inflows and outflows of cash and cash equivalents from three activities operating, investing and financing

1.21 ANSWERS TO IN-TEXT QUESTIONS

1. All of the above

2. a) False

   b) False

   c) True

3. Money

4. Historical Cost Concept

5. Cash Flow Statement

1.22 SELF-ASSESSMENT QUESTIONS

1. Define the Concept of Accounting
2. What is the difference between Accounting and Book Keeping?
3. What are the Objectives of Accounting and explain its significance.?
4. Discuss the interested users of Accounting Information with their customised areas of interest?
5. What are the drawbacks of Accounting?
6. Discuss the different Branches of Accounting.
7. What essential characteristics Accounting Information must possess?
8. Write a short note on :
    a) Money Measurement Principle
    b) Accounting Period Principle
    c) Dual Aspect Principle
    d) Going Concern
    e) Historical Cost

1.23 SUGGESTED READINGS

Latest editions of the following text books to be used:

1. Narayanaswamy R. Financial Accounting: A Managerial Perspective. PHI Learning Pvt. Ltd., Delhi
2. Robert N. Anthony, David F. Hawkins, Kenneth A. Merchant. Accountancy- text and cases. McGraw Hill Education (India) Private Limited, New Delhi.
3. Garg CA Kamal, and Sehrawat Neeraj Kumar. Beginner`s Guide to Ind AS & IFRS. Bharat Law House Pvt. Ltd., New Delhi
4. Maheshwari S. N., Maheshwari Sunil K., and Maheshwari Sharad K, An Introduction to Accountancy, Vikas Publishing House Pvt. Ltd.

LESSON 2

ACCOUNTING EQUATION AND CONCEPTS OF ACCOUNTING

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STRUCTURE

2.1 LEARNING OBJECTIVES

After reading this chapter, readers will be able to understand

- Concept of Accounting Equation
- Effect of a transaction on Financial Position
- How to use debit and credit

2.2 INTRODUCTION

In every business enterprise, users of general purpose financial statements (owners, management, employees, customers, competitors, suppliers, lenders, investors, government and regulatory bodies, etc) are interested to know the application of funds and sources of funds. Since what ever money is either borrowed or invested by owners is applied in the acquisition of current and non current assets. Therefore, in this lesson we will study how sources of funds (Equity and liabilities or Capital) matches or equates with the application or usage of funds (Assets).

2.3 MEANING OF ACCOUNTING EQUATION

Before moving to the Accounting Equation let us understand some of the important concepts used in the understanding the Accounting Equation:

Asset: Asset is a resource controlled (either through right to title/ownership or right to use) by the business entity from which it is likely that future economic benefits will flow to the entity by using it in the business for generating future profits. Assets can be Tangible and Intangible.

Capital: It is amount of resources invested by the owners into the business organisation either in the form of cash or cash equivalents or in kind or assets. The amount can be invested in the form of cash, goods, or any other asset. For a Business Entity, capital is a liability towards the owners which is to be settled only in the event of closure or transfer of the business. In case of corporates it is called as share capital.

Liability: It is the present obligation to be settled through outflow of economic resources. In other words it is the amount of money that the business owes to the other parties. E.g. when goods are purchased on credit, the entity will have an obligation to pay to the supplier the price of goods on an agreed future date or when a loan is taken from bank, there is an an obligation to pay interest and principal amount at a future specified date.

Accounting equation refers to an equation equating Sources of Funds with Application of Funds showing that the amount of assets or resources of an entity are always equal to the total amount of its liabilities and capital (funds brought by the owners).

The Accounting Equation is expressed as follows:

$$A = L + C$$

Where,
A = Assets

L = External Liabilities
C = Capital (Inside Liabilities)

Since, the Accounting Equation shows the relationship among various elements of the balance sheet (Assets, liabilities and Capital), therefore it is also known as the Balance Sheet Equation.

At any point of time during the accounting period, Assets (resources controlled by the entity from which probable future economic benefits will flow to the entity) of the business must be equal to liabilities and capital (sources of financing the business or the claims of those who finance the resources both internal and external to the entity). The owners and outsiders provide the funds to finance the resources or assets of the business to carry out its business operations.

The claim of the owners on the business is called Capital in case of Sole Proprietor, Partner's Capital in case of Partnership, Shareholders' Fund in case of Company and that of the outsiders' claim is known as liabilities.

Asset side of the balance sheet shows the resources, which the business entity owns (such as Machinery purchased) and controls (such as right to use intellectual property rights such as patent, copyright, trademark). The liabilities side of the balance sheet shows owner's claims and outsider's claims i.e what the organisation owes to owners and outsiders.

Let us understand how Accounting equation works with the help of an example:

Consider the transactions in case of a Sole proprietor Ajay who started business with a capital of Rs.10,00,000.

Assets in the form of cash Rs.10,00,000 comes into the business. Source of finance is the contribution by Ajay (Owner) of Rs. 10,00,000 as capital.

Now the balance sheet after above transaction will appear as follows:

In the Books of Ajay
Balance Sheet as at..........

Liabilities	Amount(in Rs.)	Assets	Amount(in Rs.)
Capital	10,00,000	Cash in hand	10,00,000
	10,00,000		10,00,000

<u>In the above balance sheet, the total assets are equal to the liabilities of the business.</u>

Now if we add the following transactions in the above example:

1. Opened a bank account in HDFC with Rs. 4,50,000.

   Effect of transaction: This transaction increases the cash at bank (assets) and decreases cash (asset) by Rs. 4,50,000.
2. Purchased furniture for Mehta Furnitures for Rs. 80,000, payment made through issue of cheque.

Effect of transaction: This transaction increases furniture (assets) and decreases bank balance (assets) by Rs. 80,000.

3. Purchased Plant and Machinery for the for Rs. 1,50,000 and an Rs. 20,000 in cash is paid to M/s Ajay Verma.

   Analysi of Effect of transaction: This transaction increases plant and machinery (assets) by Rs. 1,50,000, decreases cash by Rs. 20,000 and increases liabilities (M/s Ajay Verma as creditor) by Rs. 1,30,000.

4. Goods purchased from M/s Amit Traders for Rs. 75,000.

   Analysis of Effect of transaction: This transaction increases goods (assets) and increases liabilities (M/s Amit Traders as sundry creditors) by Rs. 75,000.

5. Goods costing Rs. 50,000 sold to Rashmi Enterprises for Rs. 60,000 on credit.

   Analysis of Effect of transaction: This transaction decreases stock of goods (assets) by Rs. 50,000 and increases assets (Rashmi Enterprises as debtors Rs. 60,000) and capital (with the profit of Rs. 10,000)

A summarised statement of above transactions can be presented in the form of a balance sheet as under:

Balance Sheet as at. 20XX

Liabilities	**Amount (in Rs.)** `	**Assets**	**Amount (in Rs.)** `
Sundry Creditors	2,05,000	Cash	5,30,000
Capital	10,10,000	Cash at Bank	3,70,000
		Sundry Debtors	60,000
		Inventory	25,000
		Furniture and Fixtures	80,000
		Plant & Machinery	1,50,000
	12,15,000		**12,15,000**

In terms of accounting equation:

A = L + C

Rs. 12,15,000 = Rs. 2,05,000 + Rs. 10,10,000

2.4 USING DEBIT AND CREDIT

Since every transaction involves both dual give and take aspects. In double entry accounting system, every transaction affects and is recorded in at least two accounts one with with debit and other with credit of equal amount. While recording a transaction, the total amount of debit must equal to the total amount of credit.

In accounting context — debit and credit indicate whether the transactions are recorded on the left hand side or right hand side of the account or ledger. An account typically looks like the letter T. Because of its shape, it is called a **T-account.**

The T format has a left side for recording increases and a right side for recording decreases in the item to determine the final position of each item at the end of the accounting period. For example, in the account of a debtor, all goods sold on credit will appear on the left (debit) side of customer's account depicting increase in the amount of debtors and all payments received from the debtor will be shown on the right side showing decrease in the amount of debtors. The difference between the totals of the debit and credit sides is balance due from or to the customer as the case may be.

In a T account, the left side is known as debit side (abbreviated as Dr.) and the right side is called as credit side (abbreviated as Cr.). To enter amount on the left side of an account means debit the account. To enter amount on the right side means credit the account.

Account Name

(Left Side)	(Right Side)

The summary of effects of above transactions on accounting equation is shown in the following table:

S. No.	Cash	Bank	Assets Debtors	Goods (Stock)	Furniture	Plant and Machinery	Total Assets	Liabilities (Creditors)	Capital	Total of Capital &Liabilities
1.	+10,00,000								+10,00,000	
bal	10,00,000						10,00,000		10,00,000	10,00,000
2.	(4,50,000)	+4,50,000								
bal	5,50,000	4,50,000					10,00,000		10,00,000	10,00,000
3.		(80,000)			+80,000					
bal	5,50,000	3,70,000			80,000		10,00,000		10,00,000	10,00,000
4.	(20,000)					+1,50,000		+1,30,000		
bal	5,30,000	3,70,000			80,000	1,50,000	11,30,000	1,30,000	10,00,000	11,30,000
5.				+75,000			+75,000			
bal	5,30,000	3,70,000		75,000	80,000	1,50,000	12,05,000	1,30,000	10,00,000	12,05,000
6.			+60,000	(50,000)					+10,000	
bal	5,30,000	3,70,000	60,000	25,000	80,000	1,50,000	12,15,000	1,30,000	10,10,000	12,15,000

2.5 RULES OF DEBIT AND CREDIT

All accounts/ ledgers are divided into five categories or masters for the purposes of recording the transactions:

(a) Asset
(b) Liability
(c) Capital
(d) Expenses/Losses, and
(e) Revenues/Gains.

Fundamental rules to be applied to record the effect of transactions and events in these accounts are as follows:

(1) For increase or decrease in Assets and Expenses (Losses):

- (i) "Increase in asset is debited, and decrease in asset is credited."
- (ii) "Increase in expenses/losses is debited, and decrease in expenses/ losses is credited."

(2) For increase or decrease in Liabilities, Capital and Revenues (Gains):

- (i) "Increase in liabilities is credited and decrease in liabilities is debited."
- (ii) "Increase in capital is credited and decrease in capital is debited."
- (iii) "Increase in revenue/gain is credited and decrease in revenue/gain is debited."

The rules for different kinds of accounts have been summarised as follows:

Asset

(Increase)	**(Decrease)**
+	–
Debit	Credit

Expenses

(Increase)	**(Decrease)**
+	–
Debit	Credit

Liabilities

(Decrease) **(Increase)**

-	+
Debit	Credit

Capital

(Decrease)	**(Increase)**
-	–
Debit	Credit

Revenue/Gains

(Decrease)	**(Increase)**
-	+
Debit	Credit

2.6 ASSET AND ITS CLASSIFICATION

Asset: Asset is a resource controlled by the business entity from which probable future economic benefits will flow to the entity by using it for generating future profits. Assets can be classified as Tangible and Intangible, Current and Non Current.

Tangible Assets: are the assets which have some physical existence. They can be seen, touched and felt such as:

- Plant and Machinery
- Furniture and Fittings
- Land and Buildings
- Books and periodicals
- Computers and laptops
- Vehicles

Intangible assets: Assets which have no physical existence (cannot be seen or felt although they help to generate revenue in future) and whose value is determined and restricted by the rights and expected future benefits that their possession confers upon the owner such as:

- Goodwill
- Patents
- Trade-marks
- Copyrights
- Brand Equity
- Industrial Designs
- Geographical Indications
- Other Intellectual Property Rights, etc.

Current Assets – Asset which satisfies any of the following:

i. It is expected to be realised in, or is intended for sale or consumption in the Company's normal Operating Cycle,
ii. It is held primarily for the purpose of being traded ,
iii. It is due to be realised within 12 months after the Reporting Date, or
iv. It is Cash or Cash Equivalent unless it is restricted from being exchanged or used to settle a Liability for at least 12 months after the Reporting Date.

Current Asset includes:

- Inventory (raw material, work in progress, finished goods, stock in trade, consumable supplies)
- Trade recievables (Debtors+Bills Recievables)
- Prepaid expenses
- Short term loans and adavnces
- Current investments
- Cash and cash equivalent

Non-Current Assets – All other Assets which are not classified as Current Assets are Non-Current Assets such as:

- Plant and Machinery
- Furniture and Fittings
- Land and Building
- Patent
- Trade-mark
- Copyright

Non-Current Assets are long term assets held for production of goods, rendering of services, administrative purpose and for earning rent and royalty.

2.7 LIABILITY AND ITS CLASSIFICATION

Liability: It is the present obligation to be settled through outflow of economic resources. In other words it is the amount of money that the business owes to the other parties for example if goods are purchased on credit, the entity will have an obligation to pay to the supplier the price of goods on an agreed future date or when a loan is taken from bank, there is an obligation to pay interest and principal amount at a future specified date.

On the basis of the period of holding, liabilities or obligations can be further classified into Long Term (Non-current liabilities) and Short Term (Current liabilities).

Current Liabilities – A liability which satisfies any of the following:

i. It is expected to be settled in the normal operating cycle,
ii. It is held primarily for the purpose of being traded,
iii. It is due to be settled within 12 months after the reporting date, or
iv. The Company does not have an unconditional right to defer settlement of the liability for at least 12 months after the reporting date.

Note: Terms of a Liability that could, at the option of the counterparty, result in its settlement by the issue of Equity Instruments do not affect its classification.

Non-Current Liabilities – All other liabilities not classified as current liabilities shall be classified as Non-Current Liabilities such as:

- Debentures
- Bonds
- Public deposits
- Long term bank loans
- Inter corporate loans
- Long term loans from other parties

Internal Liability/Equity: It refers to owner's equity, i.e. all the amounts which proprietors, owners, shareholders are entitled such as:

- Capital
- Reserves (general reserve, capital reserve, dividend equalisation reserve, revaluation reserve, etc.)
- Undistributed Profits

2.8 RECIEPTS AND ITS CLASSIFICATION

Receipts: Gross inflow of cash and cash equivalents to the entity from sale of goods, services or business assets. Reciepts can be further classified into:

1. **Revenue Receipts**: Revenue Receipts are those receipts which are received on account of transactions in the normal operation of business such as sale of goods, rendering of services to the customers. These are regular and reccuring in nature.
2. **Capital Receipts**: Capital Receipts are those receipts which are received on account of transactions and events which are not in the ordinary course of business sale of fixed

assets, business undertaking, long term investments. These are non recurring in nature as they do not occur regularly.

2.9 EXPENSES, EXPENDITURE AND ITS CLASSIFICATION

Expenses: It is the part of expenditure whose benefit has been expired during the current accounting period for earning revenue. For example: rent, wages, salaries, interest, repairs, etc. It is shown in the debit side of the profit and loss account or statement of profit and loss.

Expenditure: It is the amount of money spent or liability incurred for acquiring any resources, assets, goods or services for the purpose of using them in business is called expenditure. The expenditure is classified as:

1. **Revenue Expenditure**: If the benefit of expenditure is received/expired within a year, it is called revenue expenditure. For example: rent, interest, salary, etc. It is shown in the debit side of the profit and loss account or statement of profit and loss.
2. **Capital Expenditure**: If benefit out of resources, assets, goods or services acquired from the expenditure is received for more than one accounting period. The part of the capital expenditure whose benefit is not expired till the reporting date is shown as the asset in th balance sheet. For example: purchase of plant and machinery is shown as asset at cost minus depreciation.
3. **Deferred Revenue Expenditure**: There expenditure are revenue in nature but benefit of which is derived over number of years. To comply with the matching concept we have to record these expenditure on initial recognition as Assets and written off in the period of their occurrence and in the subsequent periods. For Example: Huge Advertisement Expenditure.

Intext Questions

1. Which is of the following is considered as Capital?

a. Capital is the equity stake or ownership of the shareholders/Propreitors.
b. Capital is the raw material used in the production production of goods or rendering of services.
c. Capital is the total amount of funds used in the business.
d. Capital is excess of revenue over expenses.

2. How the Accounting equation is expressed?

a. A = L + C , where A = Assets, L = Liability and C = Capital

b. A = I – E, where A = Assets, I = Income and E = Expenses

c. A = L + E, where A = Assets, L = Liability and E = Expenses

d. L = A + C, where L = Liability, A = Assets and C = Capital

3. Why both sides of the balance sheet must be equal?

a. because of money measurement concept
b. because incomes are to be matched with expenses
c. because total of Application of funds is equal to total of Sources of funds
d. because of Going Concern Concept

4. The Mathematical equation explaining relationship between Assets, Liabilities and Capital of a business entity is known as-
(a) Accounting
(b) Accounting Equation
(c) Book – keeping
(d) None of these.

5. If a business enterprise has Liabilities of Rs. 1,52,000 and Assets of Rs. 17,200 respectively. The difference Amount represents -
(a) Debtors
(b) Income
(c) Profit
(d) Capital.

6. The basis for recording business transactions is known as -
(a) Vouchers
(b) Sale invoice
(c) ledger
(d) Trial Balance.

7. Accounts are classified into how many masters of accounting-
(a) Six
(b) Five
(c) Two
(d) Three.

8. Which of the following transactions are recorded cash book of a business enterprise:

a. Only cash transactions
b. Only credit transactions
c. Only cash sales transactions
d. Both cash and credit transactions

9. Which of the following transactions would have no influence over the Capital.

a. Purchase of Machinery on Credit
b. Payment of personal expenses through cash of business.
c. Loss incurred during the year
d. Additional money invested into the business by the owners.

10. Revenue includes:

a. Cash Sales only
b. Credit Sales Only
c. Both Cash and Credit Sales
d. Both Cash and Credit Purchases.

11. The credit balance of Profit in the profit and loss account should be:

a. Subtracted from Liabilities
b. Added in current Assets
c. Subtracted from the Capital
d. Added in the Capital

12. If the capital of a business is Rs. 14,00,000 and liabilities are Rs. 6,00,000, then the assets of the business are

Rs. 8,00,000

Rs. 20,00,000

Rs. 16, 00,000

Rs, 6,00,000

13.Calculate the value of Trade recievables, if Cash at bank is Rs. 96,000, Trade payables Rs. 66,000, Property Plant and Equipment is Rs. 42,000 owner equity Rs. 1,54,000.

Rs. 42,000
Rs. 82, 000
Rs. 30, 000
Rs. 2,20,000

14. If a business borrows a sum of money from bank in the form of loan, then it will:
(a) Decrease the capital
(b) Increase the capital
(c) No effect on capital
(d) None of the above

15. Which of the following account has a debit balance
(a) Creditor's A/c
(b) Capital A/c
(c) Land and Building A/c
(d) Loan A/c

2.10 SUMMARY

Accounting Equation is the mathematical equation that equates Total Assets with sum of Capital. In other words, It shows that the assets and liabilities of a firm are equal.

An accounting equation is based on dual aspect concept which states that every transaction has two aspects.

Accounting equation is expressed as:

Assets= Capital+ Liabilities

or

Capital =Assets – Liabilities

or

Liabilities = Assets – Capital

<u>Ledger are divided into five categories</u>:
(a) Asset
(b) Liability
(c) Capital
(d) Expenses/Losses
(e) Revenues/Gains

<u>Fundamental rules of Accounting:</u>

For Assets/Expenses (Losses):
"Increase in asset is debited, and decrease in asset is credited."
"Increase in expenses/losses is debited, and decrease in expenses/ losses is credited."

For Liabilities and Capital/Revenues (Gains):
"Increase in liabilities is credited and decrease in liabilities is debited."

"Increase in capital is credited and decrease in capital is debited."
"Increase in revenue/gain is credited and decrease in revenue/gain is debited."

Asset: is a resource controlled by the business entity from which probable future economic assets will flow to the entity by using it for generating future profits. Assets can be Tangible and Intangible.

Tangible Assets: are the assets which have some physical existence. They can be seen, touched and felt

Intangible assets: Assets which have no physical existence (cannot be seen or felt although they help to generate revenue in future) and whose value is determined and restricted by the rights and expected future benefits.

Current Assets – Asset which is:

v. expected to be realised in, or is intended for sale or consumption in the Company's normal Operating Cycle,
vi. held primarily for the purpose of being traded ,
vii. to be realised within 12 months after the Reporting Date, or
viii. Cash or Cash Equivalent.

Non-Current Assets – All other Assets which are not classified as Current Assets

Liability: It is the present obligation to be settled through outflow of economic resources.

Current Liabilities – A liability which satisfies any of the following:

v. expected to be settled in the normal operating cycle,
vi. held primarily for the purpose of being traded,
vii. to be settled within 12 months after the reporting date, or
viii. entity does not have an unconditional right to defer settlement of the liability for at least 12 months.

Non-Current Liabilities – All other liabilities not classified as current liabilities

Internal Liability/Equity: It refers to owner's equity, i.e. all the amounts which proprietors, owners, shareholders are entitled

Receipts: Gross inflow of cash and cash equivalents to the entity from sale of goods, services or business assets. Reciepts can be further classified into:

Revenue Receipts: Revenue Receipts are those receipts which are received on account of transactions in the normal operation of business such sale of goods or services to customers.

Capital Receipts: Capital Receipts are those receipts which are received on account of transactions and events which are not in the ordinary course of business sale of fixed assets, business undertaking, long term investments. These are non recurring in nature as they do not occur regularly.

Expenses: It is the part of expenditure whose benefit has been expired during the current accounting period for earning revenue. For example: rent, wages, salaries, interest, repairs, etc.

Revenue Expenditure: Expenditure whose benefit is received/expired within the same accounting period in which they are incurred. For example: rent, interest, salary, etc.

Capital Expenditure: If benefit out of resources, assets, goods or services acquired from the expenditure is received for more than one accounting period. For example: Purchase of plant and machinery is shown as asset at cost minus depreciation.

Deferred Revenue Expenditure: There are the expenditures which are revenue in nature but benefit of which is derived over number of years. To comply with the matching concept we have to record these expenditure on initial recognition as Assets and written off in the period of their occurrence and in the subsequent periods. For Example: Huge Advertisement Expenditure.

2.11 SELF-ASSESSMENT QUESTIONS

1. Explain the Concept of Accounting Equation.
2. Explain the following terms:
   i. Asset
   ii. Liability
   iii. Capital
3. What is the Difference between Capital and Revenue Expenditure.
4. Differentiate between Expense and Expenditure
5. Explain the rules of debit and credit.
6. Explain the following Concepts:
   a) Current liability
   b) Current Asset
   c) Non Current liability
   d) Non Current Asset

2.12 SUGGESTED READINGS

Latest editions of the following text books to be used:

5. Narayanaswamy R. Financial Accounting: A Managerial Perspective. PHI Learning Pvt. Ltd., Delhi

6. Robert N. Anthony, David F. Hawkins, Kenneth A. Merchant. Accountancy- text and cases. McGraw Hill Education (India) Private Limited, New Delhi.
7. Garg CA Kamal, and Sehrawat Neeraj Kumar. Beginner`s Guide to Ind AS & IFRS. Bharat Law House Pvt. Ltd., New Delhi
8. Maheshwari S. N., Maheshwari Sunil K., and Maheshwari Sharad K, An Introduction to Accountancy, Vikas Publishing House Pvt. Ltd.

LESSON 3

RECORDING, CLASSIFYING AND SUMMARISING

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STRUCTURE

3.1 Learning objectives
3.2 Introduction
3.3 Nature of accounts
    3.3.1 Traditional Classification
    3.3.2 Modern Classification
3.4 Rules of Double Entry
    3.4.1 For accounts as per traditional classification
    3.4.2 For accounts as per modern classification
3.5 Recording transactions in Journal/General Journal
    3.5.1 Journal
    3.5.2 Journalizing
    3.5.3 Analysis and Journalising of certain transactions
    3.5.4 General Journal
3.6 Preparation of triple column Cash Book
    3.6.1 What is a Cash Book?
    3.6.2 Kinds of Cash Book
    3.6.3 Triple column Cash Book
3.7 Preparation of ledger accounts
    3.7.1 What is Ledger?
    3.7.2 Utility of ledger
    3.7.3 Posting
    3.7.4 Balancing
3.8 Preparation of trial balance
    3.8.1 Meaning of trial balance
    3.8.2 Features
    3.8.3 Methods of preparing trial balance
3.9 Summary
3.10 Glossary

3.1 LEARNING OBJECTIVES

This lesson would enable students to:

- Understand the nature of Accounts
- Understand the rules of Debit and Credit
- Analyse the transactions and journalise them
- Record transactions in Triple column Cash Book
- Prepare Ledger Accounts
- Prepare Trial Balance

3.2 INTRODUCTION

An account is a systematic record of business transactions related to a particular head at one place. It records the date wise details about the amount of transaction and their effect/direction. According to the concept of double entry or dual aspect concept, every transaction has two effects- a debit and a credit. Accordingly, an account has 2 sides – left is referred to as debit side and right side is referred as credit side. Debit is abbreviated as Dr. and is written on the top left side of the account and credit is abbreviated as Cr. and is written on the top right side of the account. If a transaction is recorded on the debit side, it means account is debited and and if a transaction is recorded on the credit side, it means account is credited. Debit either means an increase or a decrease in the account balance depending on the nature of the account. An account may be related to an asset, a liability, capital, revenue or expense. An account is made in a T form as follows:

Dr. NAME OF ACCOUNT Cr.

Date	Particulars	J.F.	Amount(₹)	Date	Particulars	J.F.	Amount(₹)

3.3 NATURE OF ACCOUNTS

Accounts can be classified as follows:

1. Traditional Classification

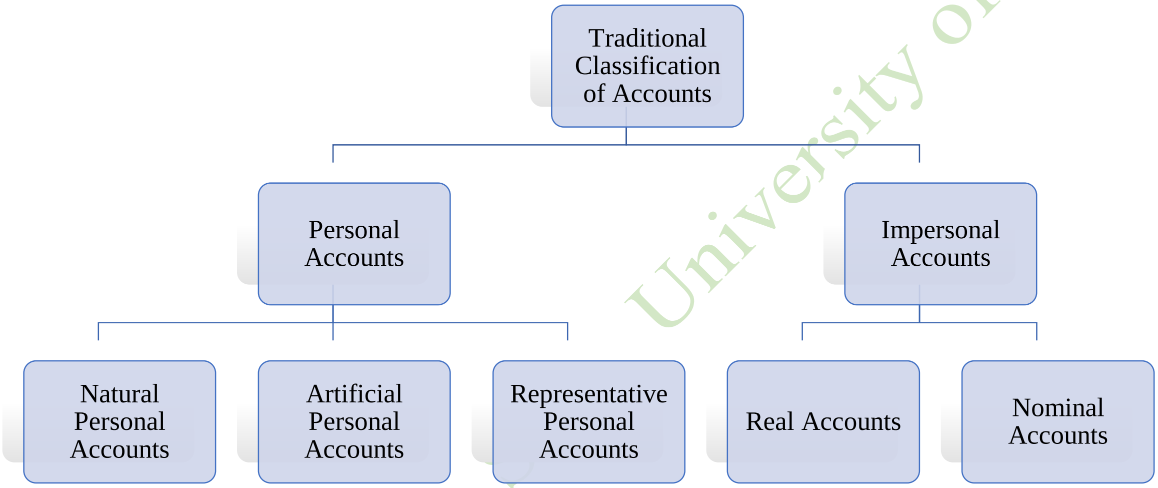
2. Modern classification

3.3.1 Traditional Classification

A complete record of transactions must be kept in the double entry system of bookkeeping. These transactions could be connected to:

• Assets or properties
• Persons

Accounts can be classified into different categories as follows:
Personal accounts are the first category.
Real Accounts make up the second group.
The third group is Nominal Accounts.



Personal accounts
These pertain to people like clients (debtors) and suppliers of goods (creditors), who may be private individuals, businesses, or corporations. These could symbolise the proprietor's capital, drawings, or other people, or they may be related to it. These can also be categorised as follows:

a) A Natural Personal Account is one that is connected to a living, natural person. In other words, those who are God's creatures. Examples include Ramesh A/c being the natural personal account if Ramesh is the company's creditor and Suresh A/c being the firm's debtor.

b) Artificial Personal Accounts are any accounts held by businesses, partnerships, banks, financial institutions, or other non-living artificial persons, i.e., entities recognised as persons by law. Examples include the accounts of Videocon Industries, ABC Co., Reliance Industries, banks, etc.

c) Representative Personal Accounts are accounts that stand in for an individual or a group of individuals. Although the costs or revenue accounts are nominal accounts, they are categorised as representative personal accounts when they are payable to or recoverable from a specific individual on a specific date. For instance, Outstanding Rent A/c will be a representative personal account since it is representing the landlord to whom the rent is owed . The person's identity as an individual is known, yet they are collectively represented through a representative personal account. Even though the identity of the individual employee and the amount that has to be paid to each of them is known, let's say that the wages that need to be paid to the employees are due. We would write it as Outstanding Wages A/c. Other examples include rent that must be paid but not yet paid (outstanding rent), prepaid insurance, advance revenue, and accrued interest. Accounts for capital and withdrawals are also representative personal accounts because they reflect the owner who put money in the company and withdraws it.

Real accounts

These are the firm's possessions or assets. Each asset is maintained in a separate account. They can be categorised according to their physical existence as follows:

a) Assets with a physical existence—those that can be seen, touched, or felt—are referred to be Tangible Real Accounts. Examples include tools, money, real estate, buildings, furniture, etc.

b) Assets that cannot be seen, touched, or felt yet have monetary worth associated to them include goodwill, trademarks, patents, copyrights, etc. they are referred to as Intangible Real Account.

Nominal accounts

Nominal accounts are those that reflect gains, revenues, expenditures, and losses. For each category of expense (or gain), separate accounts are kept. These come in two varieties:

a) Accounts for expenses, such as salaries, wages, rent, commissions, losses due to fire, interest payments, bad debts, and discounts permitted

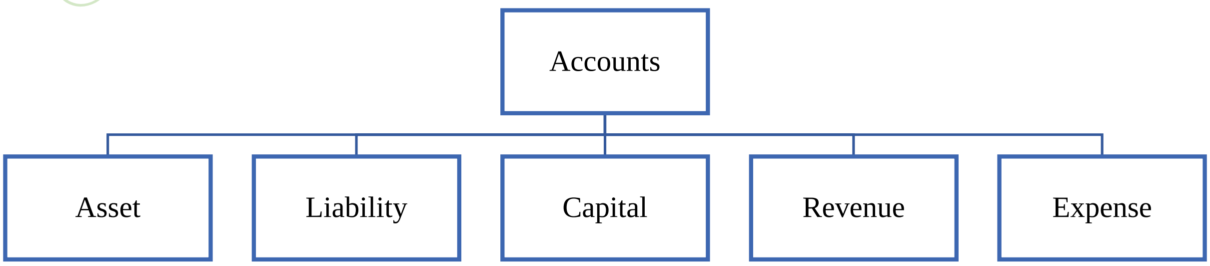
b) Revenue accounts, including money received and income received in the form of rent, dividends, and commissions.

The nominal accounts are closed at the conclusion of the financial year by transferring their balance to the Trading & P&L A/c. Their balance is not carried over to the following financial year, in contrast to real and personal accounts.

NOTE- If a prefix or suffix (like outstanding or prepaid or accrued or received in advance) is added to the nominal account, it becomes a personal account.

3.3.2 Modern Classification

Under modern classification, accounts are classified as follows:



1. Asset Account - Accounts linked to an enterprise's financial resources, i.e., its assets and real estate. They can be tangible (plants, machinery, furniture, buildings) or intangible (goodwill, patents, trademarks).
2. Liability accounts: These accounts show the sums that an enterprise owes to other parties. Basically comprises creditor accounts, unpaid bills, lenders, etc.
3. Capital Account - This account shows the money an entrepreneur has put into his business. Both capital and drawings account are included in this.
4. Revenue Account - Income and gains are shown in these accounts. Examples include sales account, rent account, discount account, commission account, interest, bad debts recovered, etc.
5. Expense Account - Losses or expenses incurred while operating the business are reflected in the expenses account. Wages, salaries, rent, commission, etc. are some examples.

IN-TEXT QUESTIONS

1. Classify the debtors account as per
   i. Traditional approach
   ii. Modern approach
2. Bank Account is a real account or a personal account?
3. Is capital account a representative personal account?

3.4 RULES OF DOUBLE ENTRY

As we follow the double entry system, every transaction has two aspects – a debit and a credit. In order to understand as to which accounts are to be debited and which are to be credited, we follow the rules of debit and credit.

The "Rules of Double Entry" or "Rules of Debit and Credit" are the guidelines that determine which account should be debited and which should be credited.

The rules of debit and credit are as follows:

3.4.1 For accounts as per traditional classification

These are known as the "Golden Rules of Accounting".
1. For personal accounts, debit the receiver and credit the giver
When a supplier of products provides a benefit to a business (by providing items on credit), the creditors account is credited because the rule states that credit should be given to the giver. Conversely, when a person receives a benefit, such as a debtor of the business, the debtors account is debited.

2. For Real Accounts, debit what comes in and credit what goes out
The assets that the company has are represented by real accounts. According to the norm, the Furniture Account is debited if an asset enters the business, such as newly purchased furniture. If an asset leaves the business, like in the case of the furniture purchase, cash is paid out and the cash account is credited.

3.For nominal accounts, debit all expenses and losses and credit all incomes and gains.
The rule states that when an expenditure is incurred, such as paying rent or a salary, these expense accounts are debited, and when an income or gain is realised, such as from sales, a discount, a gain from the sale of an asset, etc., these revenue accounts are credited.

3.4.2 For accounts as per traditional classification

Type of account	When to debit	When to credit
Asset	Increase	Decrease
Liability	Decrease	Increase
Capital	Decrease	Increase
Revenue	Decrease	Increase
Expense	Increase	Decrease

These rules are elaborated as follows:

1) Asset accounts are credited whenever a transaction results in a decrease in the assets balance and debited whenever the assets balance rises. For instance, when a company buys machinery, the asset account is debited since the asset balance increases. When equipment is sold, the equipment account is credited.

2) Liability accounts - A liability account is credited when a business transaction creates a liability, and it is debited when the liability is paid off or the balance of the liability lowers for some other reason. For instance, when things are purchased on credit, a liability is created, and the creditor account is credited. The creditor account will be debited after the debt is paid off to the creditor.

3) Capital accounts — When the business's owner invests money, the capital account is credited. When a transaction occurs that results in a reduction in capital account, it is credited.

4) Revenue accounts: A rise in revenue accounts, such as sales, is credited. Any decline in revenue results in a debit.

5) Expense accounts - Any increase in expenses is debited and any decrease is credited.

Notes:

- Depending on the type of account, a debit could result in either an increase or a reduction. Debit, for instance, denotes a drop for liabilities but an increase for assets. The nature of the accounts will determine whether a credit represents an increase or decrease. For instance, credit indicates a gain in capital but a decline in assets.
- Credit is not always advantageous, and debit is not always disadvantageous. For instance, debiting an asset is advantageous, but debiting a revenue account is bad because it results in lower revenue. Similar to this, it is advantageous to credit the revenue account but not the asset account. Debit and credit cannot be equated with positive and negative outcomes respectively.

Let us understand with the help of an example.
Classify the following accounts as per

a) Traditional approach
b) Modern approach

i. Bank A/c
ii. Bank Overdraft A/c
iii. Interest Paid A/c
iv. Capital A/c
v. Plant and Machinery A/c
vi. Goodwill A/c
vii. Sales A/c
viii. Outstanding Salaries A/c
ix. Discount Received A/c
x. Prepaid Rent A/c

Solution:

Name of account	**Nature of account (as per traditional approach)**	**Nature of account (as per modern approach)**
Bank A/c	Personal	Asset
Bank overdraft A/c	Personal	Liability
Interest paid A/c	Nominal	Expense
Capital A/c	Personal	Capital
Plant and Machinery A/c	Real	Asset

Goodwill A/c	Real	Asset
Sales A/c	Nominal	Revenue
Outstanding salaries A/c	Personal	Liability
Discount received A/c	Nominal	Revenue
Prepaid Rent A/c	Personal	Asset

IN-TEXT QUESTIONS

4. Rules of debit and credit are same for capital and liability. Why?
6. Anil received an advance for sale of tables by him. How should this be treated?
7. What does a credit in expense account signify?

3.5 RECORDING TRANSACTIONS IN JOURNAL/GENERAL JOURNAL

3.5.1 Journal

Journal is a book which records daily business transactions in a chronological order i.e. the sequence in which they occur.

As per the accounting process, any transaction is recorded first in the journal from the vouchers. That is why the Journal is known as the 'Book of Original Entry' or 'Book of Prime Entry'. The transactions are recorded in the chronological order.

A Journal is made as follows:

JOURNAL

Date	Particulars	L.F	Debit (₹)	Credit(₹)

3.5.2 Journalising

Journalizing is the process of entering financial transactions using the debit and credit rules in a journal.

The accounts that the transaction affects are identified after it is entered. The type of account is then determined. The transaction may effect accounts of the same kind or accounts of other sorts. The rules of debit and credit are then applied based on the kind of accounts to determine which account should be debited and which account should be credited.
For example, payment of insurance premium ₹20,000
Step 1: Identify the accounts involved.
Here, the accounts involved are Insurance A/c and Cash A/c.
Step 2: Identify the nature of accounts involved.
Insurance is nominal account and cash is real account.
Step 3: Apply the rule of debit and credit.
Insurance is a nominal account. Rule for nominal account is "Debit all expenses and credit all incomes". Since insurance is an expense, it will be debited.
Cash is real account and rule for real account is "Debit what come in, Credit what goes out". Cash is going out, so Cash A/c will be credited.
The journal entry will be:

Insurance A/c	Dr.	₹20,000	
To Cash A/c			₹20,000

3.5.3 Analysis and journalizing of certain transactions

Let us understand this with an example.
Analyze the following transactions as per Traditional Approach. And state which account will be debited and credited in each transaction.

i. Vaibhavi started a business by investing ₹5,00,000
ii. Purchase of office furniture worth ₹25,000
iii. Purchased goods for cash ₹ 50,000
iv. Sold goods to Rajeev for ₹40,000
v. Paid wages ₹25,000
vi. Received interest on investment ₹10,000

<u>Solution:</u>

ANALYSIS OF TRANSACTIONS

Transactions	Accounts involved	Nature of account	Rule to be applied	Debit(₹)	Credit(₹)
Vaibhavi started a business by investing ₹5,00,000 in cash	Cash Capital	Real Personal	Debit what comes in Credit the giver (giver is the proprietor in this case and capital account is representing the owner)	5,00,000	 5,00,000

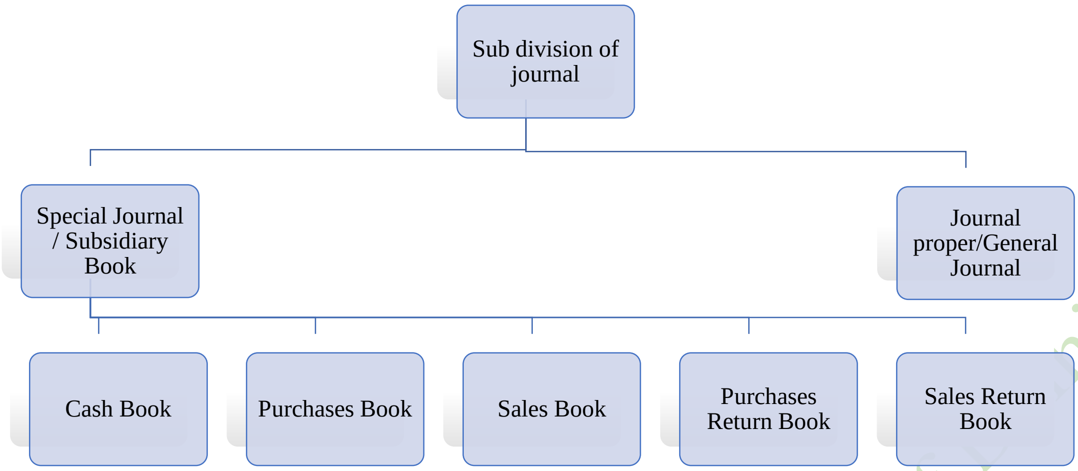
Purchase of office furniture worth ₹25,000	Furniture Cash	Real Real	Debit what comes in Credit what goes out	25,000	25,000
Purchased goods for cash ₹ 50,000	Purchases Cash	Nominal Real	Debit all expenses Credit what goes out	50,000	50,000
Sold goods to Rajeev for ₹40,000	Rajeev Sales	Personal Nominal	Debit the receiver Credit incomes	40,000	40,000
Paid wages ₹25,000	Wages Cash	Nominal Real	Debit expenses/loss Credit what goes out	25,000	25,000
Received interest on investment ₹10,000	Cash Interest	Real Nominal	Debit what comes in Credit incomes	10,000	10,000

Readers are advised to analyse the above transactions using modern approach. The results will be the same.

3.5.4 General Journal

If the organization is small, all entries—including those for cash sales, cash purchases, credit sales, credit purchases, and other types of transactions—will be made directly in the journal.

But there are a lot more transactions when it comes to big commercial concerns. It will be lengthy and heavy if all of the cash and non-monetary transactions are recorded in one journal. As a result, the Journal is divided into special journals called "Subsidiary Books," "Day Books," or "Special Journals" rather than recording all transactions in a single book. For instance, the sale of goods on credit (items that a firm deals in) is noted in the sales book, and the purchase of goods on credit is noted in the purchases book. Similar to this, various customised journals are kept to track particular types of transactions in one location. By doing this, the issue of a single journal being too large is avoided.
Additionally, because all transactions of the same kind are recorded in one location, it offers the advantages of specialisation. JOURNAL PROPER contains the remaining transactions that were unable to be documented in any of the subsidiary books.



- Cash Book

A record of all monetary/cash transactions (receipt or payment).

- Purchases Book

lists of products purchased on credit. Does not keep track of purchases of fixed assets or goods in cash.

- Sales Record

Records goods' sales. Does not track sales of products besides those the business deals in and cash sales of goods.

- Purchases Return Book

Records goods that have been returned after being bought on credit. Does not keep track of returns of goods purchased with cash or returns of anything besides goods like assets.

- Sales Return Book

Returns of goods sold on credit are recorded. D oes not keep track of returned non-goods or goods purchased with cash.

- General Journal

Records transactions which could not be recorded in any of the subsidiary books mentioned above.

Some concerns also maintain

- Bills Receivable Book
- Bills Payable Book

The transactions that are not recorded in any of the aforementioned subsidiary books are then documented in the General Journal. The transactions are listed in the order they occurred. Furthermore, because such transactions take place so infrequently, it is unnecessary to keep a separate journal just for them. The term "general journal" also refers to "journal proper."

The transactions recorded in General Journal/ Journal Proper may be of the following types:

- Opening entry
- Closing entry
- Adjustment entry
- Rectification entries
- Miscellaneous entries

Opening entry

"The journal entry passed to record the opening balances is known as Opening Entry."

When a new accounting year begins for an ongoing business (an already-existing business), an opening entry is first made in the journal/journal proper. The closing balances of the accounts from the prior year are brought forward in the current year by making this entry (in the form of opening balances). The opening entry for the current period is based on the Balance Sheet created at the conclusion of the prior year.

Keep in mind that only the balances of assets, liabilities, and capital accounts (or the traditional classification of real and personal accounts) are moved forward to the current year by opening entry. Since expense and revenue accounts (also known as nominal accounts) are closed annually by moving their balance to the statement of profit and loss, they are not permitted to be carried forward. As a result, there is no balance in these nominal(revenue and expense) accounts to carry over to the following year.
All of the assets are individually debited in the opening entry, while all of the liabilities are separately credited together with the capital account.

The opening entry is as follows:
Sundry Assets A/c Dr.
To Sundry Liabilities A/c
To Capital A/c

In case the amount of capital is not known, it can be found out by using the Accounting Equation as follows:
Assets = Liabilities + Capital or
Capital = Assets – Liabilities
Once the opening journal entry is passed, the journal entries for other transactions entered into by the business during the current accounting year are passed.

The opening entry is shown in ledger accounts by writing "To balance b/d" on the debit side of assets account and writing "By balance b/d" on the credit side of liabilities and capital account.

Elaborating with the help of an example,
Mohan has been running a cloth business. The ledger balances in his books on 31 March, 2022 are as follows:

Debtors 50,000
Creditors 70,000
Computer 10,00,000
Inventory 1,00,000
Cash 80,000
Bank overdraft 35,000
What will be the opening journal entry passed in Mohan's accounts book on 1st April, 2022?

Since the amount of capital is not known, we will calculate it using accounting equation.
Capital = Assets – Liabilities
Total Assets = Debtors + Computer + Inventory + Cash = 50,000 + 10,00,000 + 1,00,000 + 80,000 = 12,30,000
Total Liabilities = Creditors + Bank Overdraft = 70,000 + 35,000 = 1,05,000
Capital = Assets –Liabilities = 12,30,000 – 1,05,000 = 11,25,000

Opening entry will be as follows:

JOURNAL PROPER

Date	Particulars		L.F.	Dr. (₹)	Cr.(₹)
2022					
April 1	Cash A/c	Dr.		50,000	
	Computer A/c	Dr.		10,00,000	
	Inventory A/c	Dr.		1,00,000	
	Debtors A/c	Dr.		50,000	
	To Creditors A/c				70,000
	To Bank Overdraft A/c				35,000
	To Capital A/c				11,25,000

Note – Posting of the above entry to the ledger will involve writing "To balance b/d" on the debit side of the asset accounts and writing "By balance b/d" on the credit side of liabilities accounts and capital account.
Apart from being a special journal (or a subsidiary book), Cash Book also serves as the Cash Account, so opening balance of cash will be shown on debit side of Cash Book in cash column as "To balance b/d" and bank overdraft will be shown as "By balance c/d" on the credit side of Bank column in case of double or triple column cash book.

In the case of commencement of a new business, the opening entry is passed with the amount of capital introduced in the form of cash or other assets. If only cash is brought in by the owner, a direct posting will be made in the Cash Book. But if capital is brought in the form of cash and other assets, then opening entry will be made in the Journal Proper by debiting concerned assets accounts and crediting the capital account.

Closing entries

"Entries passed for closing the nominal accounts by transferring their balance to Profit and loss account are known as closing entries."

The accounting year ends with the passing of closing entries. These are required for the creation of final accounts, particularly the trading and profit and loss account,. The revenue and expense accounts—or nominal accounts under the classical classification—are closed in the closing entries by transferring their balance to the Trading and Profit and Loss Account. Examples include closing a rent account by transferring the balance to the P&L account and closing a sales account by transferring the balance to the Trading Account.

The expense accounts have debit balances, as is common knowledge. Thus, crediting the expenses account is necessary before closing them. Additionally, the P&L account is being debited because we are terminating these accounts by moving their balances to the Trading and P&L Account (showing the expenses incurred). There is a credit balance in the revenue accounts. To close them, you must debit these revenue accounts and crdit the Trading and P and L Account.

The following closing entries are passed:

Trading and P&L A/c Dr.
To Expenses A/c

Revenue A/c Dr.
To Trading and P&L A/c

Once these closing entries are passed, no balance remains in the nominal accounts.
Let us elucidate with an example for better understanding.

Following information is given in respect of the business M/s Suman Ltd.
Opening Stock ₹40,000; Wages ₹27,000; Purchases ₹40,000; Sales ₹1,00,000; Rent Received ₹7,000 ; Insurance ₹3,000; Discount Allowed ₹2,500 ; Closing Stock ₹70,000; Interest Received 3,000; Electricity 1,500
Pass the closing journal entries.

JOURNAL PROPER

Date	Particulars	L.F.	Dr. (₹)	Cr.(₹)
2022 March 31	Trading A/c Dr.		1,07,000	
	To Purchases A/c			40,000
	To Wages A/c			27,000
	To Opening Stock A/c			40,000
	Sales A/c		1,00,000	
	Closing Stock A/c		70,000	
	To Trading A/c			1,70,000

	Trading A/c (1,70,000 – 1,07,000) To P&L A/c	63,000	 63,000
	P&L A/c To Insurance A/c To Discount Allowed A/c To Electricity A/c	7,000	 3,000 2,500 1,500
	Rent received A/c Interest received A/c To P&L A/c	7,000 3,000	 10,000
	P&L A/c To Capital A/c (Net profit transferred to P&L A/c)	66,000	 66,000

Rectification entries

While entering transactions into the journal or posting them to the ledger, mistakes may be made. These mistakes/errors can be categorised as follows:

- Errors of commission,
- Omission,
- Principle, and
- Compensating errors.

To rectify is to make corrections. Rectification entries are passed to correct such errors made when recording transactions in the books of accounts.

Adjustment entries

To guarantee that financial statements reflect honest and fair business performance and position, adjustment entries are passed at the conclusion of the accounting year to make adjustments in the amounts of various accounts. The following entries are passed:

- Outstanding Expenses

Expenses A/c Dr.
To Outstanding Expense A/c

Unpaid expenses are those that belong to the present time and should have been paid now but weren't, such as wages, rent, etc. They are outstanding as a result. Due to the fact that Outstanding Expense is a liability and relates to the current period, it is credited and regardless of whether it is paid or not, it counts as an expense for currentperiod. (This is due to the accrual method of accounting that we utilise.) The expense account is therefore debited. (This suggests that it is an expense for the present period.)

- Prepaid Expenses

Prepaid Expenses A/C
To Expenses A/c
Prepaid expenses are an asset since they are paid for in advance (in the current year), but the benefits will be realised later (in next year or coming years). It gets debited since it is an asset. The expense account had to be debited at the time the payment for the expense was made. The expense account will be credited to the extent of the prepaid expense showing that such amount of prepaid expense is deducted from expense account so that it can be shown in next year's P&L Account. All of this is done because, since the amount of prepaid expense is not related to the current year and P&L Account shows items relating to the current year.

- Accrued Income

Accrued Income A/c Dr.
To Income A/c
Similar logic as for outstanding expense will apply.

- Income Received In Advance

Income A/c Dr.
To Income Received In Advance A/c
Logic similar to prepaid expense will apply.

- Depreciation

Depreciation A/c Dr.
To Fixed Asset A/c
Since depreciation is an expense, it is debited. Fixed assets have a debit balance and since depreciation reduces their value, Fixed Assets Account is credited.

- Interest on Capital

Interest on Capital A/c Dr.
To Capital A/c
Funds invested by the proprietor in his business is known as capital. Interest is allowed on such capital. Such interest is an income for the proprietor but an expense for the business. So, Interest on Capital A/c is debited. The amount of interest on capital is credited to the capital account as it increases the capital balance belonging to the proprietor.

Miscellaneous entries
Certain types of transactions are there which are left out and not recorded in specialized journals as they do not have separate subsidiary book for them. So such transactions are also recorded in Journal proper. Such transactions and their entries are discussed below.

- Credit purchase of fixed assets

If fixed assets like machinery, furniture, etc. are bought on cash basis, the entry will be made directly in cash book. But if they are purchased on credit, then such entry cannot be made in Cash Book and also cannot be made in purchase book as purchase book records credit purchases of goods in which the business deals. Hence, this transaction will be recorded in Journal Proper. The entry will be as follows:

Fixed Asset A/c Dr.
To Vendor A/c
(Fixed Asset purchased on credit)

- Insolvency of a customer

If goods were sold to a customer on credit basis and the customer become insolvent before receipt of payment from him, the entry will be made in Journal proper as follows:

Bad Debts A/c Dr.
To Debtor A/c
(Bad debts written off)

Since the amount of debt owed by the customer to the firm has become irrecoverable (i.e. bad), it is a loss for the firm and losses are debited. And since debtor can't pay now, his account is closed by making a credit.

- Occurrence of accidents like loss of goods or fixed assets by fire or theft

The following entries are passed:

(a) On occurrence of loss
Loss by theft or fire A/c Dr. (With full amount of loss incurred)
To Purchases A/c or Fixed Assets A/c *

*Either of the two will appear. If goods are destroyed then purchases account will be credited indicating reduction of stock of goods. If the fixed asset is destroyed, then fixed asset account will be credited indicating reduction in balance of fixed asset (since fixed assets have a debit balance, a decrease in them will be denoted by a credit).

(b) If goods or assets were insured and insurance company accepts the claim
Insurance Company A/c Dr. (With the amount of loss accepted as claim)
Profit and Loss A/c Dr. (With the amount of loss not accepted as claim)
To Loss by theft or fire A/c

(c) On receipt of claim money from the insurance company
Bank A/c Dr. (Amount of claim received)

To Insurance Company A/c

- Capital brought in kind by the business owner

If capital is brought in by the proprietor in the form of cash, this will be recorded directly in the cash book. But in case capital is brought in kind, then it is recorded in Journal Proper. Entry is made as follows:

Assets A/c Dr.
To Capital A/c

- Discount allowed or received (if triple column cash book is not maintained)

If, in order to get payment from a debtor, some cash discount is allowed to him/her, then the following entry will be made:

Discount Allowed A/c Dr. (With the amount of discount allowed/ given to debtor)
To Debtor /c

In a similar manner, when payment is made to a creditor and some discount is received from him/her, the following entry will be passed:

Creditor A/c Dr. (With the amount of discount received)
To Discount Received A/c

- Goods distributed as free samples

The entry will be as follows:

Advertisement Expense A/c or Samples A/c Dr.
To Purchases A/c

IN-TEXT QUESTIONS

8. What will be the journal entry for bad debts recovered?
9. Nominal accounts are never balanced but totalled and transferred to P and L account. True or False?

3.6 RECORDING TRANSACTIONS IN TRIPLE COLUMN CASH BOOK

3.6.1 What is a cash book?

In any business, a myriad of cash transactions are entered into. Such transactions may either relate to receipt of cash or payment of cash. Cash sales, receipt from debtors , sale of assets for cash, receipt of investment income are some examples of transactions involving receipt of cash. Cash purchases, payment to creditors, payment of expenses like rent, wages, insurance, etc. are some examples of transactions involving payment of cash. All these transactions involving cash are recorded in the cash book. Left side records the receipts of cash and credit side records the payment of cash.

Cash book is a book of original entry (Journal) as well a book of final entry (ledger). Since the transactions in the cash book are recorded directly from the source documents, it is a book of original entry. It performs the function of a ledger as well because it is prepared just like a cash account in T-format with debit side showing receipts of cash and credit side depicting payments of cash. This eliminates the need to prepare separate cash account in the ledger of the business. But the ledger account for the other aspects of the transaction involving cash needs to be prepared. That means if cash is received then debtors account still need to be prepared in ledger and if cash is paid to creditor, then creditor account still needs to be made in the ledger. In conclusion, the cash book is a dual purpose book. It serves as a journal as well as a ledger.

3.6.2 Kinds of cash book

- <u>Single column cash book</u> – There is only a single column for amount on each side (debit and credit) to record cash transactions. Payment or receipt in form of cheque (bank) is NOT recorded here.
- <u>Double column cash book</u> – On the debit and credit sides, there are two amount columns: one for recording bank transactions and the other for recording cash transactions. This book DOES NOT include any information about discounts given to customers or received by suppliers.
- <u>Triple column cash book</u> – There are three columns for amount on each side of the cash book- one for recording cash transactions, the second column for bank transactions and the third one for discount.

In the present text, we are going to discuss triple column cash book which is also known as three column cash book.

3.6.3 Triple Column Cash Book

As the name suggests, a triple column cash book consists of triple columns i.e. three columns on both the sides (debit and credit).
Column I is for Cash
Column II is for Bank
Column III is for Discount

A Triple Column Cash Book is made as follows:

Dr. Triple Column Cash Book

Date	Particulars	L.F.	Cash	Bank	Discount	Date	Particulars	L.F.	Cash	Bank	Discount

<u>The debit side of the triple column cash book is the receipts side or discount allowed side</u>

Cash and bank columns in the cash book represent the cash and bank accounts respectively. Since cash and bank are assets (as per modern classification) and an increase in assets in debited ,whenever any transaction involving receipt of money from a debtor will occur, it will be recorded on the debit side of triple column cash book. If any discount is allowed to a debtor, that is also recorded on the debit side (since discount allowed is an expense and expenses are debited). Cash is entered on the debit side (column pertaining to cash) if payment is received in cash. If payment is received by cheque, the amount on the debit side only but in the column pertaining to bank. Any allowed discount is also shown in the discount column on the debit side.

<u>The credit side of the cash book is the payments side or discount received side</u>

As stated above, cash and bank columns in cash book represent the cash and bank account respectively. Both cash and bank are assets (as per modern classification) and a decrease in asset is credited. So, whenever any transaction involving payment of money to the creditors of the firm will occur, it will be recorded on the right (credit) side. In case of any discount received from a creditor, it is also recorded on the credit side in the discount column (since discount received is an income and incomes are credited). If the payment is made in cash, the amount paid is recorded on the credit side in the column pertaining to cash . If a cheque is used to make the payment, the amount is noted on the credit side in the column pertaining to bank. Any discount that the creditor grants to the business is likewise noted on the credit side in the column named as 'Discount'..

<u>Totaling and balancing triple column cash book</u>

Once all the transactions are recorded in the cash book following the procedure discussed above, all the three columns of the cash book are totaled. The debit and credit side of cash and bank columns are totaled and balance is found out.

For the cash column, the debit side will always be either greater than the credit side or equal to the credit side. This means that there will be a debit balance of cash. This debit balance is shown on the credit side (the side having the lesser total) by writing "By balance c/d".

For the bank column, there can be a debit balance or a credit balance. Whenever the debit side exceeds the credit side, there will be a debit balance of bank which will be recorded on the credit side (the side having the lesser total) by writing "To balance c/d". If he credit side is greater than the debt side, there will be a credit balance, which will be recorded on the debit side (the side with a lesser total) by writing “To balance c/d”. The credit balance in the bank column means there is existence of bank overdraft.

The discount column on the debit and credit side are always totaled but never balanced. The total discount column on the debit side represents the overall discount given to debtors by the business. The total of the discount column on the cash book's credit side represents the entire discount that the company has received from its creditors.

Posting from the credit side of the cash book is made in the respective ledger accounts’ debit side. The name of the account appearing in the ‘Particulars’ column on the credit side of the cash book is debited by the amount of cash/cheque paid and the amount of discount received, if any. The total of discount received is shown on the credit side of the Discount Received A/c by writing “By Total Discount received”.

Posting from the debit side of the cash book is made on the credit side of the respective ledger accounts. The account appearing in the ‘Particulars’ column on the debit side of the cash book is credited by the amount of cash/cheque received and amount of discount allowed appearing against its name in the cash book. On the debit side of the Discount Allowed A/c, write "To Total Discount Allowed" to display the total amount of discount allowed (on the debit side of the cash book).

Contra entries: Triple column cash book can involve contra entries or cross entries. These are those entries which involve transfer of money from cash to bank (depositing cash in bank account) or bank to cash (withdrawing cash from bank from office use).Such transactions are recorded on both the sides of the cash book. If on one side of the cash book, it is recorded in cash column, then on the other side it will be recorded in the bank column and vice versa. This is because such entries affect both – the cash account and the bank account simultaneously. Such entries are denoted by writing the letter ‘C’ in the Ledger Folio (L.F.) column of the cash book. Writing ‘C’ indicates that the double entry aspect of such a transaction is complete. As a result, such entries are not posted to the ledger accounts as it involves cash and bank accounts which are represented by the cash book itself. Cash book being both - a book of original entry and a ledger account; such entries are not posted in ledger.

Let us understand this with the help of an **example.**
Cash deposited into bank ₹10,000.
As a result of the above transaction, the bank balance will increase by ₹10,000 and cash balance will decrease by ₹10,000 simultaneously. On the debit side of the cash book, the increase in bank will be noted by putting "To Cash A/c" in the Particulars column and "10,000" in the bank column. By entering "By Bank A/c" in the Particulars field and "10,000" in the cash column, the decrease in cash will be noted on the credit side of the cash book.The symbol ‘C’ will be written in the ledger folio column on both the sides.
It will be shown as follows:

Triple Column Cash Book

Date	Particulars	L.F.	Cash	Bank	Discount	Date	Particulars	L.F.	Cash	Bank	Discount
	To Cash A/c	C		10,000			By Bank A/c	C	10,000		

IN-TEXT QUESTIONS

9. Preparation of cash book eliminates the need for preparation of a cash A/c. True or false?
10. Can the bank column in cash book have a credit balance?
11. Cash deposited into bank ₹10,000. Such an entry in cash book is called?

3.7 PREPARATION OF LEDGER ACCOUNTS

3.7.1 What is ledger?

"Ledger is a book which contains, in a summarized and classified form, a permanent record of all transactions."

Ledger is a book containing a record of all transactions relating to a particular account at one place. A ledger consists of different accounts like assets accounts, liabilities accounts, revenue accounts, expense accounts and capital account. It is called as Book of Final Entry or Book of Secondary Entry as after recording transactions in the journal; they must ultimately have to be posted in the ledger. Ledger is also called the Principal Book of Accounts. This is because it helps in preparation of trial balance, which in turn helps in preparation of final accounts.

Specimen of a ledger account:

Dr. NAME OF ACCOUNT Cr.

Date	Particulars	J.F.	Amount(₹)	Date	Particulars	J.F.	Amount(₹)

3.7.2 Utility of ledger

All the transactions recorded in the journal are ultimately posted in the ledger. Journal provides a chronological record of transactions but do not show the net effect of transactions on a particular account. This effect on a particular account can be shown by ledger. Ledger can show us the balance of a particular account, how much amount is due from debtors, how much is due to creditors, etc. Let us understand this with the help of an example.

Say, Mahesh is a customer of M/S Savita Devi and Sons. Goods are sold by the firm to him on credit and fresh purchases can be made by Mahesh from the firm even without completely clearing his old balance. Now if we want to know the amount owed by Mahesh to the firm at a particular date, we won't be able to determine it without preparing Mahesh A/c in the ledger.

This is because even though journal will show the entries for sales made to Mahesh and amount received from him, but they will be scattered throughout the journal and hence journal will not be able to provide ready information as to whether any amount is owed by Mahesh to the firm or not and if yes then how much. Such information can be made readily and easily available if Mahesh A/c is opened in the ledger. Ledger helps to know the position of a business account wise in a particular period.

3.7.3 Posting

It is the process of transferring journal entries to the corresponding ledger accounts. There must be a corresponding account in the ledger book for each account in the general journal.

Procedure for posting

In a journal entry, posting is carried out on the debit side of the account for the account that is debited and on the credit side for the account that is credited.

Take up one journal entry. Identify the accounts which are debited and credited. After this follow the below mentioned procedure:

Posting of account debited in journal

1) Once the account which is debited is identified, find the T shape account with same name in the ledger.
2) On the debit side of the account, enter the date in the "Date" column.
3) Name of the account that has been credited in the specific journal entry is written on the debit side of the account in the "Particulars" column by using the phrase "To (account which is credited)".
4) On the debit side of the account in the J.F. column, note the page number of the journal where the entry was made. To complete cross-referencing, record the page number of the ledger on which the account is made in the journal's L.F. column at the same time.Enter the amount in the 'Amount' column on the debit side.

Posting of account credited in journal

1) Once the account which is credited is identified, find the T shape account with same name in the ledger.
2) Enter the transaction date in the "Date" column, on the account's credit side,.
3) Name of the account that has been debited in the specific journal entry is written on the credit side in the "Particulars" column of the account by writing "By (account which is debited)".
4) On the credit side of the account in the J.F. column, note the page number of the journal on which the entry was made.
5) On the credit side, enter the sum in the "Amount" field..

Let us illustrate this with an example.

A firm purchased furniture for ₹10,000 from Manish Furniture House on 1st April, 2022.

The journal entry for this is:

Furniture A/c	Dr.	10,000
To Manish Furniture House A/c		

The accounts affected by this transaction are: Furniture A/c and Manish Furniture House A/c.

Firstly, let us post the debit side of the journal entry.
Furniture account is debited in the journal entry. So furniture A/c is opened in ledger book.
On the debit side of Furniture A/c, the date is written in 'Date' column as "April 1, 2022".
In 'Particulars' column, on the debit side, is written the name of the account which is credited in the journal entry, i.e., "To Manish Furniture House A/c".
In J.F. column, the Journal page number would have been written had it been given in the question.
Then the amount of ₹10,000 is written in the 'Amount' column on the debit side of Furniture A/c.
Similarly is done for posting the credit side of the journal entry by opening Manish Furniture House A/c.
The two ledger accounts will appear as follows:

Dr. Furniture A/c Cr.

Date	Particulars	J.F.	Amount(₹)	Date	Particulars	J.F.	Amount(₹)
2022 Apr 1	To Manish Furniture House A/c		10,000				

Dr. Manish Furniture House A/c Cr.

Date	Particulars	J.F.	Amount(₹)	Date	Particulars	J.F.	Amount(₹)
				2022 Apr 1	By Furniture A/c		10,000

3.7.4 Balancing of ledger accounts

After all the entries are posted in an account, mostly it will have entries on both the sides. Both the sides of the account are totaled. After the debit and credit totals are obtained, the difference between the two sides is found out and written on the side with smaller total. Such a difference is known as balance. It is a debit balance and is written as "By balance c/d" or "By balance carried down" on the credit side in the "Particulars" column if the debit side total exceeds the credit side total. The total of the two sides then becomes equal. Since the closing balance of one year is treated as the opening balance of the following accounting year. On the first day of the next accounting year, this debit balance is shown as "To balance b/d" or "To balance brought down" on the debit side.
It is a credit balance and is noted as "To balance c/d" in the "Particulars" column on the debit side if the credit total exceeds the debit total. The two sides' sum then becomes equal. This credit amount will be noted as "By balance b/d" on 1st day of the following year on the credit side.
For some accounts, debit total may be equal to credit total. Such accounts will have nil balance.
Following types of accounts will typically have following balances:

Type of account	Type of balance

Asset	Debit balance
Liability	Credit balance
Capital	Credit balance
Revenue	Credit balance
Expense	Debit balance

It is important to note here that only the balance of asset, liability and capital accounts (real and personal accounts as per traditional classification) are carried forward to the next year as balance b/d. The revenue and expense accounts (nominal accounts) are not balanced rather totaled up. Hence, their amount is not carried forward to the next accounting year. These accounts are closed by transferring their total in a given year to Trading and P&L A/c. However, before passing the closing entry for transferring them to Trading and P and L A/c, Trial Balance is prepared to check arithmetical accuracy of accounting records.

IN-TEXT QUESTIONS

12. Name the type of accounts that are balanced.?
13. Which accounts are related to opening entries? (As per traditional classification)
14. Which kinds of accounts are related to closing entries? (As per traditional classification)
15. Which of the accounts are not related to closing entries?(As per modern classification)

3.8 PREPARATION OF TRIAL BALANCE

3.8.1 What is trial balance?

Trial balance is a statement showing debit and credit balances of all the ledger accounts (asset, liability, revenue, expense and capital) on a specified date.

Once the journal entries are posted in the ledger accounts, the trial balance is prepared. A trial balance *generally* contains two columns, one column showing the debit balances of different ledger accounts and the other column showing the credit balances of different ledger accounts. Once this is done, the amounts in these columns (debit and credit columns) are totaled. The total of the amount in the two columns must agree i.e. the totals should be equal. This ensures arithmetical accuracy of posting from journal to ledger. Although trial balance ensures arithmetical accuracy and shows the errors committed while making entries or posting them but it does not ensure absolute accuracy of accounts. In other words, if the trial balance agrees, it does not mean that accounting is error free. There are certain errors which are not disclosed in trial balance like compensating errors and others. Matching of two columns just means that the amount of debits and credits is equal.

The concept of trial balance is based on the "Dual Aspect Concept". This means for every transaction, entered into by the business, there are two aspects i.e., a debit and a credit. Every debit has an equal and corresponding credit. As a result, when the ledger accounts' debit balances are added together, they must match the sum of the accounts' credit balances.In other words, the debit column of trial balance must be equal to the credit balance in terms of their total.

Format of a trial balance is as follows:

Trial Balance as on…………

Heads of Accounts	L.F.	Dr. (₹)	Cr. (₹)

1.8.2 Features of trial balance

- It is a statement and not an account
- It is not a part of the double entry system of accounting. It is rather a result of the double entry system.
- It is a summarized statement containing the debit and credit balance of the ledger accounts.
- Although it is generally prepared at the end of accounting period but it is not necessary. It can also be prepared at any time of the year provided balances of ledger accounts are available.
- It ensures arithmetical correctness of ledger posting.
- It is not absolute verification of the accuracy of the books of accounts. This is because some inaccuracies, such as compensatory errors and complete transaction omissions, are not exposed by the trial balance.
-

1.8.3 Methods of preparing trial balance

Total method
Performa of trial balance under Total method is as follows:

Trial Balance as on…………

Heads of Accounts	L.F.	Debit total (₹)	Credit total (₹)

Trial balance is prepared using the totals of the ledger accounts. In this method, the trial balance consists of three columns. First column shows name of ledger account, second column shows the debit totals and third column shows the credit totals Both the debit and credit sides are individually added up for each ledger account. The sum of an account's credit and debit sides is referred to as the credit total and the debit total, respectively. An account's debit total is recorded in the trial balance's debit column, while the account's credit total is recorded in the trial balance's credit column. Similar procedure is adopted for all the ledger accounts. Once this is done, the 'debit total' column and 'credit total' column of the trial balance are totaled. The total of debit column and that of credit column of the trial balance should match. The trial balance prepared using this method is called Gross Trial balance. This method is not widely used.

Balance Method

Performa of trial balance under balance method is as follows:

Trial Balance as on…………

Heads of Accounts	L.F.	Debit Balances (₹)	Credit Balances (₹)

Trial balance is prepared using the balances of the ledger accounts instead of the totals of ledger accounts. In this method, trial balance consists of three columns, first column shows the names of ledger accounts, second column shows the debit balances of ledger accounts (instead of debit totals) and third column shows the credit balances of ledger accounts.(instead of credit totals).

A ledger account is totaled. Both the credit and debit sides are totaled and the balance of the ledger account is obtained. A ledger account can have either a debit balance or a credit balance. The balance of all ledger accounts is obtained. Then the balance amounts of ledger accounts with credit balances are posted in credit column and the balance amounts of ledgers with debit balances are posted on the debit side of trial balance. The trial balance's debit and credit column totals are calculated. They should match indicating arithmetical correctness of the ledger posting. The trial balance prepared using this method is called Net Trial Balance. This method is most widely used.

Compound Method

Performa of trial balance under compound method is as follows:

Trial Balance as on…………

Heads of Accounts	L.F.	Debit total (₹)	Credit total (₹)	Debit Balances (₹)	Credit Balances (₹)

This method is a combination of the two methods discussed above i.e. Totals method and Balance method. Hence, this method is also called totals-cum-balance method. Trial balance is prepared using both - the totals and the balances amounts of ledger accounts. The debit totals, credit totals and credit/debit balance of a particular account are used.

For a particular ledger account, its debit total, credit total and balance (which can either be debit or credit) are determined. All these three amounts are posted in the respective columns of the trial balance. Same procedure is followed for all ledger accounts. Once this is done, all the four columns of the trial balance are totaled. The total of column showing 'debit total' and the total of the column showing 'credit total' of should match. Similarly, the total of columns showing debit balances and credit balances should match. Since this method involved a lot of effort, it is rarely used.

Let us understand the preparation of ledger and trial balance from an example below.
Information regarding business of XYZ Ltd. for year ending 31 March 2022 is as follows:
April 1 Capital introduced ₹20,000
May 1 Assets bought by cheque₹ 20,000
May 1 Goods purchased from Divya ₹65,000
Jun 15 Sales of goods to Jigar ₹80,000
July 31 More capital introduced ₹1,50,000
Nov 25 Goods purchased from Gaurav ₹22,000
Nov 24 Goods sold to Arushi ₹35,000
Mar 31 Cash deposited into bank ₹50,000
Mar 31 Salary paid ₹ 60,000

Dr. Capital A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2022 Mar 31	To Balance c/d		1,70,000	2021 Apr 1 July 31	By Cash A/c By Cash A/c		20,000 1,50,000
			1,70,000				1,70,000

Dr. Cash A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2021 Apr 1 July 31	To Capital A/c To Capital A/c		20,000 1,50,000	2022 Mar 31 Mar 31 Mar 31	By Bank A/c By Salary A/c By Balance c/d		50,000 60,000 60,000
			1,70,000				1,70,000

Dr. Salary A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2022 Mar 31	To Cash A/c		60,000	2022 Mar 31	By Balance c/d		60,000
			60,000				60,000

Dr. Bank A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2022 Mar 31	To Cash A/c		50,000	2021 May 1 2022 Mar 31	By Asset A/c By Balance c/d		20,000 30,000
			50,000				50,000

Dr. Asset A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2021 May 1	To Bank A/c		20,000	2022 Mar 31	By Balance c/d		20,000
			20,000				20,000

Dr. Purchases A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2021 May 1 Nov 25	To Divya A/c To Gaurav A/c		65,000 22,000	2022 Mar 31	By Balance c/d		87,000
			87,000				87,000

Dr. Divya A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2022 Mar 31	To Balance c/d		65,000	2021 May 1	By Purchases A/c		65,000
			65,000				65,000

Dr. Gaurav A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2022 Mar 31	To Balance c/d		22,000	2021 Nov 25	By Purchases A/c		22,000
			22,000				22,000

Dr. Sales A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2022				2021			

Mar 31	To Balance c/d		1,15,000	Jun 15 Nov 24	By Jigar's A/c By Arushi's A/c		80,000 35,000
			1,15,000				1,15,000

Dr. Jigar's A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2021 June 15	To Sales A/c		80,000	2022 Mar 31	By Balance c/d		80,000
			80,000				80,000

Dr. Arushi's A/c Cr.

Date	Particulars	J.F.	₹	Date	Particulars	J.F.	₹
2021 Nov 24	To Sales A/c		35,000	2022 Mar 31	By Balance c/d		35,000
			35,000				35,000

We are preparing Trial Balance using Balance method as it is most commonly used.

TRIAL BALANCE
As on 31st March, 2022

Name of Account	**Debit Balance (₹)**	**Credit Balance (₹)**
Capital A/c		1,70,000
Cash A/c	60,000	
Salary A/c	60,000	
Bank A/c	30,000	
Asset A/c	20,000	
Purchases A/c	87,000	
Divya A/c		65,000
Gaurav A/c		22,000
Sales A/c		1,15,000
Jigar A/c	80,000	
Arushi A/c	35,000	
Total (₹)	3,72,000	3,72,000

IN-TEXT QUESTIONS

16. Trial Balance lists the balances of all accounts. True or False?
17. Is Trial Balance a conclusive proof of absolute accuracy of accounts?
Is Trial Balance prepared for a particular period or on a particular date?

3.9 SUMMARY

- As per traditional classification, accounts are classified as personal, nominal and real accounts.
- Three golden rules of accounting are to be kept in mind while making journal entries.
- Any transaction is recorded first in the journal from the vouchers. That is why the Journal is known as the 'Book of Original Entry' or 'Book of Prime Entry'.
- Ledger is called as Book of Final Entry or Book of Secondary Entry.
- Cash book can be of three types – single column, double column and three column. Triple column cash book contains three columns – cash, bank and discount.
- There are three methods of preparing trial balance – Total method, Balance method and Compound method.

3.10 GLOSSARY

Account: A systematic record of business transactions related to a particular head at one place.
Rules of Debit and Credit: The guidelines that assist in determining which account should be credited and which should be debited.
Ledger: A book which containing a permanent record of all transactions in a summarized and classified form.
Cash Book: A book of original entry (Journal) as well a book of final entry (ledger).
Trial Balance: A statement showing debit and credit balances of all the ledger accounts (asset, liability, revenue, expense and capital) on a specified date.

3.11 ANSWERS TO IN-TEXT QUESTIONS

1. (i) Asset A/c (ii) Personal A/c	10. Yes (Credit balance in bank column represents bank overdraft)
2. Personal account	11. Contra entry
3. Yes. Capital A/c represents proprietor	12. Real and personal accounts
4. As per Business Entity concept, business and its owner are two separate entities.	13. Real and personal accounts
5. Liability	14. Nominal Accounts
6. Decrease in expense	15. Asset, liability and capital accounts
7. Cash A/c Dr. To Bad Debts Recovered A/c	16. True
8. True	17. No
9. True	18. On a particular date

3.12 SELF-ASSESSMENT QUESTIONS

1. Describe an account. State the golden rules of accounting.
2. How is a Trial Balance different from a Balance Sheet?
3. Mention the nature of accounts as per modern classification.
   i. Rent received
   ii. Interest payable
   iii. Ram (Proprietor)
   iv. Bank a/c
   v. Accrued commission
   vi. Bad debts written off
   vii. Bank overdraft
   viii. Carriage inwards
   ix. Excise duty
   x. Goodwill
   xi. Prepaid insurance
   xii. Outstanding salary

4. Pass the following entries in the General Journal of Rohit Ltd.

2022 April 1	Ledger balances on 31 March, 2021 were: Building - ₹2, 00,000, Machinery - ₹1,00,000, Debtor - ₹20,000, Cash - ₹45,000, Creditors - ₹65,000 Capital - ?
April 5	Insurance prepaid ₹8,000
April 6	Old machine sold to Mahesh for ₹6,000
April 10	Goods lost by fire worth ₹10,000.

April 14	Rohan, a debtor of firm, was declared insolvent and sum of ₹12,000 could not be received
April 16	Purchased stationery from P.R. Mart ₹1,500
April 20	Goods withdrawn for personal use of proprietor ₹8,000
April 28	Half claim for goods lost by for accepted and paid by insurance company
April 30	Depreciate plant and machinery by ₹3,000

5. Prepare the triple column cash book of Faiza Ltd.

2021	
March 1	Cash at bank ₹ 65,000 ; Cash in hand ₹50,000
March 3	Cash purchases ₹ 15,000
March 7	Purchased furniture for cash ₹ 20,000
March 10	Received cheque of ₹2,500 from Dipak and deposited into bank the same day
March 12	Cash withdrawn from bank for office use ₹12,000
March 14	Cash sales ₹ 25,000
March 17	Cheque received from Himanshu ₹3,400
March 19	Paid to creditor ₹15,000 by cash and received discount of ₹500
March 20	Withdrew cash from bank for personal use ₹ 1,000
March 22	Sold goods worth ₹3,500 to Ashok
March 23	Received cheque from Hashmi ₹20,000. Discount allowed ₹450
March 26	Commission paid ₹8,500
March 27	Salary of office staff paid from Bank ₹5,000
March 29	Cheque received from Himanshu deposited into bank
March 31	Received cash from Meeta ₹4,000 and allowed her discount ₹100

6. Journalise the following transactions and prepare ledger accounts.

2021	
April 1	Purchased goods for cash ₹ 1,37,500
April 3	Sold goods to Aggarwal and Co for cash ₹ 1,75,000
April 5	Purchased goods from Suresh ₹ 1,00,000
April 10	Returned goods to Suresh (for not being up to the specification) ₹ 5,000
April 14	Cash deposited into bank ₹ 2,00,000
April 15	Sold goods to Gupta ₹ 75,000
April 17	Discount allowed to Gupta ₹ 1,500
April 21	Purchased machinery by cheque ₹ 25,000
April 25	Paid to Suresh by cheque ₹50,000
April 26	Paid salary to staff ₹ 25,000
April 27	Withdrawn money from bank for personal use ₹ 25,000
April 28	Received cheque from Gupta and deposited into bank ₹ 50,000
April 29	Received bank interest ₹ 1,000
April 29	Cheque from Gupta dishonored ₹ 50,000
April 30	Purchased stationery for cash ₹ 2,500

7. Enter the transaction in the books of Ramesh and Co. and prepare ledger accounts. Also, make Trial Balance using Balance method.

Date	Particulars
2021	
Oct 1	Mahira commenced business with cash ₹2,00,000
Oct 3	Bought furniture worth from Raja House ₹10,000
Oct 5	Purchased goods from Meera Co. worth 13,500
Oct 9	Deposited cash into bank ₹20,000
Oct 10	Purchased goods for cash ₹15,000
Oct 11	Payment to Meera by cheque ₹5,000
Oct 14	Sold goods ₹20,000
Oct 18	Goods purchased from Khosla for cash ₹10,000
Oct 20	Purchased stationery from K.K. Mart ₹ 650
Oct 21	Electricity bill paid ₹ 1,000
Oct 25	Sold goods to Zahir Khan ₹15,000
Oct 27	Goods returned to Khosla ₹2,000
Oct 28	Withdrew from bank (personal use) ₹ 5,000
Oct 30	Goods returned by Zahir ₹ 5,000
Oct 31	Cash sales ₹15,000

3.13 REFERENCES/SUGGESTED READINGS

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LESSON 4

PREPARATION OF FINANCIAL STATEMENTS OF SOLE PROPRIETOR

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STRUCTURE

4.1 LEARNING OBJECTIVES

After reading this lesson, students will be able to understand:

- Meaning and compnents of the financial statements
- Difference between the capital and revenue expenditure
- Difference between the capital and revenue reciepts
- How to prepare Trading and profit and loss account of a sole proprietor firm.
- Concept and calculation of Gross profit, Net profit and Operating profit.
- Preparation of Balance Sheet of a sole proprietor firm and its components.
- Meaning and classification of Assets and Liabilities.

4.2 INTRODUCTION TO FINANCIAL STATEMENTS

Financial Statement are the statements showing the financial performance and financial position of a business enterprise. These are the end product of Accounting process.

Financial Performance:It refers to the amount of profit earned or loss incurred during a particular accounting period.

Financial Position: It refers to the solvency of the business in the form Assets, Liabilities and Capital of a business enterprise on a particular date which is usually the end date of the accounting period which is technically known as Reporting date.

4.3 COMPONENTS OF FINANCIAL STATEMENTS

Financial statements consist of the following statements as its components:

i. **Statement of Financial Performance or Income statement:** For non corporates such as sole proprietor, partnership, HUF, income statements prepared in the form of Trading and profit and loss account, while Statement of profit and loss or Statement of Comprehensive Income is prepared in case of companies. It shows the revenue and expenses. It is prepared to ascertain the amount of profit earned /loss incurred during an accounting period.

ii. **Statement of Financial Position** –It is prepared in the form of Balance Sheet which shows the assets, liabilities, capital and reserves. It shows the application of funds in the form Assets and Sources of funds in the form of Capital and Liabilitiesi. It is shows the financial position of a business enterprise at the end date of accounting period (which is usually 31st March of financial year).

iii. **Schedules or Notes to Accounts:** These statements also forms the part of financial Statements - to give detailed information and segregation of various items in the Balance Sheet and Trading and Profit and Loss account and significant accounting policies.

4.4 OBJECTIVE BEHIND PREPARATION OF FINANCIAL STATEMENTS.

1. To present a True and Fair view of the financial performance/results (Profit earned/Loss incurred) of the business enterprise during the accounting period.
2. To safeguard and supervise the assets by showing proper value of the Assets considering the depreciation and amortisation.
3. To show the Liquidity, Profitability and Solvency of the business enterprise.
4. To present a true and fair view of the financial position (Assets/Liabilities/Capital) of the business enterprise at the end of accounting period.

4.5 CAPITAL EXPENDITURE

It is the expenditure which does not occur on recurring basis and its benefit lasts for more than one accounting period. It refers to the amount spent or liabilities incurred to construct, purchase, acquire or improve/enhance any fixed asset or acquiring any legal rights such as amount spent on the acquiring right to use copyright, trademark, patent, Industrial Designs or other intellectual property rights, or initial expenses to make fixed assets ready to use as installation charges, testing of plant and machinery, etc.

These expenditures are capitalised i.e. recorded on the assets side of the Balance Sheet at time of purchase or acquisition (initial recognition) and charged as Expense through the mode of depreciation on tangible assets or amortisation on intangible assets (subsequent recognition).

4.6 REVENUE EXPENDITURE

These expenditures are recurring and are routine nature expenditures incurred for running or operating the business smoothly and to maintain business's operating facilites continously such as:

- Salary of staff
- Rent, rates and taxes
- Lighting Expenses

- Insurance Premium
- Commission paid
- Purchase of raw material,
- Power
- Repairs, etc.

The benefit of these expenses are expected to be expired with the operating cycle or one year. These expenses are recognised by showing them on Debit side of the Trading and Profit and loss account.

4.7 Deferred Revenue Expenditure

These expenditure are also revenue in nature, but heavy amount is incurred on them and benefit likely to be derived over a number of years such as huge expenditure on advertising at time marketing the launch of a new product and therefore part of it is capitalized like capital expenditure and part of the expenditure is charges to Trading, Profit and Loss account.

Matching concept requires that expenses incurred in an accounting period are traced to their revenues recognized in that accounting period. Thus if the benefit of some expenditure is aviled over a long period of time, then it should be spread over the number of years over which the benefit of it is likely to be derived by the business in earning the revenues.

Part of the expenditure whose benefit is utilised in the current accounting period should be debited to the profit and loss account, remaining part of expenditure should be capitalised in the balance sheet on the assets side to amortise it in future accounting periods.

4.8 CAPITAL RECEIPT VS REVENUE RECEIPT

Capital Receipts: These are the irregular receipts that does not occur regularly in the normal course of business and does not affect profit or loss of the business; they either increases the liabilities (raising of omey through loans) or reduces the fixed assets (sale of fixed assets).

Capital receipts can not be distributed as profit to the owner because they increase the obligations or reduces assets.

Revenue Receipt: These are the reciepts are recurring in nature that occurs frequently.They increases the profit earned, They can be due to Direct or Indirect incomes.

Reciepts in the normal and regular course of business and related to main business operations of the entitiy such as proceeds from sale of goods and rendering services are the part of Revenue receipts from Direct Income and credited to the Trading Account.

Reciepts from non-operating business activities such as income from investment i.e. interest on debentures or bonds purchased and dividend on shares and rent received from land and buiding lent on rent basis, commison received, etc. are credited to Profit and Loss account as these are considered as receipts on account of Indirect incomes.

4.9 TYPES OF EXPENSES

Direct Expenses: These expenses are directly traceable to per unit of production and are incurred on acquisition or purchase of goods for sale in the normal course of business

These expenses are usually incurred in manufacturing operations of converting the raw materials into the finished goods such as purchase of raw material, payment of wages to labour in the factory, purchase of other direct material used in the manufacture of good, and otheroperating expenses of factory. Examples of Direct expenses are as follows:

1. Wages to labour in factory
2. Purchases of raw material and consumable supplies
3. Freight , Cartage or Carriage paid for purchase of goods
4. Custom duties and indirect taxes such GST paid on purchases whose credit is not available, Power, water and fuel used in the production of goods
5. Factory lighting, rent and rates
6. Royalty based on per unit of Production
7. All direct expenses are debited to Trading account.

Indirect Expenses: These expenses are not directly traceable to per unit of production and are not directly concerned to production or purchase of the goods. These are related to office and administration, selling and distribution of goods to customers and financial expenses such as interest expense, lumsump royalty for obtaining right to use intangibles, etc.

These expenses are debited to the Profit and Loss A/c to calculate the net profit earned during the accounting period.

4.10 CALCULATION OF GROSS PROFIT, OPERATING PROFIT, OPERATING COST, NET PROFIT AND OPERATING EXPENSES

Gross Profit, Operating Profit, Operating Cost, Net Profit and Operating Expenses can be determined using the following equations:

Gross Profit = Net Sales - Cost of Goods Sold

Sales are also known as Revenue from Operations

Where Net Sale = Total Sale (Cash sale + Credit Sale) - Sale Return

Cost of Revenue from Operations are also known as Cost of goods sold

Cost of goods sold = Opening Stock + Net Purchases + Direct Expenses (Wages+Expenses on Purchases+ Frieght or Carriage Inward, etc.) - Closing Stock.

Purchase return is also known as Return Inward

Net Purchases = Total Purchases (Cash Purchases + Credit Purchases) - Purchase Return

Example: Consider the following information for the year ended 31st March 2023:

Particulars	Amount	Particulars	Amount
Opening Stock	1,00,000	Purchases during the year	5,60,000
Freight Inward	20,000	Closing Stock	1,20,000
Packing Charges on Purchases	20,000	Packing Expenses on Sales	24,000
Sales	7,60,000		

Compute the Gross Profit for the year ended 31st March, 2023

Solution:

Gross Profit = Sales + Closing Stock – (Opening Stock + Freight Inward + Packing Charges + Purchases)

= 7,60,000 + 1,20,000 – (1,00,000 + 20,000+ 20,000 + 5,60,000)

= 8,80,000 – 7,00,000 = 1,80,000

Or it can be calculated by preparing a Trading Account as follows:

Trading Account
for the year ended March 31, 2023

Dr. Cr.

Particulars	Amount	Particulars	Amount
To Opening Stock	1,00,000	By Sales	7,60,000
To Purchases	5,60,000	By Closing Stock	1,20,000
To Freight Inward	20,000		
To Packing charges on purchases	20,000		
To Gross Profit	1,80,000		

Total	8,80,000	Total	8,80,000

Example: Consider the following information for the year ended 31st March 2023:

Particulars	Amount	Particulars	Amount
Opening Stock	80,000	Purchases made during the year	2,80,000
Cash Sales	2,40,000	Credit Sales	1,60,000

Rate of Gross Profit: 33.33% on Cost

Calculate the amount of Closing Stock on 31st March 2023 from the above information.

Solution:
Given Gross Profit = 331/3% on Cost

Gross Profit = 1/3rd of Cost

Gross Profit on Sales =1/4th of Sales

Sales = Cash Sales + Credit Sales

= 2,40,000+1,60,000 = Rs 4,00,000

Gross Profit = 4,00,000×1/4

= Rs 1,00,000

Cost of Goods Sold=Sales−Gross Profit

= 2,00,000−1,00,000 = Rs 1,50,000

Cost of Goods Sold = Opening Stock + Purchases made during the year +Direct Expenses−Closing Stock

1,50,000 = 40,000+1,40,000+0−Closing Stock

Closing Stock =Rs 30,000

Example: Calculate Gross Profit from the following for the accounting year ended 31st March 2023:

Particulars	Amount	Particulars	Amount
Opening Stock	8,00,000	Carriage paid on Sales	1,20,000
Closing Stock	7,20,000	Office Rent	2,32,000
Purchases made during the yaer	38,00,000	Sales during the year	56,28,000
Freight paid on Purchases	92,000		

Solution: Gross profit can be calculated by preparing the Trading Account as follows:

Trading Account

for the year ended March 31, 2023

Dr. Cr.

Particulars	Amount	Particulars	Amount
Opening Stock	8,00,000	Sales	56,28,000
Purchases	38,00,000	Closing Stock	7,20,000
Freight paid on Purchases	92,000		
Gross Profit	20,56,000		
Total	63,48,000	Total	63,48,000

Operating profit = Net sales - Operating cost

Operating profit = Gross Profit - Operating

Operating Cost = Cost of Goods Sold + Operating Expenses

Net Profit = Operating Profit + Non-operating Income - Non-operating expenses.

Operating expenses: expenses to the main or normal business activities such as:

1. Office and Administrative expenses
2. Selling and distribution expenses.

Operating Expenses = Office and Administrative Expenses + Selling and distribution expenses

Operating profit is also known as Earnings before interest and taxes (EBIT).

4.11 INCOME STATEMENT

Income statement for a saloe proprietor is divided into two components:

1. Trading Account which shows revenues from operations, direct expenses, the gross profit or loss.
2. Profit and Loss Account which shows indirect incomes, indirect expenses, the net profit loss.

Format of Trading Account and Profit and Loss Account

Name of Business of Sole Proprietor
Trading Account

Dr. **Cr.**

Particulars	**Amount**	**Particulars**	**Amount**
To Opening Stock		By Sales Less:Sales Returns	
To Purchases Less: Purchases Returns		By Sale of Scrap	
To Direct Expenses such as Gas, Fuel and power		By Closing Stock	
To Carriage Inwards		By Gross Loss transferred to Profit & Loss A/c)	
To Wages			
To Manufacturing Expenses			
To import duty			
To Dock and clearing charge, Freight, and cartage			
To Factory rent and lighting			
To Royalty paid per unit			
To Gross Profit transferred to Profit & Loss A/c)			

Format of Profit & Loss Account

Profit & Loss A/c
for the Year Ended……

Dr. **Cr.**

Particulars	**Amount**	**Particulars**	**Amount**
To Gross Loss (Transferred from Trading A/c)		By Gross Profit (Transferred from Trading A/c)	
To Salaries		By Rent Received	
To Legal Expenses		By Commission Received	
To Rent Rates Taxes		By Discount Received	
To Office Lighting		By Dividend Received	
To Establishment Expenses		By Interest Received	
To Printing and Stationery		By Bad Debts Recovered	
To Trade Expenses		By Miscellaneous Receipts	
To Postages and Telephones		By Gain on Sale of Fixed Asset	
To Audit Fees		By Net Loss Transferred to capital Account	
To Insurance Premium			
To Travelling Expenses			
To General Expenses			
To Bad Debts			
To Export Duty			
To Packing Expenses			
To Interest paid on loans			
To Carriage Outwards			
To Salaries of Salesman			
To Commission			
To Rebate Allowed			

To Brokerage			
To Bank Charges			
To Advertisement			
To Depreciation on Fixed Assets			
To Publicity			
To Repairs			
To Loss by Fire			
To Conveyance Expenses			
To Donations & Charity			
To Loss on Sale of Fixed Assets			
To Loss by theft			
To Net Profit Transferred to Capital Account			

Example: Consider the following information of Mr X for the year ended 31st March 2023::

Particular	Amount	Amount	Amount
Opening Stock	92,000	Purchases Return	9,600
Purchases	1,16,000	Closing Stock	1,90,800
Sales Return	2,000	Carriage Inwards	400
Sales	1,01,600	Depreciation	8,000

Prepare Trading Account from the information given above

Solution:

In the Books of Mr. X
Trading Account
for the year ended March 31, 2023

Dr. Cr.

Particulars	Amount	Particulars	Amount
Opening Stock Purchases 1,16,000 Less: Purchases Return: (9,600) Carriage Inwards Gross Profit	92,000 1,06,400 400 91,600	Sales 1,01,600 *Less*: Sales Return (2,000) Closing Stock	 99,600 190,800

Total	2,86,400	Total	2,86,400

4.12 BALANCE SHEET

Balance Sheeet: It is that part of financial statements which is concerned with depicting the financial position of the business enterprise. In other words it is a summarised statement showing application of funds in the form of assets and and souces of funds in the form of capital and liabilities at the end of accounting period.

Presentation of Assets, liabilities and Capital in the Balance Sheet: In case of Horizontal format of Balance Sheet, liabilities and capital are together presented on the left hand side of balance sheet while assets are presented on right hand side of the balance sheet.

Arrangement of Assets and Liabilities:

1. The assets are arranged and presented on the basis of their liquidity in descending order. The most liquid asset such as cash-in-hand, credit balance in current account with the bank are shown in the starting. The least liquid asset such as right to use intellectual property rights, goodwill purchased are shown at the end.
2. The liabilities are arranged and presented in the decreasing order of their timing of maturity or expected due date of settlement. The liabilities which are to be settled immediately such as outstanding salary, outstanding rent, creditors are shown shown in the staring while liabilities which are to be settled after a long period of time such as long-term loans are shown at end.

Liabilities on the basis of their timing of maturity or expected due date of settlement and Assets on the basis of their liquidity can be presented in the Balance Sheet as follows:

Balance Sheet of ....

as at 31St March ....

Total Liabilities (Capital and external liabilities)	Amount	Assets	Amount
Current Liabilities:		**Current Assets:**	
Overdraft		Cash-in hand	
Bills Payable		Cash at Bank (credit balance in the current account with bank)	
Sundry Creditors		Bills Receivable	
Outstanding Expenses such as Outstanding Salary, Outstanding Wages, Outstanding Rent, etc		Sundry Debtors	

Advance received from Customer		Short Term Investment in time deposit of banks, shares and securities of other entities	
Long-term Liabilities:		Prepaid Expenses such prepaid insurance, prepaid rent, prepaid salary	
Long term loan		Accrued Income such as accrued interest	
Reserve and Surplus		Closing Stock	
Capital:		**Long term Investments**	
Add : Net Profit		**Fixed Assets (Property Plant and Equipment):**	
Less : Drawings		Furniture and Fixtures	
Less : Income Tax paid		Plant & Machinery	
Less : Life Insurance Premium for Sole Proprietor		Building	
Less : Net Loss during the year		Land	
		Patent	
		Goodwill	

Order of Permanence: This order of arrangement of assets and liabilitiesis is reverse of the liquidity order. Therefore, the least liquid asset such as patents, goodwill will be presented in the begining and the most liquid asset such as Cash-in-hand and credit balance in current account with the banks are presented at the end.

Generally companies are required to follow the order of Permanence as per their applicable Financial Reporting Framework.

Format of Balance Sheet based on the order of performance

Balance Sheet of …………

as at............

Liabilities	Amount	Assets	Amount
Capital		**Fixed Assets/ Property Plant and Eaquipment and Intangibles:**	
Opening Balance of Capital	-	Goodwill	-
Add: Net Profit	-	Patents, Copy right, Trademark	-
(Less: Net Loss)	-	Vehicles	-
Less: Drawings	-	Land	-
		Building	-
Long-term Liabilities:		Furniture & Fixtures	-
Long term Bank loan	-	Investment: (long term)	-

Current liabilities:		Current Assets:	
Income received-in-advance	-	Closing Inventory	-
Outstanding Expenses	-	Accrued Incomes: Accrued interest	-
Sundry Creditors	-	Prepaid Expenses	-
Bills Payable	-	Sundry Debtors	-
Bank Overdraft	-	Bills Receivable	-
		Cash at Bank (credit balance in current Account)	-
		Cash in Hand	-
Total of Laibilities and Capital	XXX	**Total Assets**	XXX

4.1 ADJUSTMENT TO BE MADE WHILE PREPARING FINANCIAL STATEMENTS OF SOLE PROPRIETOR

Now let us understand the meaning of certain terms to be used in adjusting the items in the preparation and presentation of financial statements

Adjustment entries: These are the entries which need to be passed to calculate correct profit or loss during the accounting period and show true and fair financial position of the business at the end of the accounting period.

Since there are number of transactions or items which are not presented in Trial Balance such as Closing Stock (which is valued by physical stock taking at the end of the accounting period), Manager's Commission which is calculated as a specified percentage of Net profits. Adjustment entries are required to be passed to account for their impact on the profitability and financial position of the business organisation.

Closing Stock: It is the cost of inventory left unsold at the end of the accounting period.

Outstanding Expenses: These are the expenses which remain unpaid at the end of an accounting period, they relate to resources whose benefit is used during the current accounting period in the earning of revenue, so as to satisfy the Matching concept.

Prepaid Expenses: It refers to the amount of expenditure realting to resources whose benefits is not fully expired during the accounting period and would be received in the subsequent accounting period.

Accrued Income: It may sometime happen that certain items of income such as a interest on loan, commission, rent, etc. are earned during the current accounting year but have not been actually received by the end of the same year. Such incomes are known as accrued income. .

Income Received in Advance: Sometimes, a certain income is received but the whole amount of it does not belong to the current period. The portion of the income which belongs to the next accounting period is termed as income received in advance or an Unearned Income.

Depreciation: It is the decline in the value of assets on account of wear and tear and passage of time. It is treated as a business expense and is debited to profit and loss account. This, in effect, amounts to writing-off a portion of the cost of an asset which has been used in the business for the purpose of earning profits.

Closing Stock	**Closing Stock A/c**	**Dr.**	**(i) Credit side of Trading A/c.**
	To Trading A/c		**(ii) Show on the assets side of BALANCE SHEET.**
Outstanding/Unpaid Expenses	Expenses A/c	Dr.	(i) Add to the concerned item on the Debit side of Trading/Profit & Loss A/c.
	Outstanding Expenses A/c		(ii) Shown on the liabilities side of BALANCE SHEET.
Prepaid expenses/Unexpired expenses	Prepaid Expenses A/c	Dr.	(i) Deduct from the concerned expenses on the debit side of Profit & Loss A/c
	To Expenses A/c		(ii) Show on the assets side of BALANCE SHEET.
Accrued income/ Income due but not received	Accrued Income A/c	Dr.	(i) Add to the concerned income on Credit side of Profit and Loss A/c
	To Income A/c		(ii) Show on the assets side of BALANCE SHEET.
Unearned income/Income received in Advance	Income A/c	Dr.	(i) Deduct from the concerned income on the credit side of Profit & Loss A/c
	To Unearned Income A/c		(ii) Show on the liabilities side of Balance Sheet.
Depreciation	Depreciation A/c	Dr.	(i) Show on the debit side of Profit Loss A/c
	To Asset A/c		(ii) Deduct from the concerned asset in the Balance Sheet.

Bad Debts : The debtors from whom amounts cannot be recovered are treated in the books of accounts as bad and are termed as bad debts.

Further Bad Debts : These Bad debts is a loss that occurred after reparation of Trial Balance. Further bad debts be added in the bad debts already appearing in the Profit and Loss Ae and Debtors would be reduced with the same amount.

Provision for Bad Debts : In the balance sheet, debtors appears on the assets side of the Balance Sheet, which is their estimated realisable value during next year. It is quite possible that the whole of the amount may not be realized in future. However it is not possible to accurately know the amount of such bad debts. Hence, a reasonable estimate of such loss is provided in the book. Such provision is called provision for bad debts. Provision for doubtful debts is shown as a deduction from the debtors on the asset side of the balance sheet. **Note :** The provision for doubtful debts brought forward from the previous year is called the opening provision or old provision. When such a provision already exists, the loss due to bad debts during the current year are adjusted against the same and while making provision for doubtful debts required at the end of the current year is called new provision. The balance of old provision as given in trial balance should also be taken into account.

Provision for discount on Debtors : Discount is allowed to customers to encourage them to make prompt payment. The discount likely to be allowed to customers in an accounting year can be estimated and provided for by creating a provision for Discount on debtors. Provision for discount on debtors is made on good debtors which are arrived at by deducting further bad debts and provision for bad debts out of Debtors shown in the Balance sheet.

To write off bad debts	Bad Debts A/c	Dr.	(i) Debit side of P&L A/c.
	To Debtors		(ii) Deduct from debtors on the as- sets side of Balance Sheet.
Provision for bad and doubtful debts	Provision for Doubtful Debts A/c	Dr.	(i) Debit side of P & L A/c.
	To Debtors A/c		(ii) Deduct from debtors on the assets side of Balance Sheet.
Provision for discount on debtors	P & L A/c	Dr.	(i) Debit side of P & L A/c.
	To Provision for Discount on Debtors Debtors A/c		(ii) Deduct from debtors on the assets side of Balance Sheet.

Manager's Commission The manager of the business is sometimes given the commission on the net profit of the company. The percentage of the commission is applied on the profit either before charging such commission or after charging such commission. In the absence of any such information, it is assumed that commission is allowed as a percentage of the net profit before charging such commission.

1. Commission on net profits before charging such commission Commission =Net profit before commission×Rate of Commission100

2. Commission on net profits after charging such commission Commission =Net profit before commission×Rate of Commission 100+Rate of Commission

Interest on Capital	Interest on Capital A/c	Dr.	(i) Debit side of P & L A/c.
	To Capital A/c		(ii) Add to capital on the liabilities side of Balance Sheet.
Interest on drawings	Capital/Drawings A/c	Dr.	(i) Credit side of P & L A/c.
	To Interest on Drawings A/c		(ii) Deduct from capital on the liabilities side of Balance Sheet.
Interest payable on loan (borrowed)	Interest on Loan A/c	Dr.	(i) Debit side of P & L A/c.
	To Loan A/c		(ii) Add to loan on the liabilities side of Balance Sheet.
Commission payable to manager	P& L A/c	Dr.	(i) Debit side of P & L A/c.
	To Comm. Payable to manager A/c		(ii) Show on the liabilities side of Balance Sheet.

Adjustment in Respect of Goods Abnormal Loss : Sometimes losses occur due to some abnormal circumstances such as accident, fire, flood, earhquakes etc. Such losses are called Abnormal losses. These may be divided into two categories :- (A) Loss of Goods (B) Loss of fixed assets **Good taken for personal use {Drawings in goods) :** When the goods are withdrawn by proprietor for personal use the cost of such goods deduct from purchases and the amount should be deduct from capital in Balance Sheet. **Goods distributed as free samples :** Sometime goods are distributed as free sample by the businessman for the purpose of advertisement. The cost of free sample deduct from purchase and shown in Debit side of profit and loss account.

Abnormal loss of goods by fire, theft, accident, etc.

Adjustment	**Treatment in Trading & P & L A/c**		**Treatment in Balance Sheet**
1) Loss of Goods (By accident, Fire, Theft)	1) Loss of ... A/c	Dr.	(i) Gross Loss: Deduct from Purchases or show on the credit side of Trading A/c.
	To Trading A/c (or)		
	To Purchases A/c		
If goods were note insured	2) P & L A/c	Dr.	(ii) Net Loss: Debit side of P & L A/c.
	To Loss by ...... A/c		
If goods were insured and full claim accepted by insurance company	2) Insurance company A/c	Dr.	(iii) Insurance claim: Assets side of Balance Sheet.
	To Loss by ... A/c		
If full claim not accepted by Insurance Company	2) Insurance Company A/c	Dr.	
	Profit & Loss A/c	Dr.	

	To Loss By .... A/c		
2) Goods taken by the proprietor for his personal use	Drawings A/c	Dr.	(i) Deduct the amount of goods from the purchases in Trading A/c.
	To Purchases A/c		(ii) Deduct the amount from the capital on the liabilities side of Balance Sheet.
3) Goods distributed as free samples	Advertising A/c	Dr.	(i) Deduct the amount of goods from the purchases in Trading A/c.
	To Purchases A/c		(ii) Show on the debit side of P & L A/c.
4) Goods given as charity	Charity A/c		(i) Deduct the amount from the purchases on the debit side of Trading A/c.
	To Purchases a/c		(ii) Show on the debit side of P & L A/c.

Key Points to be kept in mind:

1. **If closing stock** is given in Trial Balance – show it in balance sheet only as purchases amount already gets adjusted.
2. **Salary and wages** will be debited in profit and loss A/c on the debit side (indirect expenses) while wages and salary will be debit in trading A/c (direct expense).
3. **Freight, carriage, cartage** will be debited in trading A/c if it is freight inward, if it is freight outward then it will be debited to profit and loss account.
4. Factory related expenses such as factory lighting, factory rent are debited to trading account, otherwise general lighting and rent will be debited to profit and loss account.
5. **Trade expenses** are always debited to profit and loss A/c.
6. **Packaging material**: If the packaging material is used in packing the finished goods, it will debited to trading A/c.
7. **Packing**: refers to the big containers used for transporting the goods are debited to profit and loss account as it is an indirect expense.

LESSON 5

PREPARATION OF FINANCIAL STATEMENTS, CORPORATE BALANCE SHEET

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STRUCTURE

5.14 Suggested Readings

5.1 LEARNING OBJECTIVES

The objective of thIS lesson is to explain students with the mechanics and ways of preparing financial statatements of a company. This lesson will familiarize students with the basic terminonlogies, methods, Accounting Standards, Indian Accounting Standards. After preparation of financial statement this lesson will help the students to analyse it under different conditions.

5.2 INTRODUCTION

A financial statement is collection of all the financial information of a Business. It provides information about financial position and performance of an organization. While analyzing and interpreting the financial statement of a company one can make important decisions and draw conclusion about financial health of an organization. Assets, liabilities and equity are the key components associated with the measurement of financial position. However, to assess the financial performance of the business Revenue and Expenses are taken as essential element.

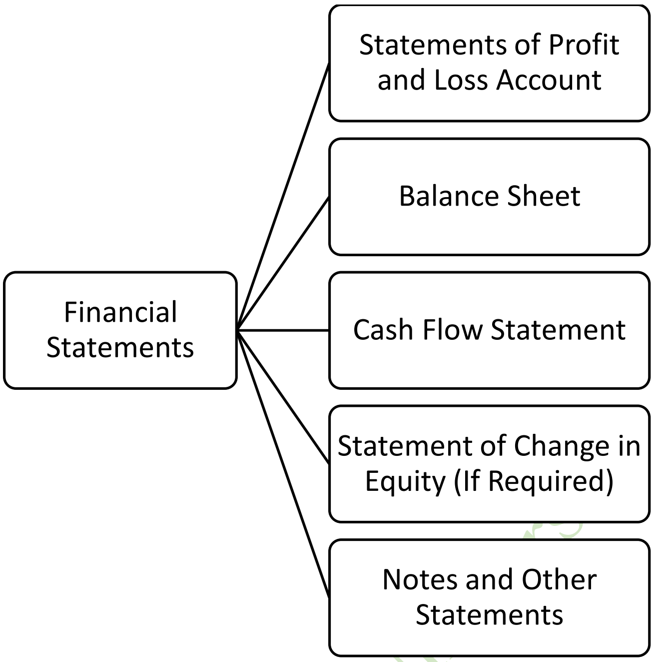
Maintenance of Book of Account: Under section 128 of Companies Act 2013, every single company should prepare and place all financial statements and other relevant books/ papers of the company for financial year at its registered office and its branches (if any) on accrual basis and double entry system of accounting. These financial statements should present a true and fair picture of the financial position and financial performance of the company during the accounting period.

5.3 MEANING AND COMPONENTS OF FINANCIAL STATEMENTS

As per Section 129 of Companies Act 2013, the Directors of the Company should lay financial statements at the annual general meeting of the company. The financial statement under **Section 2(40)** of Indian Companies Act 2013 includes the followings:

i) Balance Sheet reports the financial position of a business at a certain point in time.
ii) Profit &Loss Account/ Income Expenditure Account shows the financial performance throughout the time frame.
iii) Cash Flow Statement encapsulates the total cash inflow and outflow for the period from operating, investing and financing activities.
iv) Statement of Changes in Equity summarizes how equity in the organization (if applicable).

Along with the statements mentioned above it is necessary to give explanatory notes annexured of better understanding. There is an exception for mandatory requirement for making Cash flow Statement of One Person, Dormant and Small Companies.



Provisions Applicable: While preparing final account of the company the following point should be kept in mind:

a) As per Schedule III of Companies Act 2013 all necessary requirements,
b) Other statutory requirements
c) Accounting Standards by MCA from AS -1 to AS -29.
d) Statement and Guidance Notes issued by ICAI for understanding the rules related to accounting treatments, valuation, disclosure for the following companies:

1. If any specific act is applicable e.g. for an insurance company, banking company, company working in generation of electricity or any other company prescribed under Act for which a Form of Balance Sheet and Profit and Loss Account has been prescribed.
2. All other companies.

As per Section 2(41) of Companies Act 2012 the financial year for making financial statement should end on 31st March.

ACTIVITY 1

Go to the official website of the following companies and download the statement of profit& loss and balance sheet of the companies and check the format of each document downloaded.

i. Bharat Heavy Electricals Limited,
ii. Reliance ltd.,
iii. Infosis ltd. and
iv. HDFC Bank ltd.

5.4 USERS OF FINANCIAL STATEMENTS

The financial Statements provides financial position, performance and cash flows of the organization which is helpful for various stake holders such as: investors, employees, lenders, suppliers, creditors, customers, government and general public. The stake holders mentioned above uses these summarized as per their requirement.

There are various categories of stakeholder or users of financial information which are interested in determining the financial position and financial performance of the business.

Users	Category of User	Information need of the user
Internal	**Owners/Proprietor/ Shareholders**	Return on investment, Net profit, financial position of the company/business, growth rate.
	Management	Rate of return from different segments, products and investments.
	Employees	Profitability of the employer to bargain wages rates and bonus, dues (PF, ESI, etc.) are being deposited regularly.
External	**Potential investors**	Business and financial risk, EPS, future prospects of the business.
	Creditors/Suppliers	Short term liquidity: creditors are interested in knowing financial capability and ability of the business to pay its debts on time.
	Lenders	Repaying capacity, credit worthiness, short term liquidity and long term solvency.
	Tax Authorities	Assessment of income and expenses, tax dues, true and fair disclosure of accounting information.

	Others	Customers, researchers seek different in-formation for different own customised interests and reasons.

5.5 PRESENTATION OF FINANCIAL STATEMENTS

MCA has layed down the roadmap for all companies (except banking companies, non-banking finance companies, insurance companie) for option of Ind -AS on February 2015. Under presentation of financial statement Companies Act (Revised) 2016, IFRS conversed with Indian Accounting Ind-AS from financial year 2016-17 is mandatory where the Finance Ministry has taken various steps to simplify the implementation of Ind -AS. Ind -AS-1 provides appropriate guidelines related to presentation of Financial Statements. The basic purpose is to ensure the compatibility of the business entity with its previous year's performance and with other business entities.

Structure of the Ind AS Schedule III

- **A.** General Instructions for preparation of Companie's Financial Statements
- **B.** Part I- Preparation of Balance Sheet and Statement Change in Equity (if any)
- **C.** Part I Notes-Notes and general instruction related to point no B
- **D.** Part II-Form of Statement of Profit and Loss account
- **E.** Part II Notes- General Instructions for Point no D.
- **F.** Part III-General Instruction for Preparation of Consolidated Financial Statements

IN-TEXT QUESTIONS

4. Under section 128 of Companies Act 2013 the financial statements of the company should kept in________________.
5. Which of the following is not a part of financial statements under section 2(40) of companies act 2013:
   a) Statement of Profit and Loss A/c   b) Balance Sheet
   c) Cash Book   d) Cash Flow Statements
6. Government and regulators uses the financial statements of various companies to check its governance and tex related matters. (True/False)

5.6 STATEMENTS OF PROFIT AND LOSS ACCOUNT

The Statement of Profit and Loss account reports the financial performance of the business during a specific period taking revenue and expenses as a key variable usually a fiscal quarter or a year.

There are three major types of profits in an organization based on specific information: Gross Profit, Operating profit and Net Profit. Gross Profit determines the business efficiency and talks about the profit margin of the business, operating profit is net income of an organization derived from its core operating activities. Net profit is representation of the amount company takes for itself.

The main objective of profit and loss account are as follows:

i. Profit and Loss account is helpful in knowing the trading results i.e. gross profit/gross loss and net profit/ net loss.
ii. It is helpful in analyzing the relationship between profit and turnover of a business. Further, it is helpful in calculating and comparing profitability ratio of a company.
iii. It helps in identification and analysis of direct and indirect expense, and also helpful in reducing the indirect expenses of the business for better performance of the business.

As per Part II of Schedule III [u/s. 129(1)] of Companies Act 2013 Profit and loss account should follow the vertical format given as follows:

(Statement of Profit and Loss without stating EBITDA)

Name of the Company
Statement of Profit and Loss
for the year ended 31 March, 20XX

	Particulars	Note No.	For the year ended 31 March, 20X2	For the year ended 31 March, 20X1
			Rs.	Rs.
A	**CONTINUING OPERATIONS**			
1	Revenue from operations (gross)		XXX	XXX
	Less: Excise duty		XXX	XXX
	Revenue from operations (net)		XXX	XXX
2	Other income		XXX	XXX

3	**Total revenue (1+2)**	XXX	XXX
4	**Expenses**		
	(a) Cost of materials consumed	XXX	XXX
	(b) Purchases of stock-in-trade	XXX	XXX
	(c) Changes in inventories of finished goods, work-in-progress and stock-in-trade	XXX	XXX
	(d) Employee benefits expense	XXX	XXX
	(e) Finance costs	XXX	XXX
	(f) Depreciation and amortisation expense	XXX	XXX
	(g) Other expenses	XXX	XXX
	Total expenses	XXX	XXX
5	**Profit / (Loss) before exceptional and extraordinary items and tax (3 - 4)**	XXX	XXX
6	Exceptional items	XXX	XXX
7	**Profit / (Loss) before extraordinary items and tax (5 ± 6)**	XXX	XXX
8	Extraordinary items	XXX	XXX
9	**Profit / (Loss) before tax (7 ± 8)**	XXX	XXX
10	**Tax expense:**		
	(a) Current tax expense for current year	XXX	XXX
	(b) (Less): MAT credit (where applicable)	XXX	XXX
	(c) Current tax expense relating to prior years	XXX	XXX
	(d) Net current tax expense	XXX	XXX
	(e) Deferred tax	XXX	XXX
11	**Profit / (Loss) from continuing operations (9 ±10)**	XXX	XXX
B	**DISCONTINUING OPERATIONS**		
12.i	Profit / (Loss) from discontinuing operations (before tax)	XXX	XXX
12.ii	Gain / (Loss) on disposal of assets / settlement of liabilities attributable to the discontinuing operations	XXX	XXX
12.iii	Add / (Less): Tax expense of discontinuing operations		
	(a) on ordinary activities attributable to the discontinuing operations	XXX	XXX
	(b) on gain / (loss) on disposal of assets / settlement of liabilities	XXX	XXX

13	**Profit / (Loss) from discontinuing operations (12.i ± 12.ii ± 12.iii)**		XXX	XXX
C	**TOTAL OPERATIONS**		XXX	XXX
14	**Profit / (Loss) for the year (11 ± 13)**		XXX	XXX
			`	`
15.i	**Earnings per share (of ` ___/- each):**			
	(a) Basic			
	(i) Continuing operations		XXX	XXX
	(ii) Total operations		XXX	XXX
	(b) Diluted			
	(i) Continuing operations		XXX	XXX
	(ii) Total operations		XXX	XXX
15.ii	**Earnings per share (excluding extraordinary items) (of ` ___/- each):**			
	(a) Basic			
	(i) Continuing operations		XXX	XXX
	(ii) Total operations		XXX	XXX
	(b) Diluted			
	(i) Continuing operations		XXX	XXX
	(ii) Total operations		XXX	XXX
	See accompanying notes forming part of the financial statements			

Source: Guidance Note on Schedule VI to the Companies Act 2013

IN-TEXT QUESTIONS

4. Under which main Head of Sub-Head of the balance sheet (Equity and Liabilities) following items are shown?

   a)Bills Payable   b) Premium on Redemption of Debentures

   c)Sunder Creditors   d) Public Deposits

5. Give major Heads and Subheads shown in balance sheet as per Schedule III of Comoanies Act 2013of the following:

   a)Bills Receivable

   b)Mortgage Loan

   c) Goodwill

   d)Patent Rights

   e)Surplus i.e. Balance of Statement of Profit and Loss Account

5.7 BALANCE SHEET

The balance sheet of the company is a summarized statement of its financial position. It represents assets, liabilities and other essential things of the company. The old format of balance sheet was a represented in horizontal form also known as T-Shaped balance sheet. However, the method of preparation of Balance Sheet and its format has been revised in Companies Act 2013 and the new format is in statement form also known as vertical format of balance sheet.

The balance sheet of the company has two sections i.e., the asset and liabilities where the former shows what a company owns and the later reports what the company owes. Financial statements report the information about entity's:

i) Assets
ii) Liabilities
iii) Equity
iv) Income and Expenses, including loss and gain:
v) Contribution made by the Owner (Contribution/Distributions made by owner and his/her capacity in the business as owner)
vi) Cash flow in the organization

There is no separate format of Balance Sheet as per Ind-AS.

A. Items necessarily required to be included the following items in Balance Sheet: As per Ind-AS asset is defined as follows:

"An asset is a resource controlled by the entity as a result of past events and from which future economic benefits are expected to flow to the entity."

	Assets

a)	Property, plant and equipment
b)	Capital Work in progress
c)	Investment Property
d)	Goodwill
e)	Other Intangible Assets
f)	Intangible assets under development
g)	biological assets other than Bearer Plants within the scope of Ind AS 41, Agriculture;
h)	Financial assets i. Investments ii. Trade Receivables iii. Loans iv. Others (to be specified)
i)	Deferred Tax Liabilities
g)	Other Non-Current Assets
	Current Assets
a)	Inventories
b)	Financial Assets (i) Investments (ii) Trade receivables (iii) Cash and cash equivalents (iv) Bank balances other than (iii) above (v) Loans (vi) Others (to be specified)
c)	Current Tax Assets (net)
d)	Other current assets

As per Ind-As Equity and Liabilities are defined as follows:

"Equity is the residual interest in the assets of the entity after deducting all its liabilities."

"A liability is a present obligation of the entity arising from past events, the settlement of which is expected to result in an outflow from the entity of resources embodying economic benefits."

B). Current and Non-Current Assets and Liabilities distinction in Balance Sheet

Under Ind- AS 1 an entity should make clear distinction between current and non-current assets and liabilities side of Balance Sheet.

For classification of current items the Ind-AS focuses on the following factors:

a) The asset is expected to realize/ consume/ sell in its normal operating cycle.
b) It should be for the purpose of trading.

c) Expected to realized within 12 month of reporting period
d) the asset is cash or a cash equivalent (as defined in Ind AS 7) unless the asset is restricted from being exchanged or used to settle a liability for at least twelve months after the reporting period.

For classification of current items the Ind-AS focuses on the following factors:

a) A liability which is expected to settle within its operating cycle
b) It is primarily held for the purpose of trading.
c) Liability which is due to be settled within 12 months after reporting period.
d) it does not have an unconditional right to defer settlement of the liability for at least twelve months after the reporting period. Terms of a liability that could, at the option of the counterparty, result in its settlement by the issue of equity instruments do not affect its classification.

C). Detailed disclosure of Share Capital : The entity should disclose the following details about share capital either in Balance Sheet or in the statement of change in equity or in the notes to accounts:

a) The number of authorized shares
b) Number of fully paid and not fully paid issued shares
c) Par value per shares
d) Reconciliation of number of outstanding shares at the beginning and end.
e) Preference Shares, right shares and any restriction on distribution of dividend of such shares
f) shares in the entity held by the entity or by its subsidiaries or associates; and
g) shares reserved for issue under options and contracts for the sale of shares, including terms and amounts; and

The format of balance sheet as per Guidance Note on Schedule III to the Companies Act 2013 is as follows:

PART I – Form of BALANCE SHEET
Name of the Company……………………..
Balance Sheet as at ………………………
(Rupees in…………)

	Particulars	Note No.	As at 31 March, 20XX (Current Year Fig) `	As at 31 March, 20XX (Prev. Year Fig) `
A	**EQUITY AND LIABILITIES**			
1	**Shareholders' funds**			
	(a) Share capital		XXX	XXX
	(b) Reserves and surplus		XXX	XXX
	(c) Money received against share warrants		XXX	XXX

2	**Share application money pending allotment**			XXX	XXX
3	**Non-current liabilities**				
	(a) Long-term borrowings			XXX	XXX
	(b) Deferred tax liabilities (net)			XXX	XXX
	(c) Other long-term liabilities			XXX	XXX
	(d) Long-term provisions			XXX	XXX
4	**Current liabilities**				
	(a) Short-term borrowings			XXX	XXX
	(b) Trade payables			XXX	XXX
	(c) Other current liabilities			XXX	XXX
	(d) Short-term provisions			XXX	XXX
	TOTAL			XXX	XXX
B	**ASSETS**				
1	**Non-current assets**				
	(a) Fixed assets				
	(i) Tangible assets				
	(ii) Intangible assets	XXX			
	(iii) Capital work-in-progress	XXX			
	(iv) Intangible assets under development	XXX			
	(v) Fixed assets held for sale	XXX			
				XXX	XXX
	(b) Non-current investments			XXX	XXX
	(c) Deferred tax assets (net)			XXX	XXX
	(d) Long-term loans and advances			XXX	XXX
	(e) Other non-current assets			XXX	XXX
2	**Current assets**				
	(a) Current investments			XXX	XXX
	(b) Inventories			XXX	XXX
	(c) Trade receivables			XXX	XXX
	(d) Cash and cash equivalents			XXX	XXX
	(e) Short-term loans and advances			XXX	XXX
	(f) Other current assets			XXX	XXX
	TOTAL			XXX	XXX
	See accompanying notes forming part of the financial statements				

Source: Guidance Note on Schedule III to the Companies Act 2013.

Illustration 1. How will you explain the following items in the Balance Sheet of a Company?

- **i)** 9% Debentures
- **ii)** Proposed Dividend
- **iii)** Loose Tools
- **iv)** Capital Redemption Reserve

Answer1.

SlNo	Items	Definition	Main Head	Sub-Head
1	9% Debentures	It is a long-term debt to the business usually not secured by any collateral. 9% is the coupon rate for the long-term loan.	Non-Current Liabilities	Long-Term Borrowings
2.	Proposed Dividend	The Board of Directors have approved the proposal of dividend to be distributed in future but not distributed yet.	Current Liabilities	Short Term Provisions
3.	Loose Tools	These are the assets used in a company for various production activities, hence it is helpful in conversion of raw material to finished goods.	Current Assets	Inventories
4.	Capital Redemption Reserve	It is a reservation out of profit over the years kept in company for either redemption or purchase of companies own shares.	Shareholders' Funds	Reserve and surplus

5.8 CASH FLOW STATEMENT

Cash is the blood of business, proper circulation of blood is very important for human to survive and in the similar way proper cash circulation is very important for a business to sustain. Before we move further to understand cash flow lets understand what is cash and cash equivalent.

Cash includes cash in hand, cash at bank, demand deposits with banks and cash equivalent means liquid investments made by the company with a maturity period less than three months.

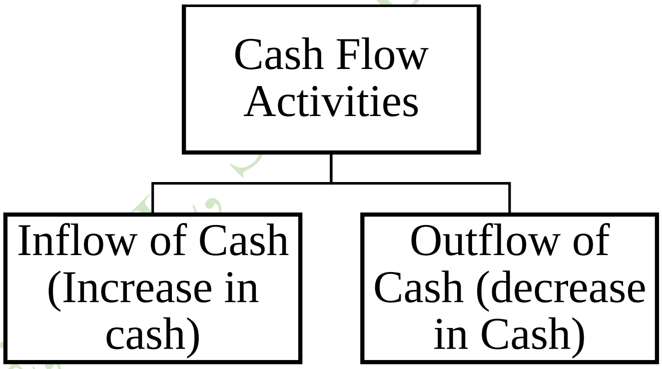
Cash= Cash in Hand+ Cash at Bank+ Demand deposit at Bank

Cash Equivalent= Short Term Highly Liquid Investment (less than three months)

Cash Flow Statement: it is the periodic statement showing the inflows and outflows of Cash and Cash equivalents from Operating, Investing and Financing activities during a particular period which is usually a financial year.

Cash Flow Statement of a company exhibits the flow of incoming and outgoing cash in the business during a specific period (usually a financial year). It helps in ascertaining the ability of the business to generate cash and its utilization.

It is also helpful in determining the solvency of a business. According to guidelines of Accounting Standard 3 issued by ICAI, a cash flow mandatory all companies with a turnover of Rs 50 crore. Companies Act 2013 directs all companies to prepare cash flow statement except one person company, dormant company and small company. However, Schedule III of Companies Act 2013 do not prescribe any format for a Cash Flow Statement and hence it should be prepared as per the AS-3 issued by ICAI under direct/indirect Method. The change in position of cash for a specific period is calculated by considering the 'source' and 'application' of cash and cash equivalent.



Sources of Cash: to identify the source of cash we check the inflow/increase in cash in the business.

a) Issue of Shares (equity or preference), debentures, bonds and long term loan.
b) Operating Cash Profit of the Business
c) Sale of fixed asset.
d) Sale of Investments.

Application of Cash: to identify the source of cash we check the outflow/decrease in cash in the business.

a) Repayment of Bank loan or redemption of Debentures
b) Payment of income tax, dividend, interest.
c) Operating Loss of the Business (Cash)

d) Purchase of any fixed asset.

Source of cash can be internal and external both. Internal sources usually cash from operations of the business. So, it is important to identify operating and non-operating activities in the business such.

Non-operating activities are one-time event in a business which may impact on revenue but falls outside of daily routine of the business and hence, excluded while calculating cash flow statements (loss/profit on sale of fixed asset, amortization of intangible asset).

The net profit calculated by the profit and loss account will have to be adjusted for non-operating items. Also, all non-cash items (depreciation, creation of reserve, provision of bad debts) already considered during computation of profit and loss account will have to be adjusted for calculation of cash flow statements.

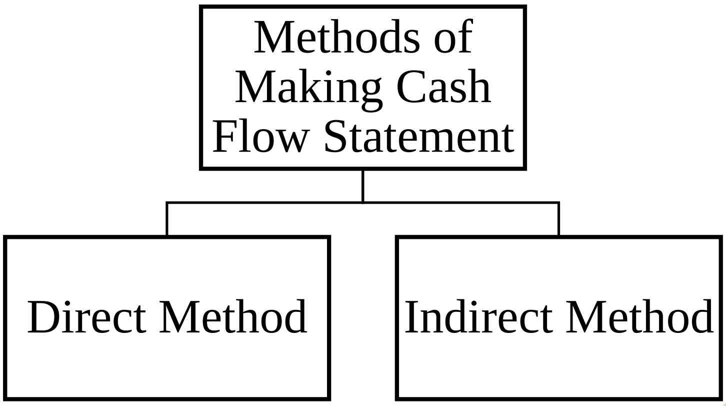
Classification of Cash Flow activities: As per As-3, the cash flow can be classified into three broad categories: Cash Flow from Operating, Investing and Financing activities. The Operating activity is principal revenue generating activity of the business, the Investing Activity is summary of acquisition and disposal of investments and fixed assets in the business and financing activity summaizes change in the size of composition of owners capital and borrowings in the business.

A. **Operating Activity:** Operating activities are daily activities related to producing and selling of product for generation of revenue to the business (sales, direct expenses, marketing expenses etc.) and it should be considered while calculating cash inflow and outflow of the business. It records both inflow and outflow of cash. The Net cash flow is reported as 'Cash Flow from operating activities'. Examples:
   a) Cash payment made to suppliers for goods and services.
   b) Cash receipts from sales of goods/ services.
   c) Cash received from royalties, fees and other revenue.

B. Investing Activities: Investing Activity is summary of acquisition and disposal of investments and fixed assets in the business. Examples:
   a) Cash paid for acquisition of fixed asset, investments, bonds, research and development.
   b) Cash received from sale of property.
   c) Purchase of government securities
   d) Interest/ dividend received from investment made.
   e) Cash advances or loans given to other parties.

C. Financing Activity: financing activity summarizes change in the size of composition of owners capital and borrowings in the business. Example:
   a. Bank loan repayment
   b. Cash proceeds from issue of shares/ debentures
   c. Cash payment by lessee for outstanding liabilities related to finance lease.

Calculation of Cash Flow Statement: A businessmen can be calculated the cash flow using direct/ indirect method.



1. **Direct Method:** In the direct method of cash flow statement, we calculate operating cash profit by taking all cash gross receipts and payment which are operating in nature. All non- operating and non-cash items are ignored under Direct method of cash flow statement.

   Proforma for assessment of 'Cash Flow from Operating Activities' using Direct Method

Particulars	Amount
Cash Receipts from:	xxx
Cash sales	
Recovery of cash from debtors for credit sales	
Recovery of cash on account of Bills Recievables for credit sales	
Sale of scrap	
Less : Cash Payments for:	
Salaries and Wages	
Rent	
Electricity expense	
Suppliers	
Cash Purchases	(xxx)
Payment to Suppliers	
Cash generated from Operations	xxx
Less: Income Tax Paid during the current year	(xxx)
Cash Flow before adjustment for Extra-ordinary Items	xxx
Adjustments for Extra-ordinary items	xxx
Net Cash utilised in/ generated from Operating Activities	xxx

Source: ICAI Study Material

2. **Indirect Method:** Under indirect method of calculation of cash flows, the net profit is taken as the base and starting point and exclude all non-operating and non-cash item. The main motive remains same using both the method i.e. calculation of operating cash profit from the business. Hence, non-operating items such as profit/loss on sale of fixed

asset and investments, amortization of intangible asset and all non-cash items such as deprecation, provision for tax, provision for Bad-debts, transfer to general reserve is adjusted to net profit of the business.

Format for calculation of 'Cash Flow from Operating Activities' as per Indirect Method

Particulars	Amount
Net Profit before Adjustments for Non Cash items, Non Operating items, Tax and Extra-ordinary items	xxx
Adjustments for Non Cash and Non Operating Activities	
Add: Depreciation provided during the year	xxx
Add: Loss due to Foreign Exchange rate fluactuations	xxx
Add: Loss on sale Investments	xxx
Less: Gain due to Foreign Exchange rate fluactuations	xxx
Less: Gain on sale Investments	xxx
Less: Dividend Received	xxx
Less: Interest Received	xxx
Operating Profit before Working Capital Adjustments	xxx
Adjustments for Working Capital Changes	
Add: Decrease in the amount of Current Assets during the year	xxx
Add: Increase in the amount of Current Liabilities during the year	xxx
Less: Increase in the amount of Current Assets during the year	xxx
Less: Decrease in the amount of Current Liabilities during the year	
Cash generated from Operations	xxx
Less: Interest Paid	(xxx)
Less: Income Taxes paid	(xxx)
Cash before Extra-Ordinary Items	xxx
Adjustment for Extra-ordinary items	xxx
Net Cash Flow from Operating Activities	xxx

Source: ICAI Study Material

5.9 SUMMARY

The Main objective of the financial statement is to evaluate the position and performance of the business. As we know that a company has neumorous stake holders and it is very important to protect the interest of the stakeholders. The publication of such relevant financial statement as per guidelines of Companies Act, MCA, ICAI gives the power to these stakeholders to interprate and take decisions accordingly.

A financial statement is collection of all the financial information about financial position and performance of an organization.

The financial statement under **Section 2(40)** of Indian Companies Act 2013 includes the followings:

v) Balance Sheet reports the financial position of a business at a certain point in time.
vi) Profit &Loss Account/ Income Expenditure Account shows the financial performance throughout the time frame.
vii) Cash Flow Statement encapsulates the total cash inflow and outflow for the period from operating, investing and financing activities.
viii) Statement of Changes in Equity summarizes how equity in the organization (if applicable).

Users of Financial Statements

Users	Category of User	Information need of the user
Internal	**Owners/Proprietor/ Shareholders**	Return on investment, Net profit, financial position of the company/business, growth rate.
	Management	Rate of return from different segments, products and investments.
	Employees	Profitability of the employer to bargain wages rates and bonus, dues (PF, ESI, etc.) are being deposited regularly.
External	**Potential investors**	Business and financial risk, EPS, future prospects of the business.
	Creditors/Suppliers	Short term liquidity: creditors are interested in knowing financial capability and ability of the business to pay its debts on time.
	Lenders	Repaying capacity, credit worthiness, short term liquidity and long term solvency.
	Tax Authorities	Assessment of income and expenses, tax dues, true and fair disclosure of accounting information.
	Others	Customers, researchers seek different in-formation for different own customised interests and reasons.

Financial Statements of companies are to be prepared as per the Schedule III of the Companies Act 2013. Financial statements report the information about entity's:

vii) Assets
viii) Liabilities
ix) Equity
x) Income and Expenses, including loss and gain:
xi) Contribution made by the Owner (Contribution/Distributions made by owner and his/her capacity in the business as owner)
xii) Cash flow in the organization

Statement of Profit and Loss account: The Statement of Profit and Loss account reports the financial performance of the business during a specific period taking revenue and expenses as a key variable usually a fiscal quarter or a year.

Balance Sheet: The balance sheet of the company is a summarized statement of its financial position. It represents assets, liabilities and other essential things of the company. The old format of balance sheet was a represented in horizontal form also known as T-Shaped balance sheet. However, the method of preparation of Balance Sheet and its format has been revised in Companies Act 2013 and the new format is in statement form also known as vertical format of balance sheet.

The balance sheet of the company has two sections i.e., the asset and liabilities where the former shows what a company owns and the later reports what the company owes.

Cash Flow Statement: it is the periodic statement showing the inflows and outflows of Cash and Cash equivalents from Operating, Investing and Financing activities during a particular period which is usually a financial year.

Sources of Cash: to identify the source of cash we check the inflow/increase in cash in the business.

e) Issue of Shares (equity or preference), debentures, bonds and long term loan.
f) Operating Cash Profit of the Business
g) Sale of fixed asset.
h) Sale of Investments.

Application of Cash: to identify the source of cash we check the outflow/decrease in cash in the business.

e) Repayment of Bank loan or redemption of Debentures
f) Payment of income tax, dividend, interest.
g) Operating Loss of the Business (Cash)

Classification of Cash Flow activities: As per As-3, the cash flow can be classified into three broad categories: Cash Flow from Operating, Investing and Financing activities.

Operating Activity: Operating activities are daily activities related to producing and selling of product for generation of revenue to the business (sales, direct expenses, marketing expenses etc.)

Investing Activities: Investing Activity is summary of acquisition and disposal of investments and fixed assets in the business.

Financing Activity: financing activity summarizes change in the size of composition of owners capital and borrowings in the business.

5.10 ANSWERS TO IN-TEXT QUESTIONS

1. Registered Head Office and its Branches (if any)

2. Cash Book
3. True
4. Heads and Subheads under Equity and Liabilities:
   a) Bills Payable-Current Liablilities-Trade Paybles
   b) Premium on Redemption of Debentures-Non-Current Liabilities- Long Term Borrowings
   c) Sundery creditors- Current Liabilities- Trade Paybles
   d) public Deposits-Non-Current Liabilities- Long term Borrowings
5. a)Bills Receivable-Current Assets-Trade Receivables
   b)Mortgage Loan-Non-Current Liabilities – Long Term Borrowings
   c) Goodwill- Non-Current Assets-Fixed Assets Intangible Assets
   d)Patent Rights-Non-Current Assets-Fixed Assets Intangible Assets
   e)Surplus i.e. Balance of Statement of Profit and Loss Account- Shareholders Funds-Reserves and Surplus

5.11 Abbrivations

- AS- Accounting Standards
- ICAI-Institute of Chartered Accountants of India.
- MCA- Ministry of Corporate Affairs
- Ind-AS-Indian Accounting Standards

5.12 SELF-ASSESSMENT QUESTIONS

1. What do you understand by the term Financial Statements and the method of preparing the financial statements under Compnaies Act 2013.
2. What do you mean by statement of profit and loss account. How is it helpful in ascertaining financial performance of the business, also explain the advantages of profit and loss accounts to the business.
3. Explain the purpose of making cash flow statements. Also give details about direct and indirect method of making Cash Flow Statement.

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5.14 SUGGESTED READINGS

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LESSON 6

GLOBAL ACCOUNTING STANDARDS / IFRS

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STRUCTURE

6.1 LEARNING OBJECTIVES

The objective of the lesson is to make the learners know about the accounting standards, why there is a need to have globally accepted standards, understand the difference between adoption and convergence, how the international standards are beneficial and the salient features of IFRS or Ind-AS. The learners are expected to have a thorough understanding of the accounting standard, its implementation and role of global accounting standards.

6.2 INTRODUCTION

Accounting standards are the written statements that are issued by institutions of the accounting profession to provide a guide for presentation of financial statements and developing

worldwide acceptance. Accounting standards provides guidelines for financial measurements and disclosures that are required to build fair and honest financial statements. They can be called as a system of measurement and disclosures.
A.C. Littleton explains standard as, "A standard is an agreed upon criteria of what is proper practice in a given situation, a basis for comparison and judgement; a point of departure when variation is justifiable by the circumstances and reported as such. Standards are not designed to confine practice within rigid limits but rather to serve as guideposts to truth, honesty and fair dealing." Accounting standards provide the best practice or the solution for a particular situation, however, they are not meant to put accounting in a straight jacket. They provide flexibility i.e., if in a given situation particular standard is not suitable, then the business can adopt alternative practices that are more suitable. Thus, accounting standard brings both "uniformity and flexibility" in accounting practice.

6.2.1 MEANING OF GLOBAL ACCOUNTING STANDARDS / INTERNATIONAL FINANCIAL REPORTING STANDARDS (IFRS)

Global accounting standards or International Financial Reporting Standards (IFRS) are the set of rules that govern how different items are to be reported in financial statements with an aim to attain consistency, transparency and comparability of financial statements world-wide. IFRS enables users of financial statements to understand and compare financial performance and position of public listed companies across different countries. IFRS are developed by "International Accounting Standards Board (IASB)". IASB has given international accounting standards with an objective to:

- To provide a single set of high-quality standards that are understandable and enforceable across international boundaries enabling reporting of transparent and comparable information in books of accounts
- To advocate use and application of these standards for financial reporting
- To bring convergence of various national accounting standards and international accounting standards

IASB came into existence in 2001 by replacing erstwhile IASC (International Accounting Standard Committee) which was formed in 1973. Often IFRS are confused with International Accounting Standards (IAS) which are older standards that were issued by IASC and since 2001 when IASB was formed, IAS were replaced by IFRS.

IFRS are principle-based rather than rule-based. Principle based accounting standards describe general guidelines, rules and regulations for preparing accounts. Users of financial statements, auditors and accountants are considered accountable for using and explaining the standards applied in a given situation. IFRS are kept dynamic or flexible that they can be applied as per the requirements. They are not strict rule based. Though rule-based standards increase accuracy and provide standardised financial reporting but they tend to be rigid as specific requirements are to be followed. Hence, to promote dynamic application, IFRS are kept principle-based.

IFRS are adopted by more than 160 countries of the world, including, Canada, Brazil, South Africa, South Korea, India, Russia, Chile and all the nations of the European Union. However, US and China do not use IFRS, instead they have their own national standards. US has rule-based accounting standard system known as "Generally Accepted Accounting Principles (GAAP)".

As of now there are 17 International Financial Reporting Standards (IFRS) issued by International Accounting Standard Board (IASB) which are used with existing 41 International Accounting Standard (IAS). The table below provides the list of IFRS that are issued so far:

IFRS Number	IFRS Name	Date of issue
IFRS 1	First time adoption of International Financial Reporting Standards	24th November 2008
IFRS 2	Share-based payment	19th February 2004
IFRS 3	Business combinations	10h January 2008
IFRS 4	Insurance contracts	31st March 2004
IFRS 5	Non-current Assets held for Sale and Discontinued operations	31st March 2004
IFRS 6	Exploration for and Evaluation of Mineral Resources	9th December 2004
IFRS 7	Financial Instruments: Disclosures	18th August 2005
IFRS 8	Operating Segments	30th November 2006
IFRS 9	Financial Instruments	24th July 2014
IFRS 10	Consolidated Financial Statements	12th May 2011
IFRS 11	Joint Arrangements	12th May 2011
IFRS 12	Disclosure of Interests in Other Entities	12th May 2011
IFRS 13	Fair value Measurements	12th May 2011
IFRS 14	Regulatory Deferral Accounts	30th January 2014
IFRS 15	Revenue from Contracts with Customers	28th May 2014
IFRS 16	Leases	13th January 2016
IFRS 17	Insurance Contracts	18th May 2017

Source: https://www.ifrs.org/issued-standards/list-of-standards/

IN-TEXT QUESTIONS

1. What is the full form of IFRS.
2. IFRS are issued by ______________.
3. IFRS came into existence by replacing _________.
4. IFRS are rule-based accounting standards. True/False

6.3 NEED FOR GLOBALISATION OF ACCOUNTING STANDARDS

Globalisation is the integration of an economy with the world economy. It refers to cross-border flow of goods and services, capital, technology, information, ideas and jobs. Globalisation has led to increase in number of financial transactions among different economies of the world. Today companies are involved in raising capital internationally, transact with companies from different countries, have subsidiaries in different parts of the world and even investors are looking for diversification and better investment opportunities across the world. The reporting of these cross-border activities by the companies becomes complicated if it is done by following the national accounting standards. Use of national accounting standards for international or cross-border transactions makes the financial reporting complex and ambiguous and leads to risk for both, the companies and the end users of the financial statements as there is no standardisation in the financial statements prepared using national accounting standards

With globalisation of world economies, there is a need for globalisation of accounting standards as well. Globalisation of accounting standards means adopting a single set of global accounting standards that can be used for reporting of domestic transactions as well as international transactions (Fosbre et al., 2009). Adoption of global accounting standards makes the financial reporting uniform, easy to understand, unbiased and standardised that can be used across the world. The need for global accounting standards can be explained as follows:

Globalisation of Business – There is a need to have a common language for preparing financial statements as with the expansion of trade and other business activities' boundaries among the countries, it is important that same terms should be used for communication. Hence, there is requirement for one set of global accounting standards world-wide.

Globalisation of Capital Markets – Along with globalisation of trade of good and services, there has been international flow of capital as well. Now, investors seek better investment opportunities across countries and companies also seek to raise capital internationally that are available at lower costs. Use of globalised accounting standards will help the investors world-wide to compare and analyse the performance of the companies from different countries easily and take an informed decisions regarding their investments.

Transparency – The globalisation of accounting standards brings transparency in the books of accounts as the reporting of transactions is done following the same rules and are presented in the same manner. It brings comparability and trust among the participants of market for financial statements of a company presented using global accounting standards.

Accountability – Global accounting standards bring a sense of accountability among the provider of financial information that they have reported correct and trustworthy records that can be compared with countries from different economies. They help in reducing the information gap between the two parties involved i.e., provider of information (companies who raise capital) and receiver of information (investors who put their money in companies). Thus, global accounting standards enhances accountability.

Efficiency – Globalised amounting standards helps in increasing efficiency for both investors and businesses. They help the market participants to take optimum decisions for example, investors tend to invest in low risk and high return avenues internationally and businesses raise capital globally where they can incur low costs. This is possible only when financial information needed for decision making is standardised and can be compared.

Facilitates comparability – Adoption of global accounting standards increases reliability of the international financial information and helps the market participants to compare the financial information of companies from different countries.

Need for developing countries – The developing countries that do not have their own domestic standards can adopt global standards easily. If required international standards can be modified before adoption. Thus, in presence of global accounting standards there would not be any need for developing nations to produce their own standards.

IN-TEXT QUESTIONS

5. Use of global accounting standards makes the preparation of financial statements more complex. True/False
6. Use of global accounting standards enhances transparency, accountability, efficiency and comparability of financial records. True/False

6.4 ADOPTION VERSUS CONVERGENCE OF ACCOUNTING STANDARDS

Accounting standards are needed for disclosing important financial information to end users in a uniform way. They help in adoption of appropriate accounting rules, principles or methods for financial reporting. With increase in globalised operations of the companies across the world, it is now important for countries to follow IFRS (International Financial Reporting Standards). IFRS has now become the need of the hour. The countries can either adopt IFRS or converge with IFRS. IFRS adoption and IFRS convergence are mostly used interchangeably, but there is a difference between the two ways of following IFRS by a country.

IFRS adoption is concerned with implementing IFRS in the same way as issued by IASB. It is 100% adoption of the standards as guided by IASB. In adoption of IFRS, a country does not make any changes or modification to the existing standards to suit the environment of their economy. Adoption of IFRS ensures the uniformity with the global reporting norms and facilitates comparability of accounting statements.

IFRS convergence means implementing IFRS with modification. Countries going for IFRS convergence uses standards issued by IASB but develop compatible accounting standards as per the systems of their own country. As IFRS are global standards that do not take into account environment and system of each country; therefore, it is needed that IFRS should not be adopted blindly instead it should be modified. However, convergence with IFRS should be performed with minimum deviations. If the countries converge with IFRS with significant deviations then the whole purpose of implementing IFRS will be distorted as there will be no uniformity in accounting standards and the companies will face difficulty in preparation of financial statements especially when consolidated financial statements are to be prepared with subsidiaries operating in different countries.

India is an example of IFRS convergence. We have not adopted IFRS as it is, we have modified IFRS and implemented with deviations to suit the economic and legal environment of the country. IFRS has been converged in the form he Indian Accounting Standards (Ind AS) which are developed by National Advisory Committee on Accounting Standards (NACAS) along with The Institute of Chartered Accountants of India (ICAI) and Ministry of Corporate Affairs (MCA). It was decided in 2007 to converge Indian accounting standards with IFRS and on 1st April 2015 new standards (Ind AS) were announced for implementation effective from 1st April 2016.

IN-TEXT QUESTIONS

7. Implementing IFRS as it is as stated by IASB without any modification is known as ___________.
8. India has ________ Indian standards with IFRS.
9. The new global standards of India are known as _______.

6.5 NEED FOR CONVERGENCE OF INDIAN ACCOUNTING STANDARDS WITH IFRS

India had their own domestic accounting standards also known as Generally Accepted Accounting Principles (GAAP) developed by Accounting Standard Board (ASB) along with ICAI. In 2007, however, it was decided to come par with international accounting practices by converging the globally accepted standards IFRS with Indian standards. India being one of the fastest growing economies with increasing integration with developed economies of the world, felt the need for having a uniform and consistent accounting language to make the financial statements easy to understand and standardised. To cater to this requirement, Indian Accounting Standards (Ind AS) were issued that are developed by converging the Indian GAAP with IFRS. The question that arises here is, why there is a need for convergence of Indian GAAP with IFRS that is explained in the following points:

Common accounting language: IFRS are used world-wide and it provides a common global accounting language to be used by businesses. Convergence with IFRS helped India to adopt that common language but with little deviations. It facilitated ease in preparation of books of account for companies having subsidiaries in different locations and better understanding of financial statements for Indian companies by overseas investors.

Facilitates better understanding of accounting practices: The use of international best practices for preparation of financial statements helped the Indian companies and investors to have a better understanding of the world's best practices in accounting field. It also enables the foreign investors and companies to understand the Indian accounting procedures and practices.

Generates reliability and comparability: India is a developing country having ties with developed and other emerging nations. At this stage of development, it is necessary for Indian companies to report reliable and transparent information so as to attract the investors and other companies and build a sense of trust among them. Thus, coming at par with the international standards for disclosure of vital financial information ensures reliability and helps in comparison for the end users.

Standardization: Earlier the companies having operations in home country as well as in foreign countries used to follow dual accounting standards, one of the home country's and other of the foreign counterparts and then consolidate them. This led to lack of standardisation in the reporting of financial information. Thus, converged accounting standards provides standardised financial statements that saves time and cost of the multinational companies

Attracts foreign investment: Foreign investment is very crucial for a growing country like India. Preparation of financial statements based on global standards generates trust among the users of accounting information specially investors. Thus, converging Indian standards with IFRS will give confidence to international investors for authenticity of the financial information of the companies and hence helps the companies to attract foreign investment.

Generates employment: Due to standardised accounting procedures many foreign companies intend to set up their operations in India where low-cost resources are available. This will lead to employment generation in India and hence will help in boosting the economy.

Time and cost saving: Building own national accounting standards and their implementation by multinational companies involves a lot of time and cost. Instead of developing domestic standards, convergence with international standards helps in brining foreign practices while keeping domestic requirements and hence saves time and cost for the companies.

The Indian Accounting Standards (Ind-AS) issued by converging IFRS with Indian GAAP are a total of 39 standards that include some of the earlier accounting standards that were used in India and some of the IFRS that are adopted to suit the needs of ecosystem of the country. The following table provides the details of new developed Ind-AS:

Ind AS	**Description**
Ind AS 101	First time adoption of Indian Accounting Standards
Ind AS 102	Share-based payments
Ind AS 103	Business combinations
Ind AS 104	Insurance contracts
Ind AS 105	Non-current assets held for sale and discontinued operations
Ind AS 106	Exploration for and Evaluation of Mineral Resources
Ind AS 107	Financial Instruments Disclosures
Ind AS 108	Operating Segments

Ind AS 109	Financial Instruments
Ind AS 110	Consolidated Financial Statements
Ind AS 111	Joint Arrangements
Ind AS 112	Disclosure of Interests in other entities
Ind AS 113	Fair Value Measurement
Ind AS 114	Regulatory Deferral Accounts
Ind AS 115	Revenue from Contracts with Customers
Ind AS 116	Leases
Ind AS 1	Presentation of Financial Statements
Ind AS 2	Inventories
Ind AS 7	Statement of Cash Flows
Ind AS 8	Accounting Policies, Changes in Accounting Estimates and Errors
Ind AS 10	Events after the reporting period
Ind AS 12	Income Taxes
Ind AS 16	Property, Plant and Equipment
Ind AS 19	Employee Benefits
Ind AS 20	Accounting for Government Grants and Disclosure of Government Assistance
Ind AS 21	The Effects of Changes in Foreign Exchange Rates
Ind AS 23	Borrowing Costs
Ind AS 24	Related Party Disclosures
Ind AS 27	Separate financial Statements
Ind AS 28	Investments in Associates and Joint Ventures
Ind AS 29	Financial Reporting in Hyperinflationary Economies
Ind AS 32	Financial Instruments Presentation
Ind AS 33	Earnings Per Share
Ind AS 34	Interim Financial Reporting
Ind AS 36	Impairment of Assets
Ind AS 37	Provisions, Contingent Liabilities and Contingent Assets
Ind AS 38	Intangible Assets
Ind AS 40	Investment Property
Ind AS 41	Agriculture

Source: https://www.mca.gov.in/content/mca/global/en/acts-rules/ebooks/accounting-standards.html

IN-TEXT QUESTIONS

10. Ind -AS came into existence by converging _____ with _____.
11. Convergence of national accounting standards with global accounting standards helps in bringing foreign investment and generate employment for the country. True/False
12. How many Ind-AS are there as of now?
13. Name the Ind-As 2

6.6 BENEFITS OF ACHIEVING CONVERGENCE WITH IFRS FOR DIFFERENT STAKEHOLDERS IN INDIA

As discussed in the previous section, convergence of Indian GAAP with IFRS is needed to promote better understanding, comparability, reliability, consistency of the financial statement reporting. It is beneficial for all the stakeholders of the businesses that are directly or indirectly related to the performance of the business. Harmonisation with global accounting standard provides benefits to different stakeholders that are explained as follows:

Investors: The investors would get benefitted from convergence of Indian standards with IFRS as it would be easier for foreign investors to understand the accounting process and practices of Indian companies. It would bring uniformity in the books of accounts and thus increases confidence of the investors to make investments world-wide. With harmonisation there will be efficient allocation of financial resources and informed decision-making by the investors.

Accounting and auditing professionals: Harmonisation of Indian accounting standards with global standards would provide a common platform or level playing field to the accounting and auditing professionals to offer their services and have discussions. It enhances their capacity to showcase their skills and due diligence around the globe and draw useful insights about the companies from different parts of the world.

Multinational companies: The major beneficiary of harmonised international standards has been the multinational companies having operations in more than one country. The multinational companies face issues while preparing financial records as accounting standards vary from country to country. But with adoption of IFRS by many countries, their burden of accounting requirements has reduced making it simple for them to prepare individual and consolidated financial statements. In India multinational companies also get benefitted from convergence of accounting standards and attracted many more international companies to set up their operations in India.

Tax authorities: This group would get benefitted from convergence of accounting standards indirectly as it will make the work of tax authorities less cumbersome with the ease of calculating foreign income of the companies. As companies have standard disclosures for their units in different countries, tax authorities can easily know the total income of the companies and hence perform tax calculations. Though taxation rules of every country also play an important role here, but standard accounting practices make preliminary calculations easier for tax authorities.

Industry: Internationally aligned accounting standards will generate a factor of trust on the companies outside the financial domain as the accounting practices that are to be followed by the companies would be on the standardised lines. Hence, the whole industry is benefitted with increased investment opportunities as a result of transparent and authentic disclosures.

Economy: With adoption of international accounting practices there will be increased interest of multinational companies to set up their operations in India, increased opportunities for auditing professionals, more investments and employment generation. Thus, the convergence of Indian accounting standards with IFRS will boost the growth of Indian economy.

6.7 SALIENT FEATURES OF IND-AS/IFRS

1.7.1 Details about Salient features

Ind-AS are developed by converging IFRS with Indian GAAP and it has features of both the standards. The salient features of Ind-AS/IFRS are explained as follows:

1. **Principle based standards:** The International Financial Reporting Standards (IFRS) are principle-based standards. They provide a set of principles to be followed while reporting accounting transactions that can be adjusted as per the requirement of a particular company. It provides flexibility unlike rule-based accounting standards that are rigid and are to applied as stated.

2. **Substance over form:** IFRS and Ind-AS promotes substance over form which means that the transactions must be recorded in the books of accounts as per their economic substance i.e., economic relevance for the business rather than just reporting their legal form to ensure true and fair view of transactions in the books of accounts.

3. **Fair valuation:** It is required that the assets and liabilities should be reported at their fair value i.e., the value that would be received in market when the asset is sold and the value that would have to be paid while retiring the liability. Global accounting standards promotes use of fair value accounting and wherever possible the items of the balance sheet are required to be valued at their fair prices.

4. **Time value of Money:** IFRS and Ind-AS are based on time value of money which means that the present value of a sum of money is more as compared to the future value of the same sum of money. It is important to follow time value of money and take discounted value of future inflows or outflows wherever it is material to do.

5. **Applicability on individual as well as consolidated financial statements:** IFRS and Ind-AS are to be used in preparation of both separate financial statements and consolidated financial statements. It makes the process of consolidation of financial statements less complex as standardised procedures are used to prepare the individual financial statements of a company.

6. **Disclosure of all relevant information:** It is needed that wherever needed there should be proper disclosures of all the assumptions and relevant information while preparation of books of accounts using these global standards.

7. **Acceptability:** IFRS have world wide acceptance and usage. Either through adoption or convergence the countries implementing IFRS have common language for presenting accounting information.

IN-TEXT QUESTIONS

14. IFRS provides flexibility while using them. This tells that IFRS are _______________ standards.
15. Transactions should be recorded as per economic substance rather than legal form. True/False
16. IFRS or Ind-AS are used for preparation of individual financial statements, and not consolidated financial statements. True/False

1.7.2 Fair value accounting

Fair value accounting is concerned with reporting the assets in the balance sheet at the price that would be received if the assets are sold in the market and reporting of liabilities at a price that would be transferred if the liabilities are discharged. It is required that this price is determined considering the sale of asset or transfer of liability as an ordinary transaction with the participants of the market at the measurement date. It is a market-based measurement concept and not related to any specific entity.
Some of the important aspects of fair value of accounting are explained as follows:

Market based price: Fair value price is the market price at the time of sale of the asset or discharge of the liability. It is not the price at which the transaction of buying the asset or assuming liability was done. It is the price at the time of the exit i.e., sale of asset and transfer of liability. Hence, fair value accounting requires market-based price at the time of exit and it is not related to entry price.

Principal market: In order to determine the market price at the time of sale, it is required that such market should be used that has greatest volume and level of activity of the concerned asset or liability. That market is called as principal market and if there is no principal market, then the most advantageous market should be chosen. Most advantageous market is one which gives highest possible price for the sale of the asset and lowest possible price for transfer of liability.

Market participants: Fair value accounting requires unrelated market participants to use their own assumptions to price the asset or liability. The market participants should be unrelated, knowledgeable and should be able to price the asset or liability independently to arrive at the fair value.

Characteristics of asset and liabilities: It is required to consider all the characteristics of the assets and liabilities in the question. The fair value of assets should be determined by considering location, condition and charges against the asset while fair value of liabilities should be determined by considering all the risk of non-performance.

IN-TEXT QUESTIONS

17. Fair value price is the entry price i.e., when asset is purchased or liability is assumed. True/False
18. If principal market is not available, then _________ should be used for determining fair value.

1.7.3 Substance over form

Substance versus form is one of the salient features of IFRS. It means that the financial statements and other disclosures should reflect the economic substance of the transactions rather than just their legal form. A true and fair picture of the financial statements is depicted when the transactions are recorded as per their economic and financial substance and not just the legal form to show the objective picture of the transactions as stated in standards. This calls for subjective judgement at the discretion of the company which is possible due to the principle-based nature of IFRS. Hence, all the information that is important for users and have economic relevance should be reported and not just their legal form.

The following example will explain meaning of substance over form:

Mr. A bought a machinery and gave it to Mr. X for production of goods. Mr. X will produce goods using the machinery and will sell them to earn the income. So, here legal owner of the machinery is Mr. A and Mr. X is using the machinery, producing income and taking risks associated with machinery. Mr. X has the economics of the machinery connected to him.

In this situation, the question that arises is that in whose books, Mr. A (legal owner) or Mr. B (associated economic substance), the machinery and the associated income and losses should be recorded. As per the principle of substance over form, whenever this conflict arises where legal owner and economic substance lies with different entities, then the economic substance should be preferred over legal form. Hence, the machinery related information will be recorded in Mr. X's books of accounts as he is actually using the asset and generating income whereas Mr. A, the legal owner, has nothing to do with income and losses of the machinery. So economic substance would prevail over legal form.

1.7.4 Time value of money

Time value of money means that a rupee today worth more as compared to the same rupee received at a future date. It is a finance concept wherein it is required to bring all the future cash flows to their present value in order to know the correct worth of the proposal or investment. To incorporate time value of money, present value is calculated for future course of actions to know its worth today.

Financial reporting using IFRS requires calculation of present value of assets and liabilities and report it. In present value technique, the future cash flows are needed to be discounted using the discounting factor to arrive at an equivalent cash flows at present. Two inputs are needed to calculate time value of money:

- Estimated time, amount and uncertainty involved with future cash flows
- Discount rate calculation to know the present values of the cash flows

Under the Indian GAAP time value of money was not followed and there was no need to discount any flow of income or cash flows. However, IFRS and Ind-AS suggests discounting of all provisions that are made in the books of accounts or discounting of any other item for which time value of money is material. Hence, time value of money should be practiced while preparing financial statements to calculate the real worth of future cash flows for the current period.

IN-TEXT QUESTIONS

19. Substance over form says that legal form prevails over economic substance in case of conflict. True/False
20. An amount of money today worth more as compared to the same amount of money in future, this is known as ___________.

6.8 SUMMARY

- International Financial Reporting Standards (IFRS) are the set of rules that govern how different items are to be reported in financial statements with an aim to attain consistency, transparency and comparability of financial statements world-wide.
- IFRS are developed by “International Accounting Standards Board (IASB)”
- Globalisation of accounting standards means adopting a single set of global accounting standards that can be used for reporting of domestic transactions as well as international transactions

- IFRS adoption is concerned with implementing IFRS in the same way as issued by IASB. It is 100% adoption of the standards as guided by IASB whereas IFRS convergence means implementing IFRS with modification
- Investors, accounting and auditing professionals, multinational companies, tax authorities, industry and economy are different stakeholders that get benefits from convergence of Indian GAAP with IFRS
- Salient features of IFRS/Ind-AS are: Principle based standards, substance over form, fair valuation, time value of money, disclosure of all relevant information and world-wide acceptability
- Fair value accounting is concerned with reporting the assets in the balance sheet at the price that would be received if the assets are sold in the market and reporting of liabilities at a price that would be transferred if the liabilities are discharged
- Substance over form means that the financial statements and other disclosures should reflect the economic substance of the transactions rather than just their legal form.
- Financial reporting using IFRS needs to be done using time value of money concept wherever material and suggests calculating present value of assets and liabilities for reporting.

6.9 ANSWERS TO IN-TEXT QUESTIONS

1. International Financial Reporting Standards	10. Indian GAAP, IFRS
2. International Accounting Standard Board (IASB)	11. True
3. International Accounting Standard (IAS)	12. 39
4. False	13. Inventories
5. False	14. Principle-based
6. True	15. True
7. IFRS adoption	16. False
8. Converged	17. False
9. Indian Accounting Standards (Ind-AS)	18. Most advantageous market
	19. False
	20. Time value of money

6.10 SELF ASSESSMENT QUESTIONS

1. What do you understand by global accounting standards? Explain IFRS
2. Why globalisation of accounting standards is important?
3. Differentiate between IFRS adoption and IFRS convergence. Explain the case of India in this regard.
4. What are the benefits for Indian economy from convergence of Indian GAAP with IFRS
5. Explain the salient features of Ind-AS/IFRS
6. What are the important aspects of fair value accounting?

7. Explain the concept of substance over form with example

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LESSON 7

INTRODUCTION TO ACCOUNTING STANDARDS

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STRUCTURE

7.1 LEARNING OBJECTIVES

The learning objectives of this sessions will be-

1. Basic Understanding of Indian Accounting Standards
2. To Analyse Applicability of Indian Accounting Standards to Indian Industries
3. To Understand Indian Accounting Standards – 1 in Brief.
4. To Understand Indian Accounting Standards -7 in Brief.
5. To Understand Indian Accounting Standards – 109 in Brief.

7.2 INTRODUCTION

IFRS have converged standards known as Indian AS (Ind AS). They have the same names and numbers as their corresponding IFRS. The Ministry of Corporate Affairs was advised to adopt these standards by the National Advisory Committee on Accounting Standards (NACAS). Indian AS are made applicable to Indian corporations by the Ministry of Corporate Affairs (MCA). There have been 40 Indian AS issued thus far.

With effect from April 1, 2019, NBFCs with net worth greater than or equivalent to INR 250 crore but less than INR 500 crore have to adopt IND AS for Financial Reporting.

The lesson will also include basic brief understanding of Indian Accounting Standard 1-Presentation of financial statements, Indian Accounting Standard 7- Cash flow statement and Indian Accounting Standard 109- Fiancial Instruments.

7.3 INTRODUCTION TO ACCOUNTING STANDARDS (IND-

7.3.1 Development of Indian Accounting Standards

In these globally connected times, the ICAI acknowledges the necessity for a universal standard. As a result, the Government of India and ICAI opted against adopting the IFRS in its current form. In its place, it debuted the Indian AS, often known as Ind AS. Let's look into Indian AS in detail, including its history and some of its key ideas.

7.3.2 Indtroduction to Indian AS

The organisation that establishes the Accounting Standards in India is the Institute of the Chartered Accountants of India (ICAI). The transition to the International Financial Reporting Standards was started by ICAI in 2006. (IFRS). The IFRS are published by the International Accounting Standards Board (IASB). The ICAI is moving towards IFRS in order to improve the financial statements of Indian corporations' acceptance and transparency on a worldwide scale.

The requirements of IFRS were initially carefully examined by the government and ICAI. They then made the decision to converge it. The Indian AS has been created by the Accounting Standards Board (ASB). It has made every effort to maintain compliance with IFRS. Only adjustments that were absolutely necessary were made.

In collaboration with the National Advisory Committee on Accounting Standards, the Central Government of India released Indian Accounting Standards (NACAS). It did so while being supervised and controlled by the ICAI's Accounting Standards Board (ASB).

IFRS have converged standards known as Indian AS (Ind AS). They have the same names and numbers as their corresponding IFRS. The Ministry of Corporate Affairs was advised to adopt these standards by the National Advisory Committee on Accounting Standards (NACAS). Indian AS are made applicable to Indian corporations by the Ministry of Corporate Affairs (MCA). There have been 40 Indian AS issued thus far.

7.3.3 The significance of Indian Accounting Standards

Based on, Ind AS They make cross-border money transfers, global listing, and cross-border financial statement comparison easier. In turn, this encourages international investment and benefits participants in the capital market. It improves the investor's capacity to evaluate investments globally. This in turn lowers the chance of making poor judgements. Additionally, it does away with the expensive demands for financial statement reinstatement.

7.3.4 Applicability of Indian Accounting Standards

The Companies (Indian Accounting Standards (IND AS)) Rules 2015, which were announced by the Ministry of Corporate Affairs (MCA) in 2015, provided for the phased adoption and application of IND AS from start of Financial year 2016-17.

Since then, the MCA has amended the Companies (Indian Accounting Standards (IND AS)) Rules 2015 three times. The IND AS are converged form of IFRS and harmonised with the IFRS to increase the transparency of reporting by Indian businesses internationally.

The need to harmonise reporting standards with international standards was felt as a result of Indian enterprises now having a much greater global reach than they did previously, requiring the creation of IND AS.

Phases of Convergence

MCA introduced a phased convergence from existing accounting standards to IND AS. Depending on their net worth and listing status, some classes of corporations must use IND AS. Here is a detailed look at each of the phases:

Phase I

Mandatory implementation of IND AS for all businesses beginning on April 1, 2016, provided:

- Whether the company is listed or not
- It has a net worth of at least 500 crore rupees.

A review of net worth over the past three fiscal years is required (2013-14, 2014-15, and 2015-16).

Phase II

Mandatory implementation of IND AS from April 1, 2017 for the following entities:

- Publicly traded corporation or is attempting to do so (as on 31.03.2016)
- Its net worth exceeds or equals Rs. 250 billion but falls short of Rs. 500 billion (for any of the below mentioned periods).

A review of net worth for the past four financial years is required (2014-14, 2014-15, 2015-16, and 2016-17)

Phase III

Mandatory implementation of IND AS for all banks, nonbank financial institutions, and insurance providers as of April 1, 2018, who:

- With effect from April 1, 2018, net worth is greater than or equivalent to 500 crore Indian rupees.

With effect from April 1, 2018, IRDA (India's Insurance Regulatory and Development Authority) will announce a distinct set of IND AS for banks and insurance companies. NBFCs include venture capitalists, stock brokers, and core investment firms. The last three fiscal years' net worth must be verified (2015-16, 2016-17, and 2017-18)

Phase IV

With effect from April 1, 2019, all NBFCs with net worth greater than or equivalent to INR 250 crore but less than INR 500 crore must make IND AS mandatory to them.

Notes to keep in mind:

IND AS shall automatically become applicable to all subsidiaries, holding companies, related businesses, and joint ventures of any firm, regardless of the individual qualification of such entities, if IND AS is rendered applicable to any company. When an Indian company conducts business abroad, the compilation of stand-alone financial statements may follow local regulations and is not required to follow IND AS. However, in order to create consolidated IND AS accounts, these entities must still report their IND AS adjusted statistics to their Indian parent firm.

Net Worth Calculation

The company's standalone accounts as of March 31, 2014, or the first audited quarter ending after that date, shall be used to calculate net value. After subtracting accrued losses, postponed expenses, and other expenses that haven't been written off, net worth is the sum of paid-up share capital and all reserves from the profit & securities premium account. Only capital reserves that result from promoter contributions and grants from the government may be included. You cannot include reserves made through revaluing assets and writing back depreciation.

Voluntary adoption

For accounting periods beginning on or after April 1, 2015, businesses have the option to voluntarily include IND AS in their reporting. Where IND AS have been created to present a comparative view, such firms shall submit with a comparative report for the periods ending March 31, 2015, or later. However, once a firm has begun reporting in accordance with the IND AS, it cannot switch to reporting in accordance with earlier rules.

SEBI Clarification

The Indian Accounting Standards (IND AS) and disclosures required in the offer documents have been clarified by SEBI for all issuer businesses whose offer documents are filed with SEBI on or after 1 April 2016. As a rule, SEBI mandates that issuer companies disclose financial data for the five fiscal years immediately before to the year in which the offer document was filed, while adhering to identical accounting principles for each fiscal year. These points can be noticed for issuer organisations that have submitted an offer document:

1. All of their financial statements submitted up until March 31, 2017, may follow Indian GAAP.

2. The three financial years that immediately before the relevant financial year must be disclosed between April 1, 2017, and March 31, 2018, and must be disclosed in accordance with IND AS principles; the other two financial years may be disclosed in accordance with Indian GAAP.

3. In the three financial years that immediately preceded the relevant financial year, beginning on or after April 1, 2018, disclosures must be made in accordance with IND AS principles. For the two remaining financial years, however, disclosures may be made in accordance with Indian GAAP.

4. Disclosures for the one remaining financial year may be made in accordance with Indian GAAP between April 1, 2019 and March 31, 2020, but those for the previous four financial years immediately before the relevant financial year must be made in accordance with the IND AS principles.

5. Disclosures for the prior five financial years must be provided in accordance with the IND AS principles beginning on or after April 1, 2020.

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IN-TEXT QUESTIONS

1. _______ organization establishes the Accounting Standards in India
2. IFRS have converged standards known as _________________.
3. In how many phases india adopted Ind AS?
4. Ind AS 16 represents ___________
5. Ind AS 11 represents ___________

7.4 UNDERSTANDING IND-AS 1: PRESENTATION OF FINANCIAL STATEMENTS

To ensure comparability with the organisation's financial statements from previous accounting periods (inter period and intra firm comparison) as well as the financial statements of other companies (inter firm comparison), IND AS 1 specifies the basis for presentation of general-purpose financial statements which are useful for the all the stakeholders in general. It outlines general requirements for financial statement presentation, rules for their organisation, and minimum standards for their content including disclosures.

Financial Statements

This requires a company or an entity to present a full set of financial statements at least annually with the financial year ending on 31st March, with comparative amounts for the preceding year and Notes to Accounts giving details of line items in Balance Sheet and Statement of Profit and Loss including significant accounting policies

Financial Statements comprises of the following :

(a) a balance sheet;

(b) a statement of profit and loss;

(c) a statement of changes in equity;

(d) a statement of cash flows;

(e) notes to accounts, including significant accounting policies;

(f) comparative information of the preceding period; and

(g) a balance sheet as at the beginning of the preceding year (opening balance sheet).

7.4.1 Objectives of IND AS 1

The standard prescribes the basis for presentation of general purpose financial statements to ensure comparability with

1. With Previous Periods (inter period comparison)
2. With Statements from other entities (inter firm comparison)

7.4.2 Scope of IND AS 1

This applies to all the entities including:

a. Those which present consolidated financial statements as per Ind AS 110 'Consolidated Financial Statements'.

b. Those which present separate financial statements as per IND AS 27 'Separate Financial Statements'.

Except for paragraphs 15 to 35 of IND AS 1, this standard is not applicable to interim financial statements prepared as per IND AS 34.

7.4.3 Definitions under IND AS 1

1. **General purpose financial statements** – They are designed to satisfy the demands of staekholders who are unable to request the entity create customised reports or statements specifically catered to their own information needs.

2. **Impracticable-** It will be treated as impractical to apply a condition if the entity has made all reasonable attempts to implement or apply trhat condition.

3. **Material-** omissions or misstatements of items are material if they could, either individually or collectively, can influence the economic decisions that users make on the basis of the financial statements.

4. **Reclassification adjustments-** these are amounts reclassified to profit or loss in the current period which were recognized in other comprehensive income in the current or previous periods.

5. **Total Comprehensive income-** TCI= Profit/Loss for the year + Other Comprehensive Income.

7.4.4 General features of financial statements

1. **True and Free View** – The Financial statements should present a true and fair view of :

a. Financial Position of the entity as on reporting date

b. Financial Performance of the entity during the accounting period

c. Cash flow of the entity from different activities during the accounting period

2. **Compliance with IND AS** – An entity complying with all the applicable IND AS as per relevant Financial Reporting Framework shall make an explicit and unreserved statement of such compliance in the notes to accounts to financial statements.

3. **Going Concern** – Unless entity has no practical alternative to maintain the assumption of going concern, either wants to liquidate the whole firm or discontinue significant operations or undertakings, financial statements shall be prepared on a going concern basis.

Uncertainties should be disclosed in notes to accounts if management has serious concerns about the entity's ability to continue as a going concern.

4. **Accrual Basis of Accounting**- An entity shall prepare its financial statements, except cash flow statement on accrual basis of accounting.

5. **Materiality and Aggregation** – An entity shall present separately each material class of similar items. If a line item is not individually material, it is aggregated with other items.

Materiality depends on the type, quantity, or both of the information. It is the entity which determines whether information, either alone or in combination with other information, is material.

6. **Offsetting**- An entity shall not offset assets and liabilities or income and expenses, unless required or allowed by any IND AS.

7. **Frequency**- An entity shall present a complete set of financial statements (including comparative Information) at least once in a financial year.

8. **Comparative information** – An entity shall present atleast the following statements:

i. 2 Balance sheets
ii. 2 Statement of Profit and Loss
iii. 2 Statement of Cash flows
iv. 2 Statement of changes in Equity and Related Notes.

When an entity applies an accounting policy retrospectively or makes a retrospective restatement from a back date; then it shall balance sheets as at –

- The end of the current period,
- The end of the previous period or beginning of the current period and
- The beginning of the earliest comparative years.

9. **Consistency-** An entity shall consistently follow and apply the same presentation and classification of items in the financial statements from one accounting period to another.

A business must include all the owner changes in equity in a statement of changes in equity. A single statement of profit and loss must include all non-owner changes in equity (also known as statement of comprehensive income), with profit or loss and other comprehensive income. The portions must be presented collectively, with the profit or loss section coming first followed by other comprehensive income.

Entity must explicitly state in the notes that its financial statements are IND AS compliant. Financial statements cannot be referred to as compliant with IND AS unless they meet all of the requirements of all the applicable IND ASs. Financial statements that are IND AS compliant are assumed to be providing a true and fair view.

The Standard also addresses concerns related to continuing operations, balancing of assets, liabilities, revenue, and expenses, as well as modifications to presentation or categorization.

7.4.5 Structure and Content

An entity shall separate the financial statements from other information in the same published document and clearly identify them. The Balance Sheet must include certain minimum Line Items as prescribed in this standard. Additionally, it specifies the details that must be included in the statement of profit and loss, other comprehensive income section, and statement of equity movements.

Other Comprehensive Income

Items of income and expenses (including reclassification adjustments) that are not recognised in profit or loss as required or permitted by other IND AS, such as changes in revaluation surplus are included in other comprehensive income.

According to the Standard, each component of other comprehensive income must be disclosed, along with any reclassification adjustments and income tax. Reclassification adjustments are sums that have been transferred from other comprehensive income to profit or loss in the current period.

The other comprehensive income includes the following:

(a) Items of other comprehensive income categorised by nature and grouped into those that:

(i) will not be subsequently reclassified to profit or loss; and

(ii) will be subsequently reclassified to profit or loss when certain conditions are met.

(b) the portion of associates' and joint ventures' other comprehensive income that is accounted for using the equity method, broken down into the portions of items that:

(i) will not be subsequently reclassified to profit or loss; and

(ii) will be subsequently reclassified to profit or loss when certain conditions are met.

Current/non-current distinction

The Standard mandates that a business exhibit current and non-current liabilities and assets in its balance sheet as separate classifications, unless liquidity provides basis provides more accurate and reliable information. An entity must list all assets and liabilities in the order of their liquidity when that exception applies.

For each asset and liability line item that combines amounts estimated to be recovered or resolved, the Standard mandates that a business report the amount projected to be recovered or settled after more than twelve months.

A maximum of twelve months following the reporting period is allowed, but more than twelve months is also acceptable.

The Standard mandates that :

(a) An entity shall disclose the material judgments, other than those involving estimations.

(b) An entity must disclose matetrial information regarding its future projections, as well as other substantial sources of estimating uncertainty.

(c) An entity must disclose information enabling users to assess the business's goals, rules, and procedures for capital management. Any firm that classifies putable financial products as equity instruments must also make additional disclosures.

7.5 IND AS – 7 CASH FLOW STATEMENT

According to IND AS 7, a business must include a statement of cash flows as a fundamental component of its primary financial statements. Operating activities (either using the "direct" or "indirect" technique), investing activities, and financing activities are the three categories into which cash flows are categorised and presented; the latter two are typically presented on a gross basis.

7.5.1 History of IND AS 7

Table 7.2: *History of Ind AS 7*

June, 1976	Statement of Source and Application of Funds Exposure Draft E7
October, 1977	Statement of Changes in Financial Position under IAS 7
July, 1991	Draft E36 Cash Flow Statements for Public Review
December, 1992	IAS 7 Cash Flow Statements (1992)
January, 1994	the launch of IAS 7 (1992)
September, 2007	As a consequence of changes to IAS 1, the statement of cash flows was renamed from cash flow statements to statement of cash flows.
April, 2009	IAS 7 has been modified with regard to expenses that don't produce a recognised asset by Annual Improvements to IFRSs 2009.
July, 2009	Date on which IAS 27(2008) modifications relating to changes in a subsidiary's ownership take effect
January, 2010	the April 2009 amendments to IAS 7 went into effect
January, 2016	Amendments to IAS 7 as a result of the Disclosure Initiative
April, 2016	IND AS Phase 1 applies
January, 2017	Date on which the January 2016 updates to IAS 7 became effective
April,2017	IND AS Phase 2 applies

April,2018	IND AS Phase 3 applies
April,2019	IND AS Phase 4 applies

7.5.2 Objectives of IND AS 7

Users of financial statements can evaluate an entity's capacity to produce cash and cash equivalents and its requirements for utilising those cash flows using information about the entity's cash flows. The ability of an entity to generate cash and cash equivalents, as well as the timing and certainty of their generation, must be assessed in order for users to make economic decisions.

By using a statement of cash flows that divides cash flows over the period into operating, investing, and financing activities, this Standard seeks to compel the supply of information on the historical changes in cash and financial equivalents of a company.

7.5.3 Applicability of IND AS 7

The cash flow statement is applicable to all businesses, and no organisation type is immune from having to prepare and submit one. However, according to the current AS, small and medium-sized businesses are not required to have one.

7.5.4 Scope of IND AS 7

For each period for which financial statements are prepared, a business must compile a statement of cash flows in accordance with the requirements of this standard and include it as a component of those financial statements.

7.5.5 Definitions of IND AS 7

- Cash – Cash comprises cash on hand and demand deposits. (Source- Ministry of corporate affairs)

- Cash equivalents – Cash equivalents are short-term, highly liquid investments that are readily convertible to known amounts of cash and which are subject to insignificant risk of changes in value. (Source- Ministry of corporate affairs)
- Cash flows – Cash flows are inflows and outflows of cash and cash equivalents. (Source- Ministry of corporate affairs)

Note-

a. Borrowing from banks is typically regarded as a financing activity. However, bank overdrafts that are repayable immediately are included in cash and cash equivalents when they constitute a crucial part of an entity's cash management.
b. Normally, an investment can only be considered a cash equivalent if its maturity is short—say, 3 months or less—from the date of purchase.

- Operating Activities – are the principal revenue-producing activities of the entity and other activities that are not investing or financing activities. (Source- Ministry of corporate affairs)

Examples-
Cash payments to suppliers for goods and services include:
1. Cash receipts from sales of goods or provision of services;
2. Cash receipts from royalties, fees, commissions, and other sources of income; and 3. Cash receipts from other sources.
4. Securities and loans may be held by an entity for trading or dealing purposes, in which case they resemble inventories purchased particularly for resale. As a result, the cash flows from dealing or trading in securities are categorised as operating activities.

Note- Cash received to produce or purchase assets held for others' rental use and thereafter held for sale is referred to as cash flows from operational operations in paragraph 68A of Industrial AS 16. Cash flow from operating activities also includes the sums received from rent payments and later sales of the aforementioned assets.

For Calculating Operating Cash flows, there are two methods i.e., direct and indirect method. The more encouraged and commonly used method is direct but indirect method of presentation is also accepted. (IAS 7.18)

❖ Direct Method - Each significant type of gross cash inflows and outflows is displayed using the direct technique. Under the direct technique, the operating cash flows component of the cash flow statement might look something like this:

Cash receipts from customers	XXXX
Cash paid to suppliers	(XXXX)
Cash paid to employees	(XXXX)
Cash generated from the operations	XXXX
Interest Paid	(XXXX)
Income tax paid	(XXXX)
Cash flow from operating Activities	XXXX

❖ The indirect approach takes non-cash transaction effects into account when adjusting accrual basis net profit or loss. Under the indirect technique, the operating cash flows component of the cash flow statement might look something like this:

Profit before interest and income taxes		XXXX
Add back depreciation		XXXX
Add back impairment of assets		XXXX
Increase in receivables	XXXX	
Decrease in inventories		XXXX
Increase in trade payables		XXXX
Interest expense	XXXX	
Less Interest accrued but not yet paid	XXXX	
Interest paid		XXXX
Income taxes paid		XXXX

Net cash from operating activities		XXXX

- Investing Activities – are the acquisition and disposal of long-term assets and other investments not included in cash and cash equivalents. (Source- Ministry of corporate affairs)

  Examples-

  1. Payment in cash for the purchase of real estate, machinery, and equipment, as well as other long-term assets.
  2. Profits from the sale of intangibles, such as property, plant, and equipment,
  3. Making a cash purchase of stock or debt instruments
  4. Loans and cash advances to third parties
  5. Payment in cash for option, forward, and future contracts

  Format-

Purchase of property, plant, and equipment	(XXXX)
Proceeds from sale of equipment	XXXX
Cash flow from Investing Activities	XXXX

- Financing Activities – are activities that result in changes in the size and composition of the contributed equity and borrowings of the entity. (Source- Ministry of corporate affairs)

  Examples-

  1. Cash received from the sale of stock instruments such as shares.

  2. Payment in cash to shareholders in order to purchase or redeem equity shares

  3. Cash received via the sale of debt instruments such as bonds, notes, and mortgages.

  4. Cash repayment for the borrowed amount, and 5. Cash repayment from the lessee to offset the outstanding liabilities

  Format-

Proceeds from issuance of common stock	XXXX
Proceeds from issuance of long-term debt	XXXX
Principal payments under capital lease	(XXXX)
Dividends paid	(XXXX)
Cash flow from financing activities	XXXX

Note - Operating, investing, and financing cash flows may all be reported on a net basis.

Foreign currency cash flows

Cash flows resulting from transactions in a foreign currency must be recorded in the functional currency of the entity by applying the foreign currency amount to the functional currency amount at the exchange rate in effect on the date of the cash flow.

The cash flows of a foreign subsidiary must be converted using the foreign currency's exchange rate and the functional currency's exchange rate as of the cash flow dates.

Cash flows do not include unrealized gains and losses brought on by fluctuations in foreign exchange rates. To reconcile cash and cash equivalents at the beginning and end of the period, the impact of exchange rate changes on cash and cash equivalents held or payable in a foreign currency is however recorded in the statement of cash flows.

This sum includes any changes, if any, that would have existed had the cash flows from operating, investing, and financing operations been reported at end-of-period exchange rates. It is given separately from those cash flows.

Interest and dividends

Dividends and interest payments and receipts must both be broken out separately in the cash flow statement. In the case of a financial institution, cash flows from interest paid and interest and dividends received should be categorised as cash flows from operating operations. Interest paid should be treated as a cash flow from financing activities in the case of other firms, whereas interest and dividend payments should be classified as cash flows from investing activities. It is appropriate to classify dividend payments as cash flows from financing activities.

For a financial organisation, operating cash flows are often defined as interest paid, interest and dividends received, and interest paid. On how to classify these cash flows for other organisations, there is no agreement, nevertheless. Some contend that since they affect whether a business makes a profit or loses money, interest paid and interest and dividends received may be categorised as operating cash flows. Although interest represents a cost of getting financial resources or returns on investments, it is more acceptable to classify interest paid and interest and dividends received as financing cash flows and investing cash flows, respectively.

Some contend that in order to help consumers assess an entity's capacity to pay dividends out of operating cash flows, dividends paid may be included as a component of cash flows from operating activities. However, because dividend payments involve a cost of getting financial resources, it is thought more acceptable to classify them as cash flows from financing activities.

Taxes on income

Unless they can be directly linked to financing and investment operations, cash flows from income taxes must be stated separately and are classed as cash flows from operational activities.

Taxes on income are incurred on transactions that result in cash flows that are categorised in a statement of cash flows as operating, investing, or financing activities. Even though tax expenses are sometimes easy to associate with financing or investing activities, the associated tax cash flows are frequently difficult to pinpoint and may occur at a different time than the cash flows of the underlying transaction. Taxes paid are therefore typically categorised as cash flows from operating operations. However, the tax cash flow is appropriately classed as an investing or financing activity when it is practical to link it to a specific transaction that results in cash flows that are categorised as such activities. The overall amount of taxes paid is disclosed when tax cash flows are distributed across many activity classes.

Non-cash transactions

A statement of cash flows must not include investing or financing activities that don't involve cash or cash equivalents. All pertinent information regarding these investing and financing operations related to such transactions must be disclosed elsewhere in the financial statements.

Components of cash and cash equivalents

The components of cash and cash equivalents must be disclosed, and the amounts in the statement of cash flows must be compared to the corresponding items on the balance sheet.

A company discloses the strategy it uses to determine the composition of cash and cash equivalents in order to comply with IND AS 1, Presentation of Financial Statements, and in light of the diversity of cash management practises and banking arrangements around the world.

7.5.6 Difference between Ind AS 7 and AS3

Table 1.3: *Difference between Ind AS 7 and AS3*

IND AS 7	AS 3
Specifically includes bank overdrafts which are repayable on demand as a part of cash and cash equivalents	Silent on this aspect
Treatment of cash payments to manufacturer or acquiring assets for rental to others and at the same time held for sale in the course of business as cash flows from operating activities	Does not contain such requirements
No mention on the treatment of extraordinary items	Cash flows associated with extraordinary activities to be separately classified as arising from operating, investing and financing activites

7.6 IND AS- 109 FINANCIAL INSTRUMENTS

The classification, recognition, de-recognition, and measurement requirements for all financial assets and liabilities are covered by IND AS 109 Financial Instruments. The stakeholders will be able to evaluate the timeliness and uncertainty of a business's future cash flow thanks to the standards provided by this standard for accounting and reporting of Financial Instruments (FI).

7.6.1 Objectives of Ind AS 109

This Standard aims to define guidelines for the financial reporting of financial assets and liabilities that will provide readers of financial statements with pertinent and helpful information for their evaluation of the quantities, timing, and uncertainty of an entity's future cash flows.

7.6.2 Scope of Ind AS 109

1. All entities shall apply this Standard to all categories of financial instruments, with the exception of:
    a. those investments in associates and joint ventures that are reported in accordance with Ind AS 28 Investments in Associates and Joint Ventures, Ind AS 27 Separate Financial Statements, or Ind AS 110 Investments in Subsidiaries, Associates, and Joint Ventures. To account for an interest in a subsidiary, associate, or joint venture in accordance with any or all of the requirements of this Standard, however, may be required or permitted in some circumstances by Ind AS110, Ind AS 27, or Ind AS 28. Unless the derivative complies with the definition of an equity instrument of the entity in Ind AS 32 Financial Instruments: Presentation, entities must also apply this Standard to derivatives on an interest in a subsidiary, associate, or joint venture.
    b. Rights and responsibilities under leases covered by Ind AS 17 Leases. However, the de-recognition and impairment criteria of this Standard apply to lease receivables that have been recognised by a lessor; The de-recognition requirements of this Standard apply to finance lease payables that are acknowledged by a lessee,

and the embedded derivatives requirements of this Standard apply to derivatives that are included in leases.

c. rights and responsibilities of employers with regard to employee benefit plans, as defined by Ind AS 19 Employee Benefits.

d. Financial instruments issued by the entity that satisfy Ind AS 32's definition of an equity instrument (including warrants and options) or that must be categorised as an equity instrument in accordance with Ind AS 32's paragraphs 16A and 16B or 16C and 16D. However, the holder of such equity instruments must treat them in accordance with this Standard unless they fall under one of the exceptions in (a).

e. rights and obligations arising under I a contract that falls under the purview of Ind AS 104 Insurance Contracts because it has a discretionary participation feature, with the exception of an issuer's rights and obligations arising under an insurance contract that satisfies the definition of a financial guarantee contract. However, if the derivative is not a contract within the purview of Ind AS104, this Standard still applies to the derivative that is contained in the contract. Additionally, an issuer of financial guarantee contracts may choose to apply either this Standard or Ind AS104 to such financial guarantee contracts if the issuer has previously stated explicitly that it views such contracts as insurance contracts and has used accounting that is appropriate for insurance contracts Contract by contract, the issuer may make that choice; but, each contract's choice is final.

f. any forward agreement between an acquirer and a selling shareholder to purchase or sell an acquire that, at a later acquisition date, results in a business combination covered by Ind AS103 Business Combinations. The term of the forward contract should not be longer than is ordinarily required to complete the transaction and acquire any relevant approvals.

g. promises to lend money aside from those later described. However, if a loan promise falls beyond the parameters of this Standard, the issuer must still apply the standard's impairment requirements to it. Additionally, this Standard's derecognition rules apply to all loan obligations.

h. Financial commitments made as part of share-based payment transactions are covered by Ind AS102 Share-based Payment.

i. rights to payments from third parties to cover expenses incurred by the company to resolve liabilities that it has recognised as provisions under Ind AS 37 Provisions, Contingent Liabilities, and Contingent Assets, or for which it has previously recognised provisions under Ind AS 37.

j. Contracts with Customers that contain rights and responsibilities covered by Ind AS 115 that are financial instruments, except from those that Ind AS 115 specifically mentions, are reported in compliance with this Standard.

2. For the purpose of recognising impairment profits or losses, the rights that Ind AS115 stipulates are accounted for in accordance with this Standard shall be subject to the impairment requirements of this Standard.

3. The loan commitments listed below fall under the purview of this Standard:

   a. obligations for loans that the firm classifies as financial liabilities and values at fair market value. Applying this Standard to all of its loan obligations in the same class is required of a company that has a history of disposing the assets arising from its loan commitments soon after origination.

   b. loan commitments that are repayable in full in cash, in the form of another financial instrument, or both. These contracts to lend money are derivatives. A loan commitment isn't considered resolved net just because it's paid off in instalments (like a mortgage construction loan that's disbursed in instalments in accordance with the construction's progress).

   c. Promises to offer a loan at a rate that is lower than the market rate

4. With the exception of contracts that were entered into and are still held for the purpose of the receipt or delivery of a non-financial item in accordance with the entity's anticipated purchase, sale, or usage requirements, this Standard shall apply to those contracts to buy or sell a non-financial item that can be settled net in cash or another financial instrument, or by exchanging financial instruments. The contracts, however, that an entity identifies as measured at fair value through profit or loss in line with the next paragraph shall be subject to this Standard.

5. A agreement to buy or sell any non-financial item that can be settled net in cash or another financial instrument, or by exchanging financial instruments, as they were a financial instrument, may be irrevocably designated as measured at fair value through profit or loss, even if it was made in accordance with the entity's anticipated needs for purchase, sale, or usage.

Only if it completely eliminates or significantly reduces a recognition inconsistency (also known as a "accounting mismatch") that would otherwise be caused by failing to recognise the contract because it is not covered by this Standard is it possible to make this designation at the time the contract is signed.A contract to buy or sell a nonfinancial object may be settled net in a number of ways, including in cash, another financial instrument, or by swapping financial instruments.

A contract that falls under subparagraphs (b) or (c) is one that is made without regard to the entity's anticipated needs for the purchase, sale, or use of the non-financial item and is thus covered by this Standard.

Other contracts covered by paragraph 2.4 are examined to see if they were signed and are still in effect for the purpose of receiving or delivering the non-financial item in accordance with the entity's anticipated needs for purchases, sales, or other uses, and if so, whether they fall under the purview of this Standard.

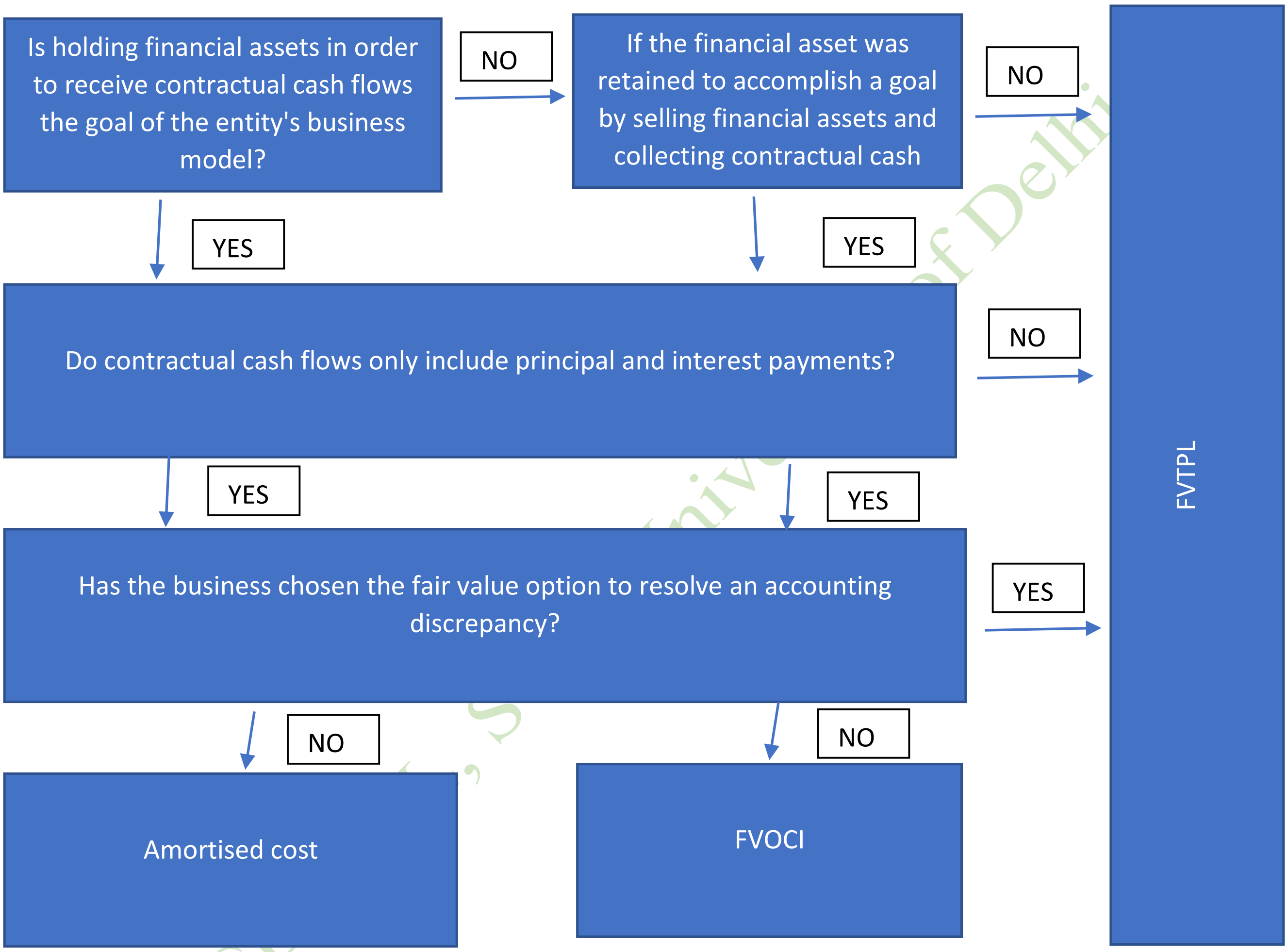
7.6.3 Classification of financial assests and financial liabilities

Classification of financial assets

An entity must categorise its financial assets as per its strategy for managing them or the contractual cash flow pattern of financial assets that will then be assessed at:

S.No.	Business Model	Measurement
1	The financial asset is kept to fulfil contractual obligations, and it generates cash flows on predetermined periods that are limited to payments of principal and interest on the outstanding principal amount.	Amortised cost
2	Financial assets are held through the sale of financial assets and the collection of contractual cash flows. The financial asset generates cash flows that are only payments of principle and interest on the outstanding principal amount due on the stated dates.	Fair Value Through Other Comprehensive Income

3	If the requirements for the first two techniques are not met, residual	Fair Value Through Profit & Loss



Classification of financial liabilities

With the exception of: (a) At FVTPL, all financial liabilities are later measured at fair value. Transfers that are ineligible for derecognition (b) (continuing involvement approach) Contracts to offer financial guarantees (c) Loan commitments made at below-market interest rates (d) (e) Changes in contingent consideration must be reported in profit or loss and evaluated at fair value.

Measurement under IND AS 109 Financial Instruments

In the absence of fair value (transaction value), the direct transaction cost of the FI is taken into account for first recognition. The following describes the Effective Interest Rate (EIR) method:

S.No.	Nature of Financial Asset	Interest Revenue calculation
1	Normal	EIR to Gross Carrying Amount
2	Purchase Credit Impaired	credit adjusted EIR Used
3	Became Credit Impaired	EIR in subsequent period Used
4	Modified contractual cash flow	Recalculate GCA and modify gain or loss in P&L

Recognition of Financial Instruments

Only until the entity has signed the contract containing the instrument will it be able to record an asset or liability in its balance sheet. Either the trade date accounting or the settlement date accounting can be used to acknowledge and de-recognize a regular acquisition or sale of financial assets.

De-recognition of financial assets

Since this idea is used at the level of the consolidated entity, an entity must first consolidate all of its subsidiaries in line with IND AS 110. Subject to certain restrictions, de-recognition may be applied to a specific portion, the full asset, or a group of related assets. Only when the contractual rights to the financial asset's cash flows expire or the financial asset is transferred and the transfer is eligible for de-recognition, must an entity de-recognize the financial asset. When an entity transfers a financial asset, it must assess the degree to which it still bears the risks and benefits of ownership.

S.No.	All Risk and Rewards of ownership	Results

1	Substantially - Transfers	Recognize the liabilities established or retained in the transfer separately and de-recognize the financial asset.
2	Substantially – Retains	Keep appreciating the financial asset
3	Neither Transfers nor retains substantially	Check to see if the entity still maintains control over the financial asset.

De-recognition of financial liabilities

A financial liability (or portion thereof) may only be discharged by an entity once it has been extinguished (Contract obligation is discharged or cancelled or expires).

Let's examine the various accounting procedure situations:

S.No.	**Event**	**Accounting Process**
1	Exchange with material changes between the current borrower and the lender	Extinguishment of the original financial liability and the recognition of a new financial liability
2	Upon expiration or transfer to a third party (entirely or part)	To be recognised in profit or loss is the difference between the carrying amount and the consideration received (including any non-cash assets).
3	Repurchase a portion of an obligation	Based on the fair values as of the repurchase date, divide the previous carrying amount between the portion that is still recognised and the portion that is de-recognised.

Embedded derivatives

An embedded derivative is a part of a hybrid contract that also contains a host contract that is not a derivative. Some of the combined instrument's cash flows fluctuate similarly to a stand-alone derivative. It is not an embedded derivative but rather a distinct FI when a derivative is linked to a FI but is legally transferable apart from that instrument or has a different counter party.

Hybrid contracts with financial asset hosts

A hybrid contract has both derivative and non-derivative components that cannot be transferred separately from the host contract. An embedded derivative in a hybrid contract with a host that is not an asset must be distinguished from the host and recorded as a derivative only if:

- The embedded derivative's economic characteristics and risks are not very closely tied to the host.
- The definition of a derivative includes a distinct instrument having the same terms as the embedded derivative.
- In order to account for changes in fair value, the hybrid contract is not valued at fair value. If it is impossible to distinguish and measure the embedded derivative from its host, the entire hybrid contract should be designated as being at FVTPL. If the fair value cannot be accurately determined, the difference between the fair values of the hybrid contract and the host is taken into account; otherwise, it is classified as FVTPL.

Reclassification

Reclassify any financial assets that are impacted when an entity modifies its business model for managing financial assets. Any financial responsibility cannot be reclassified by an entity. Since classification is dependent on specific principles, it must be redone if those principles change. Measurement must be completed on the reclassification date.

Initial	Revised	Accounting
Amortised Cost	FVTPl	FV regarding the reclassification date and PL discrepancy
Amortised Cost	FVOCI	FV on the reclassification date and the OCI difference
FVOCI	Amortised Cost	FV is carrying value as of the reclassification date. OCI's cumulative gain/loss adjusted for FV

FVOCI	FVTPL	Asset taken into account at FV. OCI-adjusted cumulative gain/loss in PL
FVTPL	FVOCI	Considering an asset at FV
FVTPL	Amortised Cost	FV is carrying value as of the reclassification date. EIR was updated

Write-off

Net Carrying When there are no realistic prospects of recovering a financial asset in full or in part, the amount of that asset is directly lowered.

Impairment – Expected Credit Loss (ECL)

Expected Credit Loss (ECL) model is used to underpin the requirements and acknowledgment of impairment. It is necessary to use the ECL approach to: 1. FI calculated using amortised cost 2. FI as determined by FVOCI 3. Contract assets, trade receivables, and lease receivables 4. Financial guarantee contracts subject to Ind AS 109 but not taken into account by FVTPL 5. No loans made have been measured at FVTPL

S.No.	Name	Explanation
1	General Approach	The 12 month ECL is employed if there hasn't been a significant increase in credit risk since initial detection. Life-time ECL is utilised if credit risk has dramatically escalated. Future impairment losses are based on 12 month ECL if credit quality improves to the point where there is no longer a significant rise in credit risk.
2	Simplified Approach	The recognition of an impairment loss based on lifetime ECLs at each reporting date eliminates the need to track changes in credit risk. If there is no significant financial component, this is required by IND AS 115 for trade receivables or contact receivables. Provision is made in accordance with prior due dates.

Hedging Instruments (HI)

A hedged item can be a known asset or liability, an unacknowledged firm commitment, a predicted transaction, or a net investment in an overseas business. The object being hedged can be a single item or a collection of items that are consistently measured or likely. Only if all of the following conditions are met does a hedging relationship meet the requirements for hedge accounting:

- There are just qualified HI and eligible hedged items in it.
- The entity's risk management purpose is included in official designation, documentation, and other information.
- satisfies each of the following criterion for hedge effectiveness:

  Relationship between the hedged item's and HI's finances

  The value changes are not primarily driven by the impact of credit risk. and

  The amount of the HI that the entity actually uses to hedge that quantity of the hedged item and the hedge ratio in the hedging relationship are both the same.

7.6.4 Accounting treatment of hedging relationships

A. Fair value hedge:

- The increase or decrease in the HI's profit or loss
- The hedged item's gain or loss is adjusted to the GCA. Profit or loss includes any gain or loss on financial asset evaluated at FVTCI.
- An equity instrument known as a hedged item adopts changes to FVOCI while remaining in OCI.

- The cumulative change in fair value of a hedged item, which is an unacknowledged firm commitment, is recognised as an asset or a liability and a corresponding gain or loss is reported in P&L.

B. Cash flow hedge:

- The lower of the following is used to adjust the cash flow hedge reserve:
  the total gain or loss on the HI since it was created
  the total change in the HI's fair value
- OCI records the gain or loss on the HI up to the amount that is deemed to constitute an effective hedge.
- The P&L accounts for any lingering gain or loss on the HI due to the hedge's ineffectiveness.

C. A hedge of a net investment in a foreign operation:

- OCI records the portion of the gain or loss on the HI that is assessed to be an efficient hedge.
- In P&L, the ineffective portion is noted.

7.7 SUMMARY

The main points and themes covered in the lesson must be reviewed and highlighted at the end of the lesson in the form of a summary. Please note that 'this is not a conclusion: rather it will help the learners in remembering the main points of the lesson and therefore it is written at the end of the lesson. It should be one paragraph and should not be too long. Further, if the author feels the need, key points can be given as a numbered or bulleted list or a diagram chart.

7.8 ANSWERS TO IN-TEXT QUESTIONS

1. Institute of the Chartered Accountants of India (ICAI)
2. Indian AS (Ind AS)
3. 4

7.9 SELF-ASSESSMENT QUESTIONS

1. Explain the significance and applicability of Indian Accounting Standards.
2. What is financial statements under Ind AS 1?
3. What are the objectives and scope of Ind AS1?
4. Write a short note on Cash flow statement?
5. Define Operating, financial and dividend activites under Ind AS 7.
6. What is the difference between inderct and direct method to calculate cash flow from operating activities.
7. Define Non cash transactions.
8. What is the difference between Ind AS 7 and AS 3 on CFS.
9. Expain Scope and Objectives of Ind AS 109.
10. Explain conceptualisation of classifying financial assests and liabilities.

7.10 SUGGESTED READINGS

1. Narayanaswamy R. Financial Accounting: A Managerial Perspective. PHI Learning Private Limited, Delhi.

2. Robert N. Anthony, David F. Hawkins, Kenneth A. Merchant. Accounting- Text and Cases. McGraw Hill Education (India) Private Limited, New Delhi.

3. Garg CA Kamal, and Sehrawat Neeraj Kumar. Beginner`s Guide to Ind-AS & IFRS. Bharat Law House Pvt. Ltd., New Delhi.

4. Maheshwari S.N., Maheshwari Suneel K., and Maheshwari Sharad K. An Introduction to Accountancy. Vikas Publishing House Private Limited, Noida.

LESSON 8

ANALYSIS OF ACCOUNTING INFORMATION

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STRUCTURE

8.1 Learning Objectives
8.2 Introduction
8.3 Meaning of Ratio, Accounting Ratio and Understanding Ratio
8.4 Forms of Expressing Ratios
8.5 Meaning of Ratio Analysis
8.6 Objectives of Ratio Analysis
8.7 Advantages of Ratio Analysis
8.8 Limitations of Ratio Analysis
8.9 Types of Ratios
8.10 Liquidity (Short-term Solvency) Ratios
8.11 Solvency (Long-term Solvency) Ratios
8.12 Activity Ratios
8.13 Profitability Ratios
8.14 Summary
8.15 Glossary
8.16 Self-Assessment Questions
8.17 Suggested Readings

8.1 LEARNING OBJECTIVES

After reading this lesson, students will be able to understand:

- The concept of Ratio and Ratio Analysis
- Forms of expressing ratios

- Significance of Ratio Analysis
- Liquidity Ratios
- Long term Solvency Ratios
- Profitability ratios
- Activity ratios

8.2 INTRODUCTION

The users of financial statements (shareholders/owners/investors, management, employees, lenders, competitors, government and regulatory agencies, auidtors, etc.) are always interested in understanding and interpretating the meaning of financial information contained in the financial statements, which is possible only by understanding the relationships between various financial variables contained in balance sheet and statement of profit and loss. Such analysis is known as the **Accounting Ratio Analysis**.

Ratios analysis helps in identifying the patterns and trends in income, expenses, sales growth and helps to predict the future financial position and results (profit or loss).

8.3 UNDERSTANDING ACCOUNTING RATIO AND ANALYSIS OF ACCOUNTING RATIOS

Ratio: It is a mathematical expression of indicating relationship between two interdependent quantities which can be financial items or variables in the financial statements or two accounting figures.

Accounting Ratio: when ratio is calculated between two financial or accounting variables on the basis of information given in the financial statements, balance sheet, profit and loss account such as profit, sales, assets, liabilities, debtors, creditors, etc

Accounting Ratio Analysis: it the mechanism of studying relationship among various financial variables (such as profit, sales, assets, liabilities, debtors, creditors) with the help of accounting ratios. It is a process of determining and interpreting relationships between financial variables given in the financial statements to obtain an understanding of trends and making future predictions of the financial performance and position of a business enterprise.

8.2 EXPRESSING ACCOUNTING RATIOS IN DIFFERENT FORMS

Accounting ratios can be expressed in the following forms:

1. **Pure:** ratio is expressed as a quotient such as current ratio, quick ratio, etc.
2. **Percentage:** ratio is expressed in the form of percentage such as net profit ratio, gross profit ratio, return on investment, etc.
3. **Times:** ratio is expressed in number of times a financial variable in terms of another financial variable such as debtors turnover ratio, creditors turnover ratio, inventory turnover ratio etc.

8.3 OBJECTIVES OF RATIO ANALYSIS

Ratio analysis is done with the following objectives:

1. Making understanding of financial information presented in the financial statement very simple and precise.
2. Facilitating determination of both liquidity and long-term solvency of the business enterprise.
3. Assists in determining the operating efficiency.
4. Facilitating analysis of profitability.
5. Comparative study which can be either intra-firm (of the same entity over different periods) or inter firm (from one entity to another) comparisons.

8.7 SIGNIFICANCE OF RATIO ANALYSIS

Ratio Analysis offers the following advantages:

1. **Determining Operating Efficiency:** ratio analysis heps in assessing and evaluating liquidity (short term solvency), solvency and profitability of a business enterprise.
2. **Inter-firm comparison and Intra-firm comparison of performance:** When performance is compared with performance other business organisations in the same industry, it is called Inter-firm Comparison. while, if the performance of same organisation over different years is compared or performance of different divisions or segments within the same organisation is compared, it is called Intra-firm Comparison. Accounting ratios facilitates both inter firm and intrafirm comparisons.
3. **Helps in Analysis of Financial position and performance:** Through ratios users of financial information can analyse the financial statements to know financial position and performance of a business enterprises. There are many stakeholders such as bankers, regulators, investors, tax authorities, creditors, owners, management, etc. who are interested in knowing the financial performance and postion of the business enterprise.
4. **Helps in making Forecasts :** Accounting ratios helps to identify the trends in financial performance or activities of the organisation which helps in future planning and

forecasting.

5. **Simplifies Accounting Information:** Ratios summarises the results of detailed and complicated information in a very precise manner.
6. **Spotting/locate Weak Areas:** Accounting ratios can be used to locate the weak areas where the business is not performing well as compared to past years or others in the industry. Therefore management can take prompt corrective actions to improve the performance in those areas.

8.8 LIMITATIONS OF RATIO ANALYSIS

Besides many advantages, ratio analysis suffers from the following disadvantages

1. **No Standard Ratio:** There is no benchmark against which actual ratios can be compared determine whether a ratio is favourable or adverse.
2. **Reliability issues:** Ratios are calculated on the basis of information given in the financial statement which is not futuristic but realtes to past only, further if the information available is not then ratios will be incorrectly calculated. Therefore, one cannot completely rely on ratios to make any future economic decisions.
3. **Qualitative Aspects are ignored:** Rratios considers only quantitative factors and all the qualitative factors such as efficiency of management, customer satisfaction level, etc. are ignored, which are also to be considered future decision making.
4. **Uncomparable in case of different Financial Reporting Framework:** Different entities within the same industry may follow different Financial Reporting Framework having different policies and procedures for preparing and presenting financial statements. Due to which amount of financial items such as sale, profit, current assets, etc would also differ. Thus, accounting ratios of different business organisation cannot be compared as they based on information derived from different accounting policies and methods.
5. **Ignores changes in Price Level:** Since accounting is based on the historical cost concept, the assets are carried at historical cost minus accumulated depreciation and not on their current market value prevailing in the relevant market.
6. **Scope for Manipulations and Window Dressing:** Accounting cannot prevent the inherent risk of window dressing by the internal management to modify the financial performance and position to gain undue advantage at the cost of users, thus manipulative information will make ratios inaccurate leading to incorrect calculation of ratios affecting the economic decisions taken on the basis such incorrect ratios.
7. **Personal Judgement:** Since, recording of transactions and events, preparation of financial statements is largely influenced by personal judgments of management. Therefore, accounting ratios calculated on the basis of such information on comparable and are biased.

8.9 TYPES OF RATIOS

Ratios are classified into the following types:

1. **Liquidity or Short-term solvency ratios:** These are the ratios which are concerned with evaluating the ability of a business orgnanisation to meet its short-term financial obligations or current liabilities (which are to be settled within normal operating cycle or 12 months from the reporting date) on time. It includes the following ratios:

1. Current Ratio (which relationship between Current Assets and Current Liabilities)
2. Liquid Asset/ Acid Test/ Quick Ratio (relationship between liquid or Quick Assets and Current Liabilities)

2. Solvency or long-term solvency ratios: These are the ratios which are concerned with evaluating the long-term financial leverage and solvency of the business organisation. They depict the ability of business to repay the long-term financial obligations such as debentures, long term bank loan, public deposits. It includes the following ratios:

1. Debt to Equity or Debt Equity Ratio (DE) (relationship between shareholders funds and debt)
2. Total Assets to Debt Ratio (relationship between total assets and debt)
3. Proprietary Ratio (relationship between shareholders fund and total assets)
4. Interest Coverage Ratio (relationship between interest and earnings before interest)

These ratios are concerned with assessment of capital structure, sources and application of funds.

3. Activity/Turnover ratios: These are the ratios which are concerned with evaluating how efficiently the entity has utilised the resources in the the business operations. It includes the following ratios:

1. Inventory Turnover Ratio (relationship between cost of revenue from operation and average inventory)
2. Debtor/Trade Receivables Turnover Ratio (relationship between net credit sales or credit revenue from operations and Average Trade Recievables)
3. Creditor/Trade Payables Turnover Ratio (relationship between net credit purchases and Average Trade Payables ivluding creditors and bills payable)
4. Working Capital Turnover Ratio (relationship between net sales and working capital)

4. Profitability: These are the ratios which are concerned with evaluating the earning capacity of the business organisation as a return on the resources used. It includes the following ratios:

1. Gross Profit Ratio (relationship between Gross profit and sales)
2. Operating Ratio (relationship between operating cost and sales)
3. Operating Profit Ratio (relationship between operating profit and sales)
4. Net Profit Ratio (relationship between net profit and sales)
5. Return on Investment (relationship between profit and capital employed)

8.10 LIQUIDITY (SHORT-TERM SOLVENCY) RATIOS

Liquidity ratios are concerned with determinig the ability to meet its short-term financial obligations or current liabilities (which are to be settled within normal operating cycle or 12 months from the reporting date) on time. It includes th following ratios:

1. Current Ratio: It is a ratio which is concerned with explaining the relationship between the current assets and current liabilities.

It evaluates the ability of a business organisation to meet or settle its short-term financial obligations or current liabilties on time from the realisation of current assets. It is expressed in the form of pure ratio.

Current ratio can be expressed as follows:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Ideal or acceptable Current Ratio is 2 : 1, cuurent assets must be atleast double the amount of current liabilities so as to provide a suuficient cover for current liabilities.
High Current Ratio indicates better liquidity however very high current ratio indicates poor credit worthiness among the suppliers and creditors and poor operational efficiency.

Current Assets: these are the assets which are expected to be uitlised, realised or converted into Cash and Cash Equivalents within normal operating cycle or within 12 months from the reporting date which ever is higher. It includes:

1. Short-term loans and advances
2. Current Investments (shares and secourities of other entities)
3. Inventories (excluding Loose Tools and Stores and Spares) in the form of raw material, work in progress, finished goods, stock in trade
4. Trade Receivables (sum of bill receivables and sundry debtors)
5. Cash and Cash Equivalents (credit balance in current account with bank, cash in hand, time deposits of upto three months, cheques/drafts in hand and other marketable securities)
6. Other Current Assets (advance given to sppliers of raw material, prepaid expenses, accrued interest, etc.)

Current Liabilities: these are the liabilities which are expected to be settled or repayable through outflow of economic resources within 12 months from the reporting date or within the period of normal operating cycle. It includes:

1. Short-term borrowings (short term bank loans, cash credit, bank overdraft)
2. Short-term provisions (provison for discount on debtors, provision for income taxation, provision for doubtful debts, etc)

3. Trade Payables (sum of bills payable and sundry creditors)
4. Other Current Liabilities (not included in th above categories)

Other Current Liabilities includes the following:
- Current maturities of long term loans or borrowings
- Accrued interest (earned) but not due and not recieved
- Interest accrued and due (earned but not recieved)
- Outstanding expenses (outstanding salary, outstanding rent, etc)
- Unpaid dividend
- Calls-in- advance (advance received for call money on shares), etc.

Operating Cycle: It is the time span between the acquisition of resources (raw material, stock in trade, labour) for processing or production of goods and their conversion into Cash and Cash Equivalents after sale and receipt of cash from debtors.

Note: If the normal operating cycle cannot be determined or not given in the question, then take it as 12 months for classifying assets and liabilities as current and non current.

Working Capital: The amount of capita which is used in meeting day to day expenses and payment to suppliers. It refers to amount by which Current Assets exceeds Current Liabilities.
Formula for Working Capital is given as:

Working Capital = Current Assets - Current Liabilities

Example : From the following information calculate Current Ratio:

Particulars	**Amount**	**Particulars**	**Amount**
Debtors	3,60,000	Bills Payable	40,000
Insurance (prepaid)	80,000	Creditors	2,00,000
Cash at bank	1,00,000	Long term bank loan	8,00,000
Treasury bills	1,00,000	Raw material	1,60,000
Plant and Machinery	10,00,000	Outstanding salary	1,60,000

Solution:

Current Assets = Debtors + Insurance (prepaid)+ Cash at bank + Treasury bills + Raw material
= 3,60,000 + 80,000 + 1,00,000 + 1,00,000 + 1,60,000
= 8,00,000
Current Liabilities = Bills Payable + Creditors + Outstanding salary
= 40,000 + 2,00,000 + 1,60,000
= 4,00,000
Current ratio = Current assets/Current liabilities
=8,00,000/4,00,000
=2:1

Here current ratio is equal to the ideal current ratio

2. Quick or Liquid ratio or Acid Test Ratio: This ratio is concerned with evaluating the cuurent ability of the business organisation to meet its short-term financial obligations or current liabilities which arises within normal operating cycle or 12 months from the reporting date. It studies the relationship between liquid assets and current liabilities. It a better, more prudent and strict indicator of liquidity or short trem solvency as compared to the current ratio because it does not takes into account blocked assets such as prepaid expenses and inventory which cannot be used to pay the current liabilities. It is expressed in the form of a pure ratio.

Liquid or Quick Ratio or Acid test Ratio

$$= \frac{\text{Liquid or Quick Assets (Current Assets- Prepaid expenses- Inventory)}}{\text{Current Liabilities}}$$

Idle Ratio: 1 : 1, Liquid assets must be atleast equal to amount of current liabilities to make their payment on time.

Liquid Assets: These assets are more liquid as compared to current assets and constitutes mainly Cash and Cash Equivalents or assets which can be converted into Cash and Cash Equivalent within the normal operating cycle or 12 months whichever is higher.

Liquid Assets or Quick Assets = Current Assets- Prepaid expenses- Inventory.
Prepaid expenses and inventory are deducted from current assets to obtain the amount of liquid assets because inventories takes time in production and sale to convert in cash and cash equivalents after recovery from trade recievables and prepaid expenses are already been paid to outsiders and cannot be used to pay the outsiders and cannot be readily converted into cash.

Liquid Assets includes the following assets:

- Short-term Loans and Advances,
- Current Investment (into the shares and securities of other entities),
- Trade Receivables (sum of sundry debtors and trade recievables),
- Cash and Cash Equivalents (cash in hand, credit balance in current account at bank, time deposits of upto three months, cheques/drafts in hand and other marketable securities),
- Other Current Assets other than Prepaid Expenses.

Example:
Consider the following information:
Current Assets 12,00,000; Inventories 2,40,000; Working Capital 10,08,000. Determine Quick Ratio.

Solution:
We know that, Quick Assets = Current Assets- – Inventories (other than loose tools and spares)- prepaid expenses
= 12,00,000 - 2,40,000- 0

= 9,60,000
Current Liabilities = Current Assets- Working Capital
= 12,00,000-10,08,000 = 1,92,000
Quick Ratio = Quick Assets or Liquid Assets / Current Liabilities
=9,60,000/1,92,000 = 5:1

Current Ratio vs Quick Ratio:

Basis of Distinction	Current Ratio	Quick Ratio/Liquid Ratio/Acid test Ratio
Relationship	between Current Assets and Current Liabilities.	between the Liquid Assets/Quick Assets and Current Liabilities.
Evalution	Shows ability to pay current liabilities out of current assets which are to be settled within a period of 12 months from the reporting date 931st March) or within the period of normal Operating Cycle which ever is higher.	ability to meet Current liabilities immediately out of liquid assets.
Ideal Ratio	Ideal Ratio is 2:1.	Ideal Ratio is 1:1.
Measure	the short-term financial position or liquidity.	better and more prudent than Current Ratio as it excludes blocked current assets such as inventory and prepaid expenses.

8.11 SOLVENCY RATIOS

Solvency Ratios are also known as Long term liquidity ratios as these are concerned with assessment of capital structure, sources and application of funds.
These are the ratios which are concerned with evaluating the long-term financial leverage and solvency of the business organisation. They depict the ability of business to repay the long-term financial obligations such as debentures, long term bank loan, public deposits. It includes the following ratios:

1. Debt to Equity or Debt Equity Ratio (DE) (relationship between shareholders funds and debt)
2. Total Assets to Debt Ratio (relationship between total assets and debt)
3. Proprietary Ratio (relationship between shareholders fund and total assets)
4. Interest Coverage Ratio (relationship between interest and earnings before interest)

Debt-to Equity Ratio: This ratio is widely used in the industry and is concerned with analysing the relationship between borrowed funds or long-term external debts (includes long-term loans, debentures, public deposits and long-term provisions) and Owners' fund or Equity (Proprietory funds / Equity/Shareholders' Funds consisting of share capital and reserves and surplus).

It determines the capital structure-the mix of outside debts (borrowed funds) and owner's funds invested in the total resources of the orgainsation. It assesses long-term financial soundness of the business enterprise and indicates dependency of business enterprise on external borrowed funds for financing its resources. It is expressed in the form of Pure Ratio.

$$\text{Debt to Equity Ratio} = \frac{\text{Debt (Non current liabilities)}}{\text{Equity (Shareholder's Funds)}}$$

Debt includes the following items:

1. Long term Borrowings (debentures, public deposits, loans from bank)
2. Long term Provisions (provision for Gratuity, leave encashment)
3. Deferred tax Liabilities
4. Other Non Current liabilities

Long term Borrowings:

- These are the borrowings that are due to be settled beyond 12 months from the reporting date (31^{st} March) or after the operating cycle period which ever is higfher.
- Part of Long Term Borrowings payable within 12 months from the reporting date or normal operating cycle period which ever is higher, then such borrowing is termed as 'Current Maturities of Long Term Debts' shown under the head Current Liabilities and will not be considered as Debt while calculating Debt to Equity ratio.

Long term Provisions: These are the provisions for liabilities to settled after 12 months from Balance Sheet date or normal Operating Cycle period whichever is higher. These are shown as line item under the head Non-current liabilities in the balance sheet.

Debt = Long-term Borrowings + Long-term Provisions+ deferred tax liabilities + other long term liabilities

Or

= Total of Equity and liabilities – Non current liabilities -Current Liabilities

Or

= Capital Employed – Equity (shareholders fund)

Equity = Share Capital + Reserves & Surplus

Capital Employed = Non Current liabilities + Shareholder fund (Share Capital + Reserves and Surplus)
Non-Current Assets = Tangible Fixed Assets (Property Plant Equipment) + Intangible Fixed Assets + Non-Current Trade Investments+ Deferred tax Assets + Long-term Loans and Advances + Other non Currents Assets.

Working Capital = Current Assets – Current Liabilities

Note: If there exists Negative Balance of profit in Statement of Profit & Loss under Reserves and Surplus is deducted from Reserves and Surplus to calculate the Shareholders' Funds.

Example: Consider the following information:

Particulars	**Amount**
Property Plant and Equipment	16,80,000
Accumulated Depreciation on Property Plant and Equipment	2,80,000
Non-current Investments in shares and securities	28,000
Long-term Loans and Advances to related parties	1,12,000
Current Assets	7,00,000
Current Liabilities	5,60,000
16% Long-term Borrowings	8,40,000
Long-term Provision for gratuity	2,80,000

Determine Debt to Equity Ratio

Solution:
Debt = 16% Long-term Borrowings + Long-term Provision for gratuity
= 8,40,000+2,80,000 = 11,20,000
Equity = Total Assets - Total external Debts
= (16,80,000 -2,80,000+28,000+1,12,000+7,00,000) -(4,20,000-1,40,000 -2,80,000)
= 5,60,000
Debt /Equity Ratio = Debt (Non Current Liabilities)/Equity (Shareholders Funds)
=11,20,000/5,60,000=2:1

Total Assets to Debt Ratio: It is the ratio which is concerned with explaining relationship between total assets (Current as well as Non Current) and Non Current Liabilities of the business enterprise.
It determines the proportion to which payment of Long term debt or borrowing is covered by the total assets both current and non current assets. It calculates the 'Safety Margin or cover' available to the lenders or outside debt holders to recover their debts.
A high total assets to debt ratio indicates higher safety margin for lenders and vice versa. It is expressed in the form of a Pure Ratio.
Formula for Total Assets to Debt Ratio is given as follows:

Total Assets to Debt Ratio = $\frac{\text{Total Assets(Non current Assets + Current Assets)}}{\text{Debt (Long-term Debts)}}$

Total Assets: These include both Non-current and Current assets which are as follows:

Non-Current Assets: This includes the following assets:

- Fixed assets or Property Plant and Equipment and Intangible Assets (tangible and intangible fixed assets, capital work in progress, intangible assets under development)
- Non-Current Investments (in shares and securities of other entities)
- Deffered Tax Assets (net of Deffered Tax Assets and Deffered Tax Liabilities)
- Long term Loans and Advances
- Other non current assets (not included in above)

Current Assets: This includes the following assets:

1. Current Investments (in shares and securities of other entities)
2. Inventories (including spare parts and loose tools)
3. Trade Receivables (sum of sundry debtors and trade recievables)
4. Cash and Cash Equivalents (cash in hand, credit balance in current account with bank, time deposits of upto three months, cheques/drafts in hand and other marketable securities)
5. Short-term Loans and Advances (advance or loan given to directors, mansgers, employees)
6. Other Current Assets (such as prepaid insurance, prepaid rent, etc.)

Debts: This will include:

1. Long-term Borrowings
2. Deferred Tax liabilities
3. Long-term Provisions
4. Other non current liabilities

Proprietary Ratio: this ratio is concerned with explaining the relationship between proprietor's fund (Shareholders' Funds or Equity) and total assets of the business enterprise showing the financial strength and financial risk or leverage of the business. It shows the proportion of total assets funded by the shareholders' money in the form of shareholders funds. Lenders and banks use it identify the portion of shareholders' funds and external borrowed funds in the total assets employed to measure safety margin or cover available to them aginst their funds invested in the form of loans.

A very high Proprietary ratio indicates that management is not using the concept of trading on equity and there is improper mix of owner' funds and borrowed funds leading to lower return on investment to equity owners. However it indicates the safety margin for creditors and lenders while, lower ratio means inadequate cover for lenders of funds.

Proprietary Ratio = $\frac{\text{Proprietor's Funds or Shareholders' Funds or Equity}}{\text{Total Assets (Current Assets + Non Current Asset)}}$

Proprietors' Funds/ Shareholders' Funds: This can be calculated using two approaches:

1. Liabilities Approach: In this approach,

Proprietors' funds = Share Capital (Equity Share Capital+ Preference Share Capital) + Reserves and Surplus (General Reserve, Securities Premium reserve, credit balance of Surplus).

2. Assets Approach: In this approach,

Proprietors' funds = Non-current Assets + Working Capital (Current Assets – Current Liabilities) – Non-current Liabilities.

Interest Coverage Ratio: This is the most popular ratio used in the industry by professionals, credit rating agencies as it explains the relationship between Net Income before Interest and Tax and Interest on Long Term borrowings or other fixed financial charges. It evaluates profit available to provide as cover against fixed financial service obligations or interest on long term debts including preference dividend. It is expressed in number of times.

A high Interest Coverage Ratio provides a signal of high cover of profit to meet the interest payments, thereby creating a confidence among the lenders about the financial strengtb and earning capacity of the entity.

Formula for Interest Coverage Ratio is given as:

$$\text{Interest Coverage Ratio} = \frac{\text{Profit before Interest and Tax}}{\text{Interest on Long-Term Debt + Prefernce Dividend}}$$

8.12 ACTIVITY RATIOS

Inventory Turnover Ratio (ITR):

a. It shows relationship between Cost of Goods Sold and Inventory.
b. It determines whether the investment in stock is effieciently utilised to generate sales.
c. It depicts the number of times a business organisation sells and replaces its inventory during a year.
d. A high ratio indicates more sales per rupee of investment in the inventories.

$$\text{ITR} = \frac{\text{Cost of Revenue from Operations (Cost of Goods Sold)}}{\text{Average Inventory (Opening Inventory + Closing Inventory)}}$$

Calculation of Cost of Revenue from Operations or Cost of Goods Sold:

<u>In case of a trader:</u>

Cost of Revenue from Operations = Opening Inventory+ Net Purchases (Purchases-Purchase return) + Direct Expenses (Carriage Inward + Wages) - Closing Inventory

<u>In case of a Manufacturer:</u>

Cost of Revenue from Operations = Cost of Raw Materials Consumed + Purchases of Stock-in-Trade + Changes in Inventories of Finished Goods, Work in Progress & Stock-in-Trade +

Direct Expenses(Carriage Inward + Wages)

Direct Expenses: if no direct expenses are given in question, then assume it to be nil.
Average Inventory: (Opening Inventory + Closing Inventory) ÷ 2

Example: Consider the following information:
Revenue from Operations: 32,00,000
Average Inventory: 4,40,000
Gross Loss Ratio 10%
From the above information, calculate Inventory Turnover Ratio
Solution:
Gross Loss = Cost of Revenue from Operations (Cost of Goods Sold)- Revenue from Operations(sales)
Cost of Revenue from Operations = Sales +Gross Loss
= 32,00,000+1,60,000
= 33,60,000
Inventory Turnover Ratio = Cost of Goods Sold /Average Inventory
= 33,60,000/4,40,000 = 7.64 times

Example: Consider the following information:

Particulars	Amount in Rs.
Sales	8,00,000
Gross Profit	2,00,000
Closing stock	2,40,000
Excess of Closing Inventory over Opening Inventory	80,000

Calculate Inventory Turnover Ratio from the above information.
Solution:
Sales = 8,00,000
Gross Profit = 2,00,000
= Sales − Gross Profit
= 8,00,000 − 2,00,000
Cost of Goods Sold = 6,00,000
Let Opening Inventory = x
Closing Inventory = x + 80,000
2,40,000 = x + 80,000
x = 1,60,000
Opening Inventory = 1,60,000
Average Inventory= (1,60,000+2,40,000)/2
Average Inventory= 2,00,000
Cost of Goods Sold = Revenue - Gross Profit
Cost of Goods Sold = 8,00,000 - 2,00,000=6,00,000

Inventory turnover Ratio (ITR) = Cost of Goods Sold or Cost of revenue from operation/Average inventory

ITR =6,00,000/2,00,000
Inventory turnover Ratio = 3 Times

Example: Consider the following financial information of Abhishek limited:

Particulars	2021-22	2022-23
Closing Inventory on 31st March	14,00,000	34,00,000
Sales during the year	1,00,00,000	1,50,00,000

Gross Profit is 25% on Cost of Goods Sold

In the year 2021-22, inventory increased by 4,00,000.

Calculate the Inventory Turnover Ratio for the years 2021-22 and 2022-23 from the above information

Solution:
Gross Profit=1,00,00,000×25/125=20,00,000
Cost of goods sold=1,00,00,000-20,00,000 =80,00,000
Opening Inventory=14,00,000-4,00,000=10,00,000
Average Inventory=(10,00,000+14,00,000)/2=12,00,000
Inventory turnover Ratio(2021-22)= 80,00,000/12,00,000
Inventory turnover Ratio(2021-22)= 6.67 Times

Gross Profit=1,50,00,000×25/125=30,00,000
Cost of goods sold=1,50,00,000-30,00,000 =1,20,00,000
Average Inventory=(14,00,000+34,00,000)/2=24,00,000
Inventory turnover Ratio (2022-23)= 1,20,00,000/24,00,000
Inventory turnover Ratio (2022-23)= 5 Times

Debtor/ Trade Receivables Turnover ratio: This is one of the most popular and widely used ratio which is concerned with explaining the relationship between Credit Revenue from Operations (Net Credit Sales) and Average Trade Receivables (Average debtors + Average bills receivable).

It shows the number of times debtors are turned over or realized in a year with respect to credit sales. i.e how efficiently and readily trade receivables are realised or converted into Cash and Cash Equivalents It indicates the efficiency in recovery and collection of cash from debtors.

A higher ratio indicates that debts are collected more frequently and strict credit policy as less credit period is involved or less investment in debtors is bloacked.

Formula for Trade Receivable Turnover Ratio (DTR) is given as:

$$DTR = \frac{\text{Credit Revenue from Operations (Credit Sales)}}{\text{Average Trade Receivables(Average debtors + Average bills receivable)}}$$

It is expressed in Times

Note 1: Note: provision for doubtful debts is not to be deducted from sundry debtors.

Credit Revenue from Operations (Net Credit Sales) = Credit Sales – Sales Return

Or

= Revenue from Operations – Cash Revenue from Operations

Average Trade Receivables = (Opening Trade Receivables + Closing Trade Receivables)/2

Average Trade Rec. = (Opening Debtors + Closing Debtors + Opening B/R + Closing B/R)/2

Example: Consider the following information:
Closing Trade Receivables 8,00,000
Cash Sales being 25% of Credit Sales
Excess of Closing Trade Receivables over Opening Trade Receivables 4,00,000;
Revenue from Operations or Net Sales 30,00,000.
Calculate Trade Receivables Turnover Ratio from the above information.

Answer:

Let Credit Sales be	= *x*
Cash Sales	=25% of Credit Sale
	=x×25/100
Cash Sales	=25x/100
Total Sales	= Cash Sales + Credit Sales
30,00,000	=25x/100+x
Or, 125x/100	=30,00,000
Or, x	=30,00,000×100/125=24,00,000
Opening Trade Receivables	= Closing Trade Receivables − 4,00,000
	= 8,00,000 − 4,00,000 = 4,00,000
Average receivables	= Opening Receivables +Closing Receivables/2
Average receivables	= (4,00,000+8,00,000)/2=6,00,000
	=Net Credit Sales/Average Trade Receivables
Trade Receivables Turnover Ratio	=24,00,000/6,00,000
	=4

Therefore, Trades Receivable Turnover Ratio is 4 Times

Debt Collection Period: It shows the average time taken in collection of cash from debtors.

$$\text{Debt Collection Period} = \frac{\text{365 Days/ 12 months}}{\text{Trade Receivables Turnover Ratio}}$$

Lower Debt Collection Period is better. It is expressed in number of days or months.

Trade Payables Turnover Ratio:

a. It explains the relationship between the net credit purchases and trade payables
b. It indicates the number of times the trade payables are turned over as compared to credit purchases.
c. A high ratio implies that the enterprise has high credit worthiness among creditors and high bargaining power with suppliers\
d. It is expressed in Times.

$$\text{Trade Payables Turnover Ratio} = \frac{\text{Net Credit Purchases}}{\text{Average Trade Payables}}$$

$$\text{Average Trade Payables} = \frac{\text{(Opening Trade Payables + Closing Trade Payables)}}{2}$$

Or

Average Trade Payables = (Opening Creditors + Closing Creditors + Opening B/P + Closing B/P) ÷ 2

Average Payment Period or Average Age of Payables:
It shows the credit period enjoyed by the enterprise in paying creditors.

$$\text{Average Payment Period} = \frac{\text{Average Trade Payables}}{\text{Net Credit Purchases}} \text{ X Number of Months/Days}$$

or

$$\frac{\text{Months or Days in a Year (12/365)}}{\text{Trade Payables Turnover Ratio}}$$

Example: Consider the following information:
Opening Creditors 1,25,000

Opening Bills Payable 10,000

Closing Creditors 90,000

Closing bills Payable 5,000

Purchases 9,50,000

Cash Purchases 1,00,000

Purchases Return 45,000.

Determine the Trade payables Turnover Ratio from the above information.

Solution:

Net Credit Purchases = Purchases – Cash Purchases – Purchase Return

= 19,00,000 -2,00,000-90,000 = 16,10,000

Average Trade Payables = (Opening Creditors & Bills payables + Closing Creditors & Bills payables) / 2

= 2,50,000 + 20,000 + 1,80,000 + 10,000/2

= 2,30,000

Trade Payables turnover ratio = 16,10,000/2,30,000 = 7 times

Example: Closing Trade Payables 10,80,000, Net purchases `86,40,000, Cash purchases `21,60,000. Calculate Trade Payables Turnover Ratio

Solution: Trade payable turnover ratio= credit purchases/ average trade payable

Trade payable turnover ratio =64,80,000 / 10,80,000= 6 Times
Credit purchases= net purchases - cash purchases
64,80,000 = 86,40,000- 21,60,000

<u>Working Capital Turnover ratio:</u>

a. It explains the relationship between working capital and net sales.
b. It shows the number of times a unit of rupee invested in working capital generates sales.
c. It determines whether working capital is effectively used in generating sales.
d. A higher ratio implies overtrading with less use of current assets.

$$\text{Working Capital Turnover Ratio} = \frac{\text{Revenue from Operations/COGS}}{\text{Working Capital}}$$

It is expressed in number of times.

Revenue from Operations:

It is the revenue earned by the company from its Operating Activities.
If Revenue from Operations is not given, then take Cost of Goods Sold.
Working Capital: = Current Assets – Current Liabilities

Consider the following information:
Cost of Revenue from Operations (Cost of Goods Sold) 10,00,000

Current Assets 500,000

Current Liabilities 3,00,000
Determine Working Capital Turnover Ratio from the above information:
Solution:

Working Capital = Current Assets - Current Liabilities

= 5,00,000 - 3,00,000

= 2,00,000

Therefore,

Working Capital Turnover ratio = Cost of Revenue from Operations(or Cost of goods sold)/ Working Capital

= 10,00,000/2,00,000

= 5 times

Example: Consider the following financial information:

Cash Sales 10,00,000

Credit Sales 12,00,000

Sales Return 2,00,000. Current Assets 6,00,000;

Current Liabilities 2,00,000.

Determine Working Capital Turnover Ratio from the above information.

Solution:

Net Sales = Cash Sales + Credit Sales − Sales Returns

= 10,00,000 + 12,00,000 − 2,00,000 = 20,00,000

Working Capital= Current Assets - Current Liabilities

Working Capital Turnover= Net sales/ Working Capital

=20,00,000/4,00,000

= 5 Times

8.13 PROFITABILITY RATIOS

Gross Profit Ratio: It shows the relationship between the Gross Profit and Revenue from Operations (Net Sales). It shows the average gross margin on goods sold or the services rendered in the ordinary course of business. It indicates the efficiency with which production and/or purchase operations and selling operations are carried on. It is used fixing selling prices and determining the efficiency of trading activities.

Gross Profit Ratio= Gross Profit x 100

Revenue from Operations

It is expressed as percentage percentage of net sales.

Gross Profit: It is calculated as follows:

Gross Profit = Revenue from Operations (i.e. Net Sales)– Cost of Revenue from Operations (COGS)

Cost of Revenue from Operations: It is calculated using the following:

Cost of Revenue from Operations = Opening Inventory (excl. Spare parts & loose tools) + Net Purchases + Direct Expenses – Closing Inventory (excl. Spare parts & loose tools)

Or

= Cost of Materials Consumed+ Purchases of Stock-in-Trade+ Change in Inventories of FG, WIP & SIT + Direct Expenses

Or

Revenue from Operations-Gross Profit

Reasons for decline or increase in Gross Profit Ratio:
Increase: This ratio increases because of the following reasons:

a. If the selling price increases and the cost of revenue from operations is constant.
b. If the Cost of revenue from operations decreases and the selling price is constant.
c. If there exists a combination of above two situations.

Decrease: This ratio decreases if the above reasons are reversed.

Operating profit Ratio: It shows the relationship between Operating Costs incurred in running the business and realted Sales.It is the proportion of Cost of Revenue from Operations and Operating Expenses to Sales. It helps in determining the operational efficiency of the business. It is expressed as the percentage of Sales or Revenue from Operations that is utilized in the Operating costs.

A low operating ratio indicates higher profit margin to meet non-operating expenses such as dividend, etc. On the other hand, a high operating ratio indicates reduction in the efficiency of business operations.It is expressed as percentage of sales or revenue from operations.

$$\text{Operating Ratio} = \frac{\text{Operating Cost}}{\text{Revenue from Operations (Net Sales)}} \times 100$$

$$\text{Operating profit Ratio} = \frac{\text{Operating profit}}{\text{Revenue from Operations (Net Sales)}} \times 100$$

Operating Profit = Gross Profit + Other Operating Income-Other Operating Expenses

Or

Operating Profit = Net Profit Before Tax + (Non-operating Expense/Losses) -(Non-Operating Incomes)

Or

Operating Profit = Revenue from Operations -Operating Cost

Relationship between Operating Profit and Operating Ratio

Operating Ratio + Operating Profit Ratio = 100%

Net Profit Ratio: It shows the relationship between Net Profit and Revenue from Operations i.e., Net Sales. It helps in determining the operating efficiency of the business operations. It indicates the actual earning performance of business activities.

A higher Net Profit Ratio indicates higher profitability. An increase in the ratio over the past period shows improvement in the operational efficiency. It is expressed in percentage.

Net Profit Ratio = $\frac{\text{Net Profit After Tax}}{\text{Revenue from Operations i.e. Net Sales}} \times 100$

Net Profit = Revenue from Operations or Net sales – Cost of Revenue from Operations – Operating Expenses – Non-Operating Expenses + Non-Operating Income – Tax.

<u>Return on Investment or Capital Employed</u>: It shows the relationship between Net Profit/Earnings before interest and tax with capital employed. It measures the efficiency with which the resources are being used. It is a measure of the profitability for comparison with the other businesses in the same industry. It assesses the overall performance based on the total long term fund employed in the business. It is expressed as percentage of capital employed.

ROI = $\frac{\text{Net Profit before Interest, Tax and Dividend}}{\text{Capital Employed}} \times 100$

Computation of Capital Employed: It can be computed through following two approaches:

1. **Liabilities Approach:** Under this approach, Capital employed is calculated by adding the following:

i. Shareholders Funds/Equity (Share Capital + Reserves and Surplus) and

ii. Non-current Liabilities (Long-term Borrowings (debenture, public deposits) + Long-term Provisions + Deferred Tax Liabilities + Other Non Current Liabilities)

Capital employed = Share Capital + Reserves and Surplus + Long-term Borrowings + Long-term Provisions + Deferred Tax Liabilities + Other Non Current Liabilities

Note: if balance of surplus in Statement of profit and loss is negative, it is deducted to calculate Shareholders' funds.

2. **Assets Approach:** Under this approach, Capital employed is calculated adding the following:

iii. Non-current Assets (Fixed Assets (Tangible & Non-Tangible) + Deferred Tax Asset + Non-current Trade Investments + Long-term Loans and Advances +Other Non Current Asset)

iv. Working Capital (Current Assets – Current Liabilities)

Capital employed = Non-current Assets+ Current Assets – Current Liabilities

8.14 SUMMARY

Accounting Ratio Analysis: It is concerned with studying relationship among various financial variables in a business with the help of accounting ratios. It is a mechanism of determining and interpreting relationships between financial variables given in the financial statements to obtain an understanding of the financial performance and position of a business enterprise.

Ratio: It is a mathematical expression of relationship between two interdependent quantities which can be financial items or variables in the financial statements or two accounting figures.

Accounting Ratio: It is a ratio which is calculated on the basis of accounting information given in the financial statements, balance sheet, profit and loss account such as profit, sales, assets, liabilities, debtors, creditors, etc

Forms of Expressing Accounting Ratios:

- Pure
- Percentage
- Times

Advantages of Ratio Analysis:

- Tool for analysis of Financial Statements
- Simplifies Accounting Data
- Assessment of Operating Efficiency of Business
- Assists in Forecasting
- Identifies Weak Areas
- Facilitates Inter-firm and Intra-firm Comparison

Limitations of Ratio Analysis:

- Reliability of Ratios
- Only Quantitative Factors considered
- No Standard Ratio
- Non Comparable
- Price Level Changes Ignored

- Window Dressing
- Personal Bias

Types of Ratios:

1. Liquidity (short-term solvency): show the ability of the enterprise to meet its short-term financial obligations. It includes:

i. Current Ratio
ii. Quick Ratio

2. Solvency (long-term solvency): assess the long-term financial position of the enterprise. They assess the ability to meet the long-term financial obligations of the enterprise. It includes:

i. Debt to Equity Ratio
ii. Total Assets to Debt Ratio
iii. Proprietary Ratio
iv. Interest Coverage Ratio

3. Activity/Turnover: shows how efficiently the enterprise resourcesare being used for the business operations. It includes:

i. Inventory Turnover Ratio
ii. Trade Receivables Turnover Ratio
iii. Trade Payables Turnover Ratio
iv. Working Capital Turnover Ratio

4. Profitability: show the profitability of the enterprise. It includes:

i. Gross Profit Ratio
ii. Operating Ratio
iii. Operating Profit Ratio
iv. Net Profit Ratio
v. Return on Investment

8.15 GLOSSARY

Capital: It is amount of resources invested by the owners into the business organisation either in the form of cash or cash equivalents or in kind or assets. The amount can be invested in the form of cash, goods, or any other asset. For Business Entity, capital is a liability towards the owners which is to be settled only in the event of closure or transfer of the business. In case of corporates it is called as share capital.

Drawings: It represents an amount of cash, goods or any other assets which the owner withdraws from business for personal use. e.g. if the life insurance premium of proprietor is paid from the business bank account, goods withdrawn for personal use. It will result in reduction in the owners' capital.

Asset: Asset is a resource controlled by the business entity from which probable future economic assets will flow to the entity by using it for generating future profits. Assets can be Tangible and Intangible.

Tangible Assets: are the assets which have some physical existence. They can be seen, touched and felt such as:

- Plant and Machinery
- Furniture and Fittings
- Land and Building
- Books and periodicals
- Computers and laptops
- Vehicles

Intangible assets: Assets which have no physical existence (cannot be seen or felt although they help to generate revenue in future) and whose value is determined and restricted by the rights and expected future benefits that their possession confers upon the owner such as

- Goodwill
- Patents
- Trade-marks
- Copyrights
- Brand equity
- Industrial designs
- Other intellectual property rights, etc.

Assets can also be classified into Current Assets and Non-Current Assets.

Current Assets – Asset which satisfies any of the following :

e. It is expected to be realised in, or is intended for sale or consumption in the company's normal operating cycle,

f. It is held primarily for the purpose of being traded ,

g. It is due to be realised within 12 months after the reporting date, or

h. It is cash or cash Equivalent unless it is restricted from being exchanged or used to settle a liability for at least 12 months after the reporting date.

Current Asset includes:

- Inventory
- Trade recievables (sundry debtors and bill recievables)
- Prepaid expenses
- Current investments
- Cash and cash equivalents
- Short term loans and advances

Non-Current Assets – All other assets which are not classified as current assets are non-current assets such as:

- Plant and Machinery

- Furniture and Fittings
- Land and Building
- Patent
- Trade-mark
- Copyright

Non-Current Liabilities – All other liabilities not classified as current liabilities shall be classified as Non-current liabilities such as:

- Debentures
- Public deposits
- Long term bank loan
- Inter corporate loans
- Long term loan from director

Internal Liability: It refers to owner's equity, i.e. all the amounts which proprietors are entitled such as:

- Capital
- General reserve
- Deneture redemption reserve
- Undistributed profits, etc.

Working capital: The assets which are held to maintain the flows of revenue from operation in the form of current assets such as:

- Cash required to pay for expenses or to the creditors
- Inventories required to smoothen production and sale
- Accounts receivables (debtors and bills receivable) to increase the sales .
- Cash at bank
- Prepaid expenses

The total of current assets constitute the working capital of a firm which is termed as Gross working capital.

Gross working capital = Total current assets = long term internal liabilities + long term debts + the current liabilities – Non current assets.

Net working capital is the excess of current assets over current liabilities. It is the amount of current assets that remain in a firm if all its current liabilities are paid. This aspect of working capital is a more realistic concept.

Working capital (net) = Current assets – Currents liabilities.

8.16 SELF-ASSESSMENT QUESTIONS

1. Explain the concept of Ratio and ratio Analysis
2. What are the Objectives of Ratio Analysis.

3. What is the significance of ratio Analysis
4. Discuss the various types of Lquidity and Short term Solvency ratios
5. Write a Short Note on Debt Equity ratio, Creditors's turnover Ratio and inventory turnover ratio.
6. Consider the following information of ABC ltd:

Particulars	**Amount (in Rs)**
Revenue from Operation	20,00,000
Sales Return	2,00,000
Gross Profit	3,60,000
Closing Stock	4,00,000
Excess of Closing Inventory over Opening Inventory	80,000

Calculate Inventory Turnover Ratio from the above information
7. From the following information, calculate Revenue from operation:
Quick Ratio 2,
Current Ratio 3
Total Current Assets 40,00,000
Inventory Turnover Ratio 6 Times.
Goods are sold on 25% Profit on Sales

8. Consider the following information:
Fixed Assets: 1,50,00,000
Current Assets: 80,00,000
Current Liabilities: 54,00,000
14% Debentures: 1,60,00,000
Net Profit before Interest, Tax and Dividend: 29,00,000.
From above information, calculate:
(a) Return on Investment and
(b) Total Assets to Debt Ratio
9. From the following information, calculate Return on Investment (or Return on Capital Employed):

Particulars	**Amount**
Share Capital	10,00,000
Reserves and Surplus	5,00,000
Property Plant and Equipment	45,00,000
Long term Investments in shares	5,00,000
Current Assets	22,00,000
16% Long-term Borrowings	40,00,000
Current Liabilities	17,00,000

8.17 SUGGESTED READINGS

Latest editions of the following text books to be used:

1. Narayanaswamy R. Financial Accounting: A Managerial Perspective. PHI Learning Pvt. Ltd., Delhi
2. Robert N. Anthony, David F. Hawkins, Kenneth A. Merchant. Accountancy-text and cases. McGraw Hill Education (India) Private Limited, New Delhi.
3. Garg CA Kamal, and Sehrawat Neeraj Kumar. Beginner`s Guide to Ind AS & IFRS. Bharat Law House Pvt. Ltd., New Delhi
4. Maheshwari S. N., Maheshwari Sunil K., and Maheshwari Sharad K, An Introduction to Accountancy, Vikas Publishing House Pvt. Ltd.

LESSON 9

PREDICTING FINANCIAL DISTRESS, EARNINGS MANAGEMENT AND BEYOND BALANCE SHEET ANALYSIS

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STRUCTURE

9.1 LEARNING OBJECTIVES

After reading this chapter, readers will be able to understand:

- Altman's Z-Score Model in predicting Financial distress
- LC Gupta Model in predicting corporate failure.
- How to manage Earnings.

- Approaches to manage Earnings.
- How to analyse the Finacial position using beyond Balance Sheet Analysis.

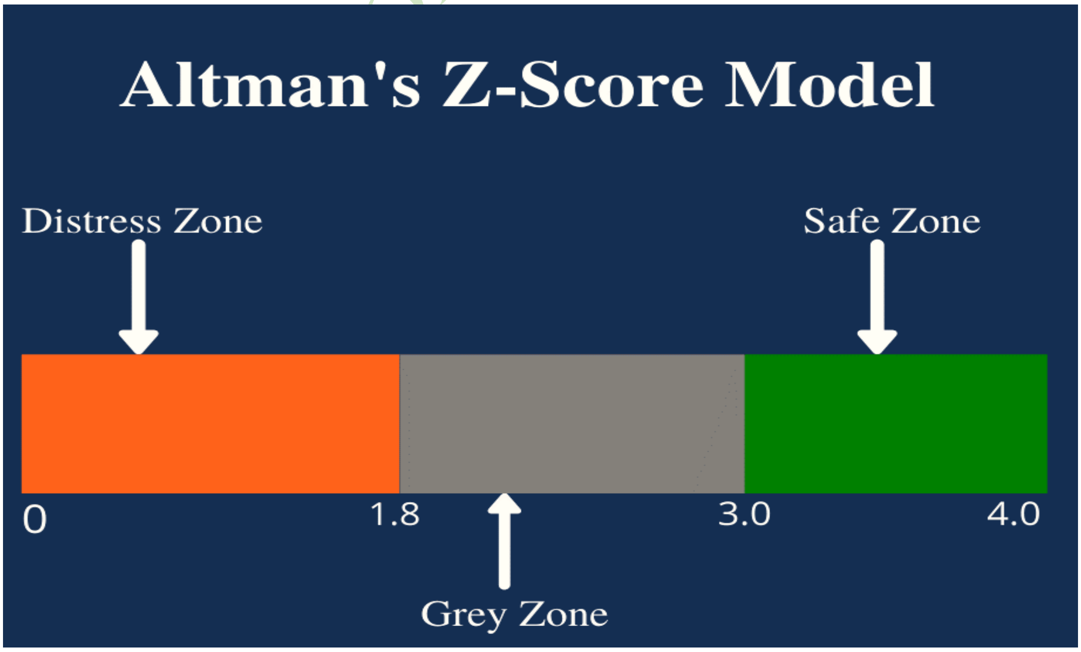
9.2 INTRODUCTION

Insolvency refers to a situation where a person or entity is unable to discharge or pay the debts it owes to others because Assets owned are less than liabilities.

Legal declaration of insolvency by the court of law is known as **Bankruptcy**. Once the bankruptcy is declared efforts are made in the form of compromise, arrangement, negotiations among the creditors, lenders and shareholders, etc to revive and rehabilitate the entity, the process of negotiations, arrangements and compromises is known as **Insolvency Resolution**. If Insolvency is not resolved then the entity have to go for liquidation which involves realisation, sale or disposal of assets, payment to creditors and lenders, distribution of surplus(which occurs rarely in insolvency cases) among the shareholders.

9.3 ALTMAN'S Z-SCORE MODEL

Altman's Z-Score model provides a mechanism for numeric measurement to predict the chances of a Bankruptcy (situation when an enitity is declared insolvent by court of law) of a business enterprise in the coming next two yearsfrom the date of assessment. The model was given by Edward Altman, an American finance professor in 1968 to measure of the long term solvency or financial stability of companies.



Source: https://corporatefinanceinstitute.com/resources/knowledge/credit/altmans-z-score-model/

Altman's Z-score model helps to predict situation financial distress of a business enterprise by analysing various items of Balance sheet and Income statement. Altman start developing the model during Great Depression, when there was sudden increase in the number of businesses going bankrupt.

The Z-score model predicts the probability that a particular business enterprise would collapse in the next two years from the date of assessment of Z-score. The model have a good track record of accurately predicting bankruptcy in many cases with accuracy of 72% in predicting bankruptcy two years prior to its occurrence, and it provide a false positive opinion of 6%.

Altman used a weighted average of various financial ratios to predict the chances of a business enterprise going bankrupt.

Altman developed three different Z-scores for different categories of business enterprises. The original model came in 1968, specifically designed for public manufacturing companies with assets of above $1 million.

In 1983, he developed two other models Model A and Model B for smaller private manufacturing companies.

Model A Z-score was developed specifically for private manufacturing companies.

Model B was created for non-publicly traded companies.

The Z-score model is based on the weighted average of following five financial ratios:

i. Working Capital/Total Assets ratio
ii. Retained Earnings/Total Assets ratio
iii. Earnings Before Interest and Tax/Total Assets ratio
iv. Market Value of Equity/Total Liabilities ratio
v. Total Sales/Total Assets ratio

The model uses information given in the 10-K report the increase the model's accuracy to measure the financial health of a company and probability of its bankruptcy.

The Altman's Z-score can be expressed in the form of a linear equation which is as follows:

$\zeta = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E$

Where:

Zeta (ζ) is the Altman's Z-score
A is the Working Capital/Total Assets ratio

B is the Retained Earnings/Total Assets ratio
C is the Earnings Before Interest and Tax/Total Assets ratio
D is the Market Value of Equity/Total Liabilities ratio
E is the Total Sales/Total Assets ratio

What Z-Scores Mean?

The Z-Score can be interpreted in terms of its numeric value. Different ranges of Z-Scores indicates different risk levels of bankruptcy which is discussed as below:

a) **Z-score < 1.8:** If the Z-score is low, then it indicates higher chances of a company going for bankruptcy. A Z-score lower than 1.8 implies that the company is in deep financial distress and there exists higher chances of company going bankrupt.
b) **Z-score ≥1.8 and <3:** A score of between 1.8 and 3 implies that the company is in a grey area and face a moderate risk of filing for bankruptcy. In other words, there is no immediate problem or danger to face inability to meet long term debt obligations.
c) **Z-score ≥3:** A Z-score of 3 and above implies that the company is in a safer zone and there are very less chances to file for bankruptcy.

Altman's Z-score is used by investors to decide whether to buy or sell a company's stock, depending on the financial strength. If thers is a company with a Z-score near to 3, investors will be purchasing the company's stock because there is very less risk of the company going bankrupt in the coming two years.

If a company shows a Z-score closer to 1.8, the investors will sell the company's stock to avoid losing their investments because such a lower score implies a high probability of going bankrupt.

The Five Financial Ratios in Z-Score

The following are the key financial ratios that make up the Z-score model:

1. Working Capital/Total Assets

Working capital is the difference between the current assets and current liabilities or it is the excess of current assets over current liabilities. Working capital determines short-term solvency of an entity. A positive working capital implies that a company can meet its short-term financial obligations. While negative working capital means that a company will face difficulty to meet its short-term financial obligations.

2. Retained Earnings/Total Assets

This ratio indicates the amount of retained earnings or losses in an entity. A low retained earnings to total assets ratio implies that it is financing its expenditure using borrowed funds rather than from its own retained earnings. It increases the probability of a company going bankrupt, while a higher retained earnings to total assets ratio implies that a company uses its retained earnings to finance its capital expenditure. It shows that the company has achieved profitability over the years, and it does not need to rely on borrowings.

3. Earnings Before Interest and Tax/Total Assets

EBIT is a measure of profitability and ability of a company to generate profits solely from its business operations. The EBIT/Total Assets ratio indicates an entity's ability to generate enough revenues to stay profitable and provide finance for ongoing operations and repay its debts on time.

4. Market Value of Equity/Total Liabilities

The market value also known as market capitalization, is the value of a company's equity. It indicates the worth of total equity shares held by the shareholders. It is calculated by multiplying the number of outstanding shares by the current price of stocks.

Market value = Total no. of Equity Shares x Current Market Price per share

The market value of the equity/total liabilities ratio indicates the degree to which a company's market value would decline when it goes bankrupt before the value of liabilities exceeds the value of assets on the balance sheet. A high market value of equity to total liabilities ratio implies high investor confidence in the company's financial strength.

5. Sales/Total Assets

The sales to total assets ratio shows how efficiently and optimaly the management uses assets to generate revenues as compared to the competitors in the industry. A high sales to total assets ratio is translated to mean that the management uses a small investment to generate high sales, thereby increasing the overall profitability and return on investment.

A lower sales to total assets ratio means that the management is using more resources to generate enough sales, reducing the profitability and return on investment.

9.4 L.C. GUPTA MODEL OF FINANCIAL DISTRESS

L.C. Gupta Model also helps in determining Financial Distress. The model examine survival strength of the company. This model is evolved after a study based on Indian data and it attempt to distinguish sick and non-sick companies on the basis of financial ratios.

A sample of 41 cotton textile companies (20 sick and 21 non-sick) and 39 non-textile companies (18 sick and 21 non-sick) was taken and both type of companies were evaluated and compared on the basis of product manufactured, age and size measured in terms of paid-up capital, assets and sales for the period of 1962-1974. This model compute 56 financial ratios for making the prediction of distress.

METHODOLOGY OF LC GUPTA MODEL

- Take a sample of Sick and Non-Sick companies.
- Arrange them in the ascending or descending order by the value of the ratios.
- Select a cut-off point dviding the array into two classes with a minimum possible number of misclassifications.
- Calculate the percentage of classification error.
- The ratio which have the least "percentage classification error" at the earliest possible time is considered to have the highest predictive power.

The model suggested a combination of the following four major ratios in order to minimize the classification error rate:

X1 = ***EBDIT*/*Sales***
X2 = ***Operating Cash Flow*/ *Sales***
X3 = ***EBDIT*/ *Total Asset***
X4 = ***EBDIT* /*Interest*+0.25 *Debt***

OBSERVATIONS FROM LC GUPTA MODEL

- The net worth ratio are the worst predictor of bankruptcy among profitability ratios.
- Among balance sheet ratios, the solvency ratios are more reliable indicators of strength than any liquidity ratios.
- Companies with an inadequate equity base are more prone to bankruptcy.

9.5 EARNINGS MANAGEMENT

Earnings management is a practice used by the management to modify the earnings reported in financial statements to present an excessively positive view of a company's financial positions, inflating earnings. It is done to achieve a set target and is different from managing the business operations.

Earnings management is used to flatten out variations in earnings and report profits that are consistent each quarter or year. Variations in earnings may create doubts among investors, as they prefer to invest in stocks of companies that show growth and stability.

The share price of a company usually fluatuates upon the announcement whether the company meets or fails to meet earnings forecasts. The management tries to change accounting practices an policicies to meet the earnings estimates and move share prices up.

9.6 EARNINGS MANAGEMENT APPROACHES

Most common strategies used by companies for earnings management are as follows:

1. Earnings-focused decisions

Decisions taken by the management are primarily focused on achieving earnings estimates. The easiest way is to control and cut the company's operating expenses on certain activities such as research, advertising, or staff training can be suspended temporarily with the premise that the business will perform better in the upcoming periods, and the suspended activities can be resumed later.

However, for companies that are performing well in terms of sales and net earnings, the management focuses on the long-term success and does not usually resort to artificially enhancing the earnings.

2. Biased accounting judgments

Management needs to exercise prudent judgments while applying accrual accounting. There exist many formal policies, accounting manuals, and processes used by well-performing companies to ensure that the judgments are not biased. But accrual system of accounting provides room for earnings management as management can distorts judgments and mends policies to meet expected earnings.

3. Altering accounting standards and policies, principles

Accounting Standard Boards in every country frame and provide accounting standards that prescribe the different and standardised generally accepted accounting rules for the specific accounting matters. But some accounting standards allow different accounting policies for same transaction. For example, value of closing inventory and fixed asset can be determined in different but acceptable ways.

The management of big and successful corporates selectes the accounting policies that best reflects financial position and performance in true and fair manner. Earnings management happens when a company's management selects an alternative of a certain accounting standard, which will cause the earnings number to meet the expectations.

9.7 IDENTIFYING EARNINGS MANAGEMENT

Chartered Professional Accountant (CPA) companies and the Securities and Exchange Commission (SEC) revelations uncover various types of earnings management used by companies.

Investors should perform due diligence before investing in the stocks of any company. Some investors analyze a company's financial reports and can identify earnings management.

Listed below are the signs that an investor needs to look for to determine if a company is exercising earnings management to manipulate its financials:

1. The company claims an increase in revenue without a corresponding increase in cash flows.
2. The company reports an increase in earnings only in the final quarter of the fiscal year.
3. The fixed assets of the company are expanding beyond the normal standard for the industry or company.
4. The net worth of an asset is inflated by ignoring the use of the true depreciation schedule.

9.8 USE OF BEYOND THE BALANCE SHEET INDICATORS TO DETERMINE THE FINANCIAL POSITION OF AN ENTITY.

There is no single financial statement that evaluates and shows all of the quantitative and qualitative information with respect to financial position. Therefore, there is need to go beyond the balance sheet.

Balance sheet provide information relating to financial position, however it is just a basic "snapshot" of a company's financial position on a particular point in time and reflects the resource structure or capital structure showing sources of finance into liabilities and equity and application of funds in the form of assets.

The Quality of system of financial reporting and the transparency of the financial statements should also be considered in evaluating a company. Management and external auditors, with appropriate oversight from audit committees, continue to improve financial reporting and communication process so as to ensure better understanding of the assumptions used in establishing significant accounting estimates and determining values.

Many qualitative and quantitative factors that influence a company's financial position are not from financial statements which are as follows:

1. Degree of liquidity**:** Whether the company have enough cash, other liquid assets, or credit to pay its short term financial obligations on time. Whether the capital structure matches with the asset structure.
2. Nature of the business
3. Inherent risks
4. Aaccounting principles and methods
5. Judgments in the selection and method of application of accounting principles
6. Application of historical cost or fair value measurement methods.
7. The estimates and assumptions in the preparation and presentation of financial statements.
8. The possible impairment of Fixed assets.

Liquidity

Liquid assets are cash and other assets that can be easily converted to cash; liquidity is the extent to which an entity can produce cash to meet its obligations.

A high level of liquid assets is an indicator of financial flexibility, it comes at a price: cash and cashequivalent assets often produce the lowest returns. Consequently, an entity with a large cash balance may be less profitable than a similar company that has all of its assets invested in profitable business activities.

The nature of the business

The nature of a company's business and the inherent risks depends on many factors, such as the size of the company, stage of product life cycle, the geographic areas where the firm is operating, competitive landscape, risk management policies and realted strategies, business model. The nature of a company's business influences the accounting methods.

The accounting policies and management's discussion summarizes accounting methods and assumptions.

Proximity of book values to economic fair values

The quality of the fair value estimates depends upon the reasonableness of the assumptions used and the quality of the experts and the models on which the estimates are based. Valuations done as per active market are more reliable than private valuation based on models.

There are many assets and liabilities that are valued based on historical costs differing significantly from fair values. For example land, whose value has been increased since the time of its purchase.

In determining financial position, any changes in fair value should be considered.Considerable attention should be given to fair value accounting. For example goodwill and other intangibles and the useful lives should be reassessed to match with fair values.

Estimates and assumptions

There are areas of judgment that require management to make and record estimates in their financial statements. Among these areas are estimates of pension, health care, and post-retirement medical assets and liabilities. Judgment is also involved in determining allowances and reserves for a variety of items, including the collectability of receivables and loans; the utility, value, or obsolescence of inventory; the realization of deferred tax assets; and environmental, plant closing, warranty, and self-insurance reserves. These assets and liabilities are subject to estimates of recoverability or valuation, and it is important to understand the quality of the underlying estimates and the assumptions used in developing them. It is also important to understand the portion of the estimates that is based on management's assumptions. The use of third-party specialists can improve the quality of estimates and assumptions, especially in the areas of pension and benefit plan valuations, derivatives valuations, and litigation and environmental reserves.

Some areas require more judgment than others; for example, pension accounting relies on the assumptions of management and plan actuaries. Companies sponsor pension plans and incur pension obligations—the assumed future obligation to retired employees. In the long term, pension plan assets and investment returns reduce those liabilities. In the short term, if the fund's returns are projected to exceed the expected liability and associated costs, the company's pension contribution can be reduced, which can boost earnings. The higher the expected rate of return the lower the company's pension expense, resulting in greater earnings.

The assumptions underlying the estimates should be monitored from period to period and should also be reviewed against estimates and assumptions used by comparable companies in the industry.

Impairment

Understanding the possibility of impairment is also key to the quality of a company's financial position. The company should have reasonable policies in place to assess an asset's impairment, if any. The assumptions used in predicting future cash flows should be reasonable and supportable. Additionally, companies should consider economic, performance, or industry trends that may call into question the recoverability of assets at their recorded values. During the past decade, many companies bought and sold assets which resulted in values largely accounted for as "intangible" or "goodwill"; recently, many of these values have been written down through impairment losses as a result of subsequent declines in the values associated with these transactions.

Off-balance-sheet arrangements

An understanding of off-balance-sheet financing is helpful in assessing a company's financial position. These arrangements may include special-purpose entities, leasing transactions, debt guarantees, co-borrowing arrangements, securitizations, and other contingent obligations that may not require recognition on the balance sheet. An analysis of financial position should encompass factors that are likely to affect the company's ability to continue using those off-balancesheet financing arrangements. In addition, arrangements should be analyzed for their business purposes and activities, their economic substance, the key terms and conditions of any commitments, the initial and ongoing relationships with the company and its affiliates, and the potential risk resulting from the company's contractual commitments related to the arrangement.

The risk associated with special-purpose entities (SPEs) has been highlighted by recent accounting failures. An SPE is typically created for a single purpose, such as to serve as the lessor in a leasing transaction, to acquire or construct operating assets while keeping the assets and related debt off the balance sheet, or to act as a counterparty to a financial instrument contract. If undertaken for valid business reasons and accounted for properly, SPEs can be beneficial to a company, such as a securitization SPE for mutual funds. It is important to understand the business reason for undertaking these types of transactions, as well as the structure of the arrangement, because companies may employ structured-finance transactions to specifically avoid debt on the balance sheet.

Companies often guarantee the debt associated with these off-balance-sheet entities, creating the potential for additional liabilities that are not reflected on the balance sheet. Consequently, an assessment of a company's debt position should consider this debt in the complete aggregation of the company's obligations. As a result, appropriate disclosure takes on greater importance to the readers of financial statements.

Management and audit committees should also be aware of commitments, contingencies and uncertainties that are known, but are not required to be recognized in the balance sheet. For example, commitments such as operating leases may be significant, but are not obligations recorded in the balance sheet. Other examples are tobacco companies or companies that use asbestos in their products, which are likely to have much higher litigation risk than most businesses, or a company that has used hazardous materials in its production process, which may have environmental risks related to a closed plant. Although accounting rules state that contingencies should be recorded only when the loss is probable and estimable, it is important to consider the adequacy of the disclosures as well as consistent monitoring of these risks to identify losses that would need to be recorded in the near future.

In addition to the off-balance-sheet liabilities discussed previously, items should also be considered such as

- trained employees
- loyal customers

- popular brand names
- fully depreciated plant and equipment
- intellectual property rights such as trademarks, brand names, patents.
- research and development
- employee know-how
- collaborations with suppliers and distributors.

Internal controls

Controls should be pervasive throughout an organization.

CEOs and CFOs to now required to certify that they have responsibility for establishing and maintaining internal controls. Control includes

- knowledge of the accounting staff
- internal accounting function
- corporate risk officers,
- working computer systems
- external audits and reviews

Many of the account balances such as bank balances and accounts receivable can be reconciled and verified from the third parties, account balances such as inventory and fixed assets can be physically counted.

Give attention to unusual transactions such as

- sale of fixed assets outside the ordinary course of business
- mergers and acquisitions,
- unusual period-end revenues,
- launch of new period-end sales promotion programs,
- disposal of significant business segments.

Appropriate disclosure demonstrates transparency and may suggest to users of financial statements that a higher degree of control exists.

Communication between the internal audit team and the audit committee is another crucial element of control. The internal auditors act as "eyes and ears" for the audit committee in investigating areas that are of greatest concern.

Specific Questions to be considered

The following questions gives a framework to assess financial position.

General considerations

- Whether accounting principles selected in line with the industry and applicable Financial Reporting framework?
- What are significant estimates made by management?
- Whether significant accounting policies and estimates are aapropriately explained in the management's discussion and analysis, and disclosures in financial statements.
- Whether any significant assets or liabilities measured at fair value?

Related parties

Has management identified:

- ✓ all related party relationship
- ✓ related-party transactions
- ✓ special-purpose entities
- ✓ off-balance-sheet transactions

Accounts receivable:

- Whether accounts receivable increasing significantly faster than growth in revenue?
- Whether accounts receivable constitute only few significant customers?
- Wheteher significant customers experiencing financial difficulties?
- Whether seasonal factors influences the turnover of accounts receivable?
- Whether aging categories becoming older?
- Whether discount have an unfavorable impact on future sales?
- Wheteher there is major change in composition of the customers?
- Whether some customers are offered unusual payment terms?
- Whether is the reason for factoring?

Inventory: with respect to inventory, consider whether:

- Whether there is any unusual ratio between inventory and sales
- Whether carrying amounts of inventory is too high
- Whether books of accounts are adjusted after taking a physical inventory
- Whether there are reserves for inventory obsolescence, returns, and warranty claims

Fixed assets and intangibles with respect to Fixed assets and intangibles, consider:

- Whether physical counts of fixed assets are performed.
- Whether there is change in the depreciation or amortization method or useful life.
- Whether depreciation policies consistent with competitors
- Whether capital expenditures significantly differsfrom budgeted
- Whether tests were performed to detect impairment
- Whether assumptions for fair value are reasonable
- Whether disclosures adequately shows methods for calculating fair value
- Whether there is any sales or leaseback transactions

Debt covenants with respect to Debt covenants, consider:

- Whether there is any violation of debt covenants requiring disclosure and reclassification liability
- Whether additional borrowing capacity exists under debt agreements
- Whether there is any cross-default provisions
- Whether there is debt covenants relating to unspecified "material adverse changes"

Deferred taxes

- Whether there is any cumulative losses in recent years
- Whether conditions requiring valuation allowance for net deferred tax assets exists

Pensions and other post-retirement benefits

- Whether expected rate of return on pension plan is appropriate
- Whether fluctuations in asset values, changes in interest rates, increases in health care costs requires revision of the accounting estimates

Accruals and liabilities

- Whether there is any unusual trends in accruals
- Whether estimates related to warranty, environment, merger, restructuring, etc.change in the current period
- Whether all contingent liabilities been recorded

Guarantees and commitments

- Whether there is sufficient cash to meet its guarantee commitments
- Whether guarantees related to core businesses only
- Whether there is chances of exposure to credit/default risk
- Whether there exists significant purchase commitments and/or obligations?

Employee stock options

- Whether there are changes to its options plans (repricing or extending the term of options)
- Whether there is change its method of accounting for stock options

Derivatives: Consider the following questions with respect to Derivatives:

- Whether risk management policy is appropriate
- Whether derivative/hedging strategy exists and is implemented
- Whether hedging strategy is economically effecctive
- Whether risk management infrastructure is appropriate and commensurating with organisation's structure
- Whether complex derivative instruments are used

- What is the methodology for measuring derivative positions
- Whether assumptions for mark-to-market valuations are reasonable
- What is the criteria and methodology adopted for measuring counterparty credit risk

Off-balance-sheet accounting – general

Consider the following questions:

- Are assets and liabilities appropriately included in or excluded from the balance sheet Reasons of Exclusions
- Whether management reviewed transactions that may give rise to off-balance-sheet commitments and contingencies
- Were transactions deliberaltely engineered to achieve off-balancesheet treatment
- Economic or business reason for the arrangement
- Whether exposure to credit and other losses from off-balance-sheet transactions evaluated
- What factors could cause the obligation to move onto the balance sheet

Special-purpose entities

Consider the following w.r.t to SPEs:

- All structuring transactions
- Amendments to the original documents
- The nature of relationships with third parties
- Ability to control asset acquisition
- Do the voting interests in the SPE convey a controlling financial interest? •
- Does management assess party that has a relationship with an SPE?

9.11 SUMMARY

Insolvency refers to situations where a person or entity cannot pay the debts it owes to others because Assets are less than liabilities.

Bankruptcy Legal declaration of insolvency by the court of law.

9.12 SELF-ASSESSMENT QUESTIONS

1. Explain the LC Gupta model to predict Financial distress.
2. Discuss in brief Altman's Z Score to predict Bankruptcy.
3. Explain the concept of Earnings Management
4. Discuss in brief different approaches to earnings management.
5. Write a short note on beyond Balance sheet Analysis to analyse the financial position.

9.13 SUGGESTED READINGS

Latest editions of the following text books to be used:

Narayanaswamy R. Financial Accounting: A Managerial Perspective. PHI Learning Pvt. Ltd., Delhi

Robert N. Anthony, David F. Hawkins, Kenneth A. Merchant. Accountancy- text and cases. McGraw Hill Education (India) Private Limited, New Delhi.

Garg CA Kamal, and Sehrawat Neeraj Kumar. Beginner`s Guide to Ind AS & IFRS. Bharat Law House Pvt. Ltd., New Delhi

Maheshwari S. N., Maheshwari Sunil K., and Maheshwari Sharad K, An Introduction to Accountancy, Vikas Publishing House Pvt. Ltd.

Department of Distance and Continuing Education
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INDEX

Lesson 1
INTRODUCTION TO MANAGEMENT

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STRUCTURE

1.1 Learning Objectives

At the end of this lesson, the student should be able to:

- Explain the need and importance of a manager in an organization.
- Develop an understanding of the functions of a manager and managerial roles in an organization.
- Understand the difference between managerial and non-managerial employees.
- Define various levels of management and explain the types of management skills possessed by managers at different levels.
- Understand various challenges and opportunities faced by managers.
- Understand the importance of studying Management.

1.2 Introduction

Most of you must have heard the name of Tim Cook and Sheryl Sandberg. If not, then explore it they are the famous chief operating officers of Apple and Facebook respectively. Have you ever wondered, why they are famous or why such people in managerial roles are important for an organization? What kind of roles or functions do they perform in an organization? What kind of skill set is required to be a manager?

The present lesson elaborates the meaning of the most commonly used terms “management” and “manager”. The lesson also provides answers to all the above questions, along with various challenges that a present-day manager faces. Through this lesson, the student will be able to understand the significance of studying management as a subject.

1.3 What do you mean Organization?

Organizations' are formed to achieve some purpose, the purpose of any organization is stated through a vision, mission, goal, and specific objectives of the organization (Refer to lesson no 4 to learn more about it). To fulfil the underline goals, organizations need people. People further forms "structures" where they could collectively work to accomplish the set goals (Refer to lesson no 6 to learn more about various types of structures). The purpose or structure both differs from organization to organization.

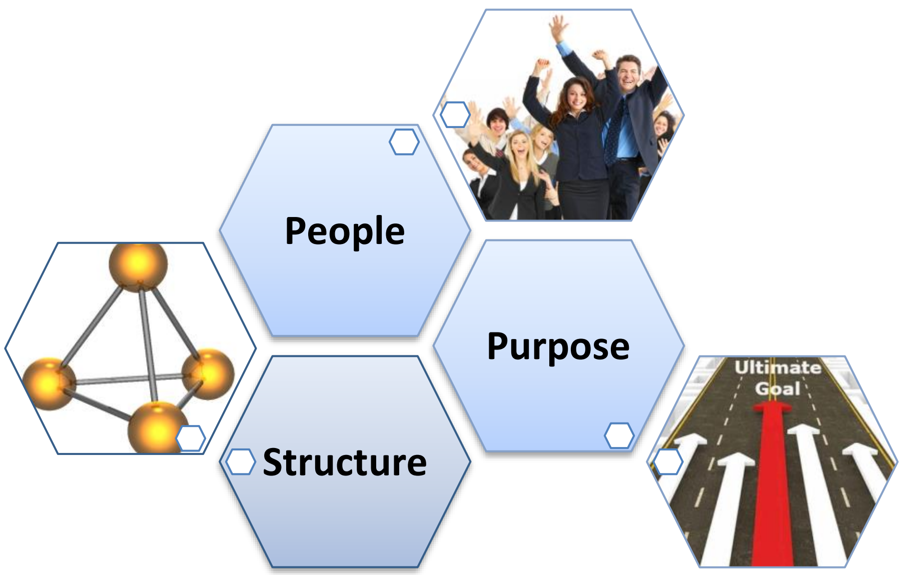

Figure 1.1 Features of an Organization

Find out?

Figure out the difference between Google and Procter & Gamble. After this search for the difference between Procter & Gamble and Unilever. Compare the purpose and structure in these three companies.

<<Hint: *You will be able to see the difference between structure and purpose of these organizations. Like the Google is having flexible work structure and Procter and Gamble still follow traditional form of structures. In terms of purpose P&G and Unilever are competitors whereas purpose of Google is different. >>*

1.4 How managers are different from non- managerial employees?

Managers are the coordinators who are responsible for managing social units, these social units help the organization in achieving its goals. Basically, managers are responsible for getting work done through people. Their main task is not to complete the task directly.

Non-managerial employees on other hand are only responsible for completing the task given to them. Their main task is not to do the planning or organizing of structures. Though nowadays, employees in managerial roles do take suggestions from non-managerial employees for various reasons, but ultimate planning role is performed by employees at the managerial level.

1.5 Levels of Management

With an increase in a number of employees, scale, and size of the organization, work becomes more complex. Different skills and abilities could be required for different roles. The level of management represents a demarcation of managers based on the roles performed by them. Mainly at different levels of management different skills and abilities are required by the manager. Broadly there are three levels of management, namely, first-line managers, middle-level managers, and top-level managers. These three levels of management form a pyramid-like structure as shown in figure 1.2.

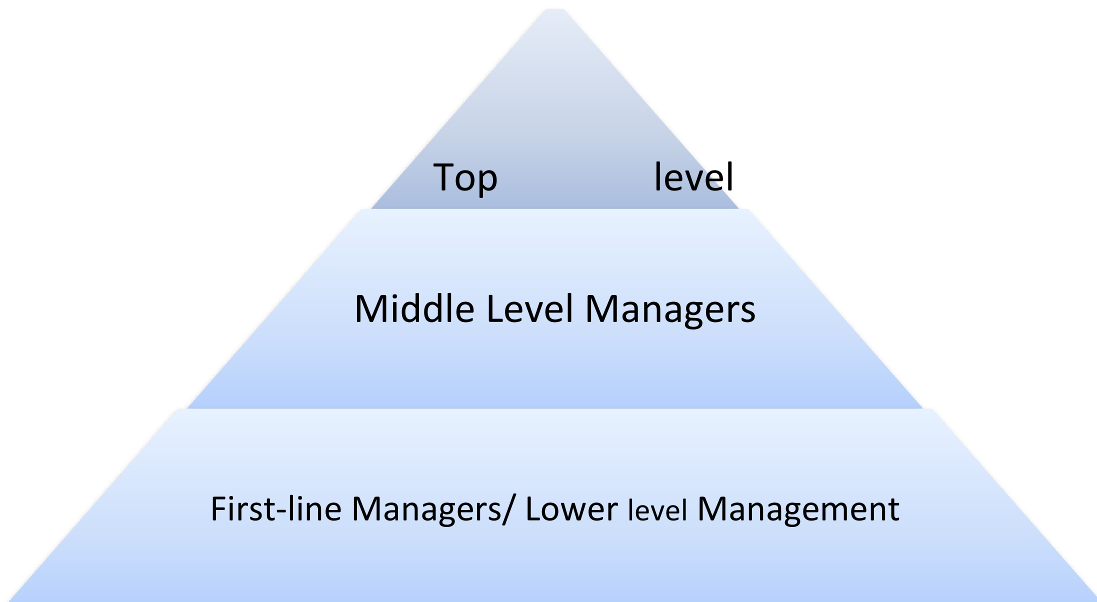

Figure 1.2 Level of Management

1.5.1 First line manager: First line managers are at the bottom of the pyramid. They are mainly responsible to manage non-managerial employees. They are also known as an office manager or supervisor. They could be involved in producing the product or providing services to the organization. Some roles performed by first-line managers could be assigning work to non-managerial employees, providing resources to subordinates, motivating them, etc.

1.5.2 Middle-level Managers- They are in the middle of the pyramid, between top-level management and lower-level management (or first-line managers). They supervise first-line managers and are the link between top and lower-level management. They could be named department heads, store managers, or project heads. Some roles performed by middle-level managers are like inspiring first-line managers, providing training to them, and plans for their individual units (like departments, projects, etc.).

1.5.3. Top Level Managers- They are at the top of the pyramid. They are responsible for the whole organization, and they have complete authority. They could be titled as Managing director, chief executive officer, chief operating officer, etc. They are mainly engaged in preparing plans, laying down goals, and objectives, taking organizational-level decisions, etc.

The pyramid structure is given to represent the level of management because a number of managers at a lower level are generally more as compared to the top level. The complexity of task increase as one move from lower-level management to top-level management.

IN-TEXT QUESTIONS

1. Level of management could be broadly classified into _______categories.
2. First line managers are also known as supervisors. True / False
3. Following title could not be given to Top level manager-

a) Project manager b) Managing Director

c) Chief operating officer d) Chief executive

4. ___________ are only responsible for completing the task given to them.
5. Organization represents a set of arrangement by group of people to accomplish some underline __________.

1.6 What do managers do?

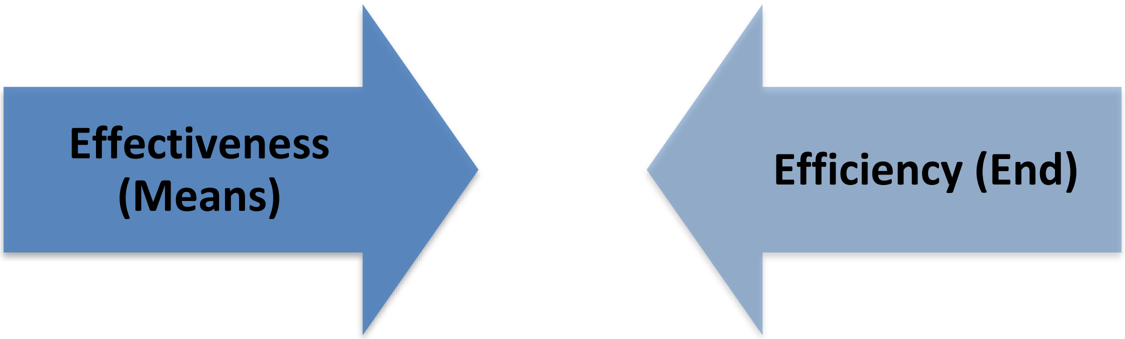

Figure 1.2 Efficiency and effectiveness

Managers are the coordinators, they help an organization in accomplishing its objectives through people in a most effective and efficient manner. Here "effectiveness" means completion of a given task within the planned time frame. The focus of the manager should be on "*doing right things*" so those goals could be achieved on time. Efficiency means achieving goals with minimum resources. For achieving efficiency managers should focus on "*doing things right*" to minimize wastage as far as possible. Both effectiveness and efficiency are important to accomplish organizational goals. Managers strive to achieve the goals with minimum wastage.

Henry Fayol and Henry Mintzberg gave a detailed description of various functions and roles performed by a manager. Functions of management are part of the classical approach, given by Henry Fayol (French Industrialist). Later in the 1960s, Henry Mintzberg divided the diverse responsibilities of a manager into ten roles performed by the manager.

1.6.1. Management Functions

Henri Fayol identified five functions of management, namely, planning, organizing, commanding, coordinating, and controlling. The manager performs various tasks of similar nature within each function. The detailed description of all five functions of management are as follows-

Planning: The main purpose of any organization is to achieve certain goals. The manager needs to define these goals in line with the main purpose and vision of the organization. It is a complete process where the manager explores various alternatives, built a strategy for the whole organization, and set objectives for employees. Later these goals become a yardstick against which outcomes are being measured. Fayol summed up this role under a broad category known as "*Planning*".

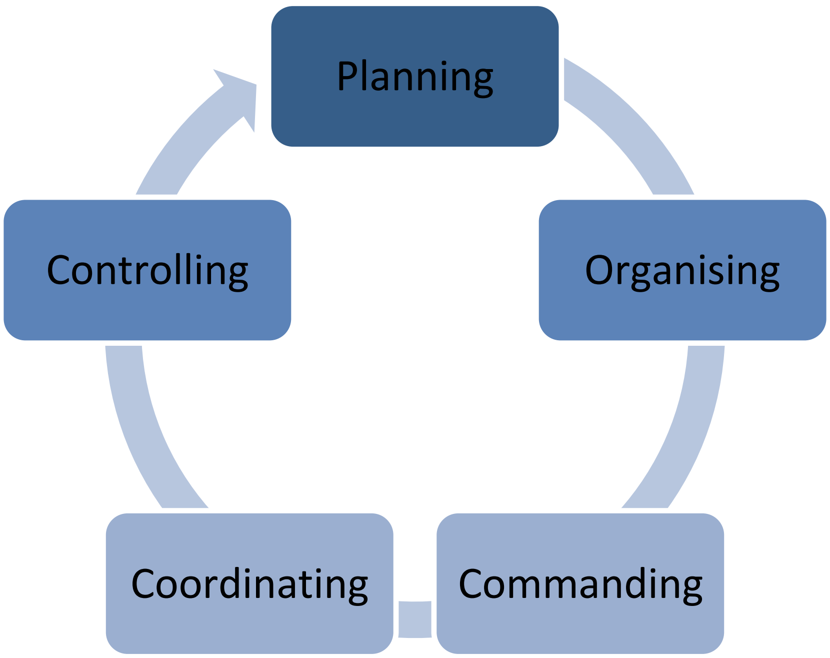

Figure 1.3. Five Management Functions by Henry Fayol

Organizing: The manager is also responsible for building the structures in the organization. The organizing function includes identifying various tasks in an organization, grouping, and classification of similar nature tasks, it also includes designing reporting relationships.

Commanding: The manager is responsible for communicating planned strategies, goals, or targets. In line with organizational goals and practices, a manager should command subordinates. It is not a negative approach, but it is associated with communicating clear instructions to employees in line with the standards of the company. A manager should be able to inspire and motivate the employees in achieving the goals of the company.

***Coordination**:* Coordination is one of the crucial functions of management. Setting goals, creating structures, and giving instructions to employees will fail if all activities will not be coordinated properly. It is equally important to harmonize all activities in an organization. Managers should ensure that various activities are complementing each other, this would also reduce conflicts and would stimulate employees' motivation.

***Controlling**:* Manager set standards/objectives at the planning stage. The planning stage will remain incomplete unless the manager will compare the standards with actual performance. Therefore, a manager should periodically compare the targets with the actual performance and should take corrective actions in case there is any gap.

The five functions provided by Henry Fayol give an overview of the main functions of management, it may not cover all the complexities that a manager is expected to deal with.

1.6.2. Managerial Roles

The role of managers in an organization is multifold and is defined by Henry Mintzberg in 1960. Based on observation, Mintzberg segregated all the roles of a manager into three broad categories, namely, interpersonal, informational, and decisional. He stated that these roles are highly interrelated and reflect a certain set of behaviors followed by managers in an organization. The detailed description of all three categories of managerial roles is as follows-

Interpersonal role of a manager: : Interpersonal role of a manager includes three subsets within it. First is "Figurehead", a symbolic role where the manager works on routine level work of social and legal nature. This role inspires others in the organization. Secondly, the manager acts as a "leader" responsible for hiring, motivating, and directing employees. The third managerial role within interpersonal is called "Liaison"; under this role; he builds his network. He can gather the required information through networking with people internal or external to the organization. Such contacts also provide a manager with favours.

Informational Role of a manager: The informational role of a manager is associated with a process where the manager gathers required information, transfers it into the organization, and transmits it to the outside organization. This role includes three subsets. The first subset is known as "Monitor"; under this role; the manager collects information through various sources and analyses the internal and external environment. Later the manager transmits relevant information to other members of the organization; this role also defines the second subset known as "Disseminator". Finally, under the third subset, the manager as a "spokesperson" transmits the information outside the organisation.

Decisional Role of a Manager: The manager is not only a symbolic head who manages information or directs employees but also a decision-maker. As an "Entrepreneur" manager searches for new opportunities and brings new assignments/ projects to the organization, a manager also initiates change. The manager is responsible for "handling disturbance" in the organization. For example, suppose there is some roadblock in the organization's functioning; the manager is responsible for handling it. The manager also acts as a "Negotiator", where he represents the organization in all the major negotiations. Lastly, as a "resource allocator," he is responsible for procuring and allocating resources.

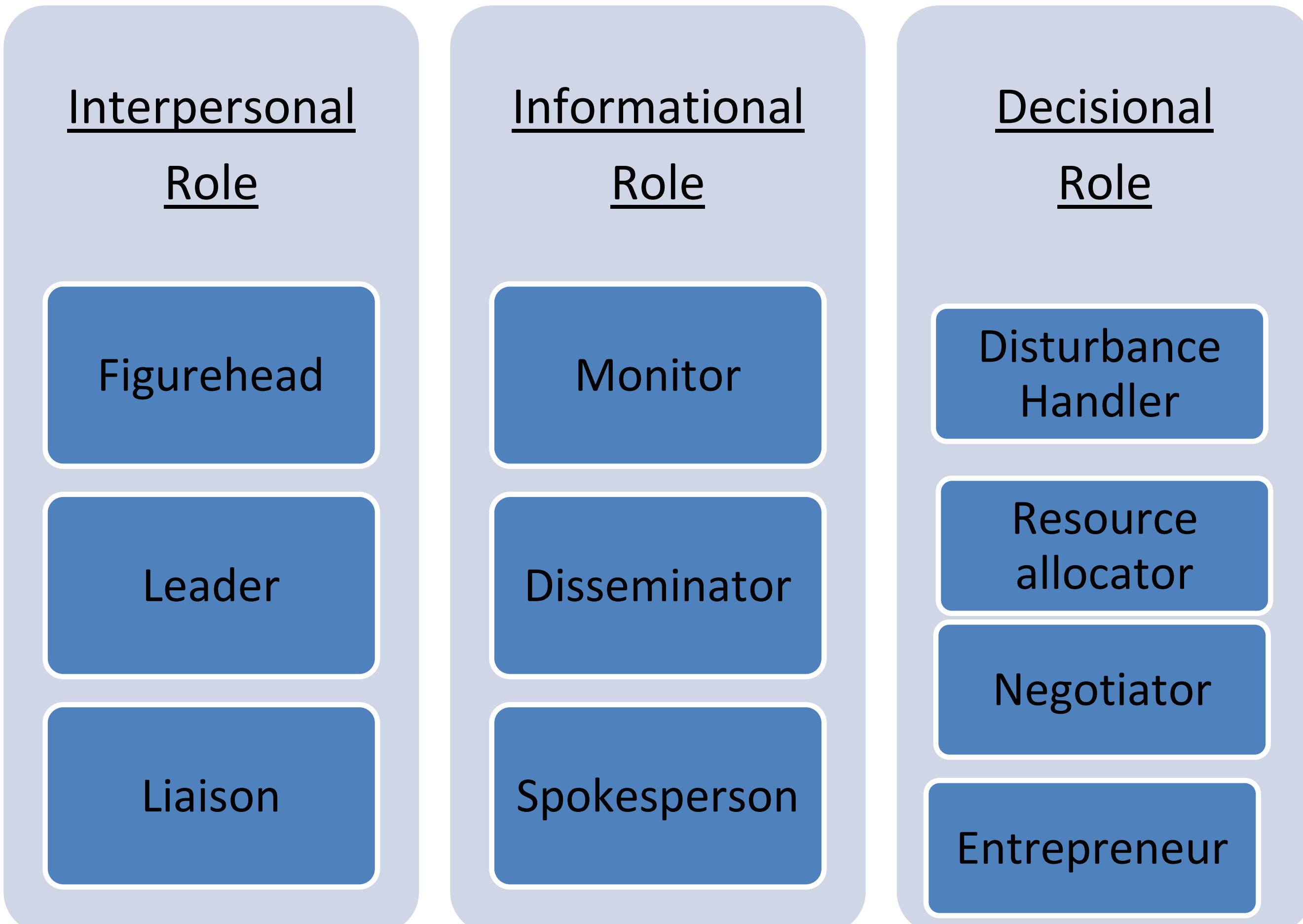

Figure 1.4 Mintzberg Managerial Roles

Emerging Managerial Roles

What do managers do? Or what a successful manager is supposed to do? If asked by a management student, the answer will be either associated with five basic functions (namely, planning, organizing, staffing, and controlling) as defined by French industrialist Henri Fayol or will be associated with ten managerial roles as defined by Henry Mintzberg.

But in the current scenario, in addition to these functions and roles, a manager should change and get away with the traditional approach while dealing with the employees. With growing competition and technological advancement, a manager must change some commonly followed practices like limiting his role to problem-solver, micromanagement, giving direction to employees, etc. To meet the contemporary challenges in the workplace the manager must shift from-

1. ***Directive to Instructive***: The role of the supervisor has considerably changed with the advent of technology. Robots driven by AI (Artificial Intelligence) have already replaced manual & repetitive work in the majority of industries. AI could impact the present roles of the employees, but it won't be able to exclude the need for human resources. New roles are emerging and are replacing the old ones. The present-day manager needs to explore best practices to shape the impact of AI on the industry.

2. ***Restrictive to Expansive***: Present-day competitive business environment needs employees to think and learn quick decision-making. Centralization and micromanagement by managers could restrict employees in the way they think. Therefore, it is important for managers to delegate and motivate their employees to analyze the market, think about a solution, and take decisions based on their analysis.

3. ***Exclusive and Inclusive***- Managers should include employees in the decision-making process especially while dealing with some new situation (Like- WFH (Work from Home); Virtual organizations, etc. during Covid-19), this brainstorming process adds diversity and helps in identifying various perspectives around the problem. It also makes the "process of change" easier in the organization.

4. ***Repetitive to Innovation***- There is no best time for innovation, rather it is an ongoing process. Innovation makes an organization successful, and a successful organization needs innovation to remain competitive.

5. ***Problem solver to Challenger***- The role of the present-day manager is not limited to problem solver, today manager needs to be proactive in understanding, analyzing, and solving upcoming challenges in the industry.

6. ***Employer to Entrepreneur***- Present-day manager needs to think like an entrepreneur. An entrepreneur facilitates development and helps others in growth.

For more details please check: *Pistrui, J., & Dimov, D. (2018). The role of a manager has to change in 5 key ways. Harvard Business Review.*

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1.7 Managerial Skills

Robert L. Katz has identified various skills that are necessary for developing a successful manager. According to him, a manager needs the following skills to accomplish their goals-

1.7.1 Technical Skills*:* Technical skills refer to the "*Employees' ability to apply specialized knowledge or expertise while performing the given task*", or in other words, technical skills mean knowledge and the ability to accomplish the given task. For example, for a manager at ABC ltd (an audit firm), technical skills could include knowledge about the fundaments of accounting, the Ind AS rules, and how to conduct an audit process. Though education/ and qualification are important for technical skills (like a chartered accountant degree), along with knowledge gained through degree/schooling/ college technical skills could also be developed in a job.

1.7.2 Human skills: The primary responsibility of managers is to coordinate employees and achieve objectives through others. To accomplish this purpose a manager should have the ability to motivate, and handle employees. A manager should be able to handle conflicts in the organization. For example, An audit manager with a chartered accountant degree might possess sound technical knowledge about the audit process. Still, he won't be able to manage a team or accomplish goals unless he has good human skills (like- the ability to communicate, listen, and motivate; the ability to create good coordination between team and client to achieve the set targets; etc.)

1.7.3. Conceptual skills: Presently, the work environment is highly associated with the popular term "VUCA" (Volatility, Uncertainty, Complexity, and Ambiguity). In such an environment it is difficult to make a decision based on only past knowledge. Therefore, to work in a present-day environment a manager should possess the mental ability to deal with a complex problem. The ability to analyze a complex problem is termed "*Conceptual skills*". For decision-making in the VUCA environment, a manager should have good conceptual skills. *For example, A* manager needs to analyze the problem, generate various alternatives and take the best one out of them.

1.8 Managerial Activities: Effective versus successful Manager

Fred Luthans and his associations found that all managers could be engaged in four activities, namely-

- ***Traditional Management***: This includes planning, organizing, making decisions, etc.
- ***Communication:*** This includes communicating information, doing all sorts of paperwork, and exchanging information.
- ***Human resource management***: This includes managing people using human skills (Like motivation, training, handling conflicts, etc.).
- ***Networking***: Building a social network, interacting with outsiders.

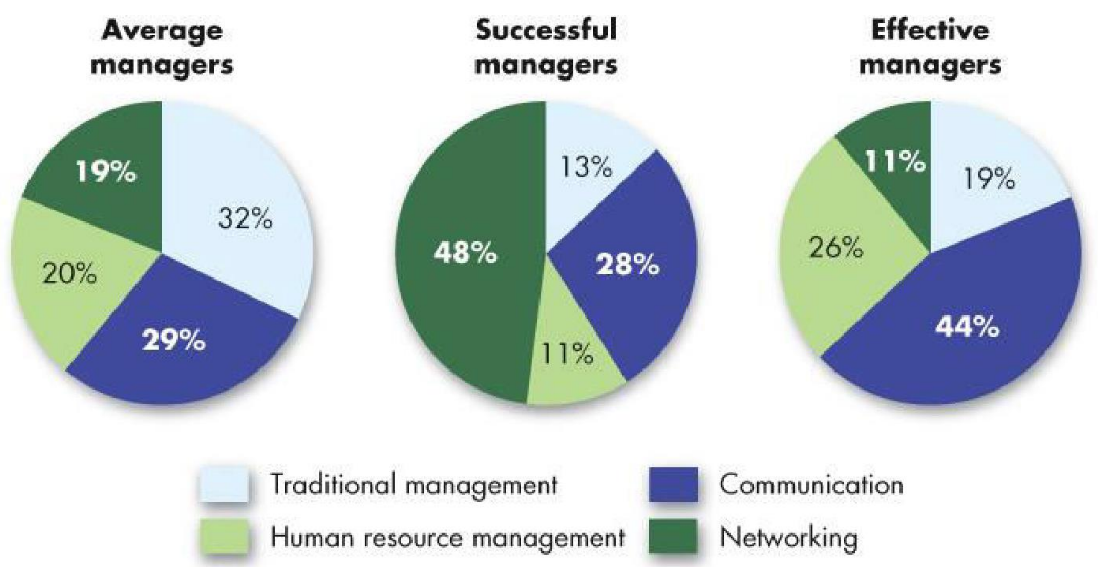

Figure 1.5 Allocation of Activities by Time

Source: Based on F. Luthans, R. M. Hodgetts, and S. A. Rosenkrantz, Real Managers (Cambridge, MA: Ballinger, 1988).

An empirical study based on a sample of 450 employees was conducted by Luthans and his associates. It was found that a successful manager spends 48% of his time in networking and hardly 13% of his time in traditional management. Whereas an effective manager spends 44% of his time in communication and hardly 11% of his time in networking. An average manager spends between 19%-32% of his time in all activities. In nutshell, networking is an important activity that makes a manager successful.

IN-TEXT QUESTIONS

6. Efficiency means achieving goals with ______________.
7. Functions of management are part of the classical approach, given by_______
8. _________means completion of given task within planned time frame.
9. According to Mintzberg, manager transmits the information outside the organisation, and this role is termed as _______
10. ________is a symbolic role, under this role manager inspires the employees.
11. The _______stage will remain incomplete unless manager will compare the standards formed at ____stage with actual performance.
12. To coordinate with employees manager needs ______ skills.
13. A manager needs ______ to analyze complex nature problem.

1.9 Challenges and Opportunities faced by Manager

Today work environment has become more challenging. With technological advancement and globalization, new employment opportunities have emerged, and managing the workforce has become more challenging. . HR professionals have faced various challenges due to the emerging gig economy, and the arrival of artificial intelligence. Following are the emerging challenges due to which the job of a manager is changing-

Responding to Globalization: Globalization refers to the integration of various economics. Today businesses are no longer restricted to a particular region. The company sells products in other countries (Like Samsung is a South Korean company but it sells its product worldwide, same is the case of Brazilian company Burger King, and others), hire employees from other countries due to the cost of labor (Like apple is the US company, but the majority of Apple employees are not from the US), even production process is undertaken in a foreign land (like Honda cars are built in Ohio). The world has become a "Global village". Therefore, a manager needs to focus on global issues. An expatriate manager must understand the cultural differences among employees and that the legal system varies from country to country. Something that fits the culture or legal system of the homeland might not fit in the culture or legal system of other countries.

Managing Workforce Diversity: Workforce diversity means differences and similarities between employees in terms of gender, ethnicity, race, sexual orientation, age, value, etc. Presently organizations are operating globally, this also means they have to deal with people of diversity. The heterogeneous workforce is important because it helps the organization in understanding the customer needs, it helps in bringing new innovative ideas to the organization and it also increases the morale of other employees. But the diversified workforce is also a challenge for management. It is difficult to resolve conflicts as people tends to stick to their viewpoints which often centers around their values, belief, religion, or cast.

1.9.3. Improving customer service: Employees in front roles (directly dealing with customers) play an important role in ensuring customer satisfaction. In competitive environment customer satisfaction plays an important role. There is a need for a “customer-responsive” culture in an organization. Organizational behavior could help managers in bringing such a culture into the organization by working on employees’ attitudes and behavior.

1.9.4. Working in Networked Organization: Network organizations allow employees to work together even when they are far away from each other in terms of distance. Worldwide lockdown around 2020 due to the pandemic (Covid-19), forced most organizations to move to the virtual platform. Even today in 2022, many businesses are still working through virtual platforms or have permanently adopted a hybrid mode. Managing such an organization needs a different set of skills, presently collaborating and coordinating with employees through online mode is an emerging challenge for managers.

1.9.5. Helping employees in Work-life balance: Employees today find it difficult to create a balance between their work and life. Long working hours are one of the main reasons for work-life conflict. Today, employees from all over the world are virtually connecting through online platforms, it may be a day time for one employee and a night for another employee. So, the world never sleeps. Work is endless and there is no specific working time. This leads to work-life conflict. Work-life conflict could increase burnout and stress among employees and as a result of which it could drop the employee's productivity.

1.9.6. Creating a positive work environment: The new wave of positivity within the fields of the organization led to the growth of a new concept of positive organizational behavior (POB), which is a study that focuses on the strength of employees. The earlier focus of managers was to work on the weakness of the employees or correct what is wrong, but the field of POB suggests that the focus needs to be a deviation from what is wrong to what is right. A manager today needs to learn how to get the best from the strengths of the employees.

1.9.7. Economic Pressure: Managing employees in bad times like during Covid-19 is more challenging than managing employees in good times. The spread of the novel Covid-19 in the year 2020, forced the ensure social distancing and put a limit on their traveling, which badly impacted businesses at all levels. Other than impacting health conditions, the pandemic has pushed organizations to go for cost-cutting. COVID -19 pandemic can be regarded as a negative factor that has suddenly changed the business environment and presented unprecedented challenges to most businesses and their management. Under good economic conditions, managers work on employee motivation through rewards, but under bad economic conditions, managers need to deal with the growing stress conditions in the workplace.

1.9.8. Improving ethical behavior: It is not that employees always want to do something that is considered wrong on ethical grounds for their benefit or they are not aware of the fact of what is right or ethical, it is just that people in a work setting mostly face Moral Distress, i.e., mostly they know what is right but due to the limitations and fear of negative outcomes they fail to do the right thing. Though there is no clear line between what is right and what is wrong. Still, a manager needs to create an "ethically- health climate", which could minimize the vagueness between right and wrong behaviors. Further, It is important to promote integrity in the organization at all levels.

Above challenges could also provide various opportunities to present-day managers. For instance, workforce diversity brings new ideas to the organization but it could also lead to an increase in conflicts. It is important for a manager to learn how to convert these challenges into opportunities.

IN-TEXT QUESTIONS

14. Role of manager is changing and becoming more challenging due to the technological advancements. (True/False)

15. ______suggests that the focus needs to be a deviation from what is wrong to what is right.

1.10 Importance of studying Management

Students from different disciplines like science, accounting, etc. often wonder why it is important to study management as a subject. How this subject of management is contributing to their career and if at all it will be required in their respective organizations. The importance of the course could be understood through the following-

1. **Concept of Universality:** Management is needed by all organizations, irrespective of size and type. An organization consists of a group of people, and when individuals come together, it becomes important for the manager to prepare plans, assign roles, motivate them, etc; to smoothly accomplish the purpose. It doesn't matter whether the organization belongs to the IT sector or the FMGC sector. It doesn't even matter if it is a small size firm with one department or a big organization with multiple departments. This need for management by all organizations, at all levels and in all sectors is also termed as "The Universality of

Management". In fact, the organization provides management training to technical experts as they move up in the hierarchy (i.e., from non-managerial roles to managerial roles).

2. **Growth in Career-** Every organization expects employees at the managerial level to coordinate with subordinates and get work done through people rather than completing all the tasks at an individual level. With the growth in an individual's career, the authority and responsibility both go up and it becomes impossible for an individual to complete all tasks on his own. With technical skills, it is easy to complete the given task but takes human and conceptual skills to manage people and take decisions. Insights from management play a very important role in handling the employees and taking decisions.

1.11 SUMMARY

The lesson aims to highlight the meaning of organization and management along with the various function and roles performed by the manager. The present-day managerial roles have changed with technological advancement, globalization, changing organizational structures, and changing lifestyles of employees at all levels. A manager needs to learn how to convert these challenges into opportunities. Additionally, with increasing complexity in an organization, the skills required by a manager could also vary. Broadly, there are three levels (namely, lower-level management, middle-level management, and top-level management) in any organization, and the skills required to be a manager could also be bifurcated into three categories (namely, technical skills, human skills, and conceptual skills). The manager at any level use combination of these skills, the combination of these skills differentiates an effective manager from a successful manager.

1.12 GLOSSARY

Managers are the coordinators who are responsible for managing social units, these social units help the organization in achieving its goals.

Level of Management: There are three levels of management, namely, first-line managers, middle-level managers, and top-level managers. These three levels of management form a pyramid-like structure.

Functions of Management: Henri Fayol identified five functions of management, namely, planning, organizing, commanding, coordinating, and controlling.

Effectiveness means the completion of a given task within a planned time frame.

Workforce diversity means differences and similarities between employees in terms of gender, ethnicity, race, sexual orientation, age, value, etc.

First-line managers are at the bottom of the pyramid. They are mainly responsible to manage non-managerial employees. They are also known as office managers or supervisors.

1.13 ANSWERS TO IN-TEXT QUESTIONS

1. Three	9. Spokesperson (or Informational role of manager
2. True	10. Figurehead
3. a) Project Manager	11. Planning Stage
4. Non- Managerial employees	12. Human skills
5. Purpose/ goal (Both are correct)	13. Conceptual Skills
6. Minimum Resources	14. True
7. Henry Fayol	15. Positive Organisation behavior
8. Effectiveness	

1.14 SELF-ASSESSMENT QUESTIONS

1. Assume you become a bank manager of a bank. As per Mintzberg's theory, what roles do you think you will be required to play as a manager? *(BMS; Open book exam)*
2. An effective manager may not be an efficient manager. Comment. Also, explain the various skills required by a manager to be a successful manager.
3. Explain the difference between various levels of management, along with a suitable example.
4. Write a short note on the functions of a manager. State how functions of management are different from managerial roles.
5. Explain various challenges faced by a present-day manager. Elaborate on how the role of a manager is changing with time.
6. "Management is a universal concept". Do you agree? Comment.

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LESSON 2

EVOLUTION OF MANAGEMENT THOUGHT

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STRUCTURE

2.1 LEARNING OBJECTIVES

After completing this lesson, you will be able to:

- Describe the difference between Administration and Management;
- Understand if management is science, art or profession;
- Explain the different functions of management.
- Describe the evolution process of management thought;
- Understand the various classical management theories;
- Understand the various behaviourial management theories
- Understand the various quantitative management theories;
- Understand the various modern management theories;

2.2 INTRODUCTION

Management being a multi-disciplinary subject has been approached from different perspectives to be understood. The very nature of the essence of management is sometimes confused with different terms such as regulation, administration, leaders etc. Thereby, it is important to dig deep into the core of the management and distinguish it from synonyms used in the industry. It is possible to think of management as the ability to delegate tasks to others. It differs slightly from administration, which refers to a method for efficiently managing the entire organisation. The primary distinction between management and administration is that the former is focused on leading or steering the organization's operations, whereas the latter emphasises establishing the organization's policies and goals.

2.3 ADMINISTRATION VS. MANAGEMENT

Key Similarities between Management and Administration: Despite major differences, there exists quite a lot similarity between the two:

- Both make uses of skilled employees to carry out their practices and achieve the objectives. These two things are not suitable for beginners.
- Both have their own appropriate and specific procedures, as well as tips and tricks. Despite the fact that each application procedure is unique, initiatives are almost the same.
- For sustainability, both must be implemented throughout the organization.
- Management forms typically include administrative tasks. Administration collaborates with management at the same time. The crucial point here is that a manager must possess both management and administrative skills.
- The objective is to produce the anticipated results, whether administered or managed.
- Both involve planning, organising, and exercising control. These are management and administration's fundamental duties.
- Though management deals with business or non-government organizations and administration deals with the government. Both, however, function in the same ways.

Figure 2.1: Administration and Management

Key Differences between Administration and Management

Basis	Administration	Management
Meaning	Deals with a group of people.	Dealt with a mere people.
Authority	Higher-level	Mid and Lower level
Operational Zone	Fully control over the activities	Working out under the administration
Provide Explanation of	When and what does it?	How and who does it?
Focus	Making Policy	Policy utilization
Function	Conclusive	Governing

Basis	Administration	Management
Relevance	Service-oriented organizations	Profit-oriented organizations
Concentration on	Efficient use of resources	Work management
Personality	Administrator	Manager
Consistency	Objectives and policies	Actions and plans
Capacity	Determinative and Parliamentary	Ruling and Executive

Table 1.1: Key Differences between Administration and Management

(Source: https://higherstudy.org/difference-between-management-and-administration/#Difference_between_Management_and_Administration)

IN-TEXT QUESTIONS

1. Administrators create policy for managers to implement it. True or False?
2. Administration is policy making while management is policy_____.

2.4 MANAGEMENT AS AN ART OR A SCIENCE

"Science is a systematically organised body of knowledge based on proper findings and exact principles and is capable of verification". Management is not considered perfect science as compared to physical sciences like physics, chemistry, biology etc. The main reason behind it that management deals with human behavior and it is very difficult to accurately predict behaviour. Management being a social process it falls under the category of 'social sciences' Ernest Dale called management, a 'soft science' as its principles and theories when applied to different situations may not lead to same results. "Art is the bringing about a desired result through the application of skills". Every manager is an artist in the sense that he/she takes the knowledge from the science of management and apply skilfully over the human and resources in the organization. Every manager has their own style of managing people and achieving results.

From the Table 1.2, it is evident that management has characteristics of both science and art. It is science as it is an organized body of knowledge which has universal facts. It is an art as it requires managers to have their distinct styles of applying acquired skills.

Characteristics of Science	Whether characteristics belong to Management or not.	Characteristics of Art	Whether characteristics belong to Management or not.
Systematized body of knowledge including concepts, principles and theories	Yes	Personal skills	Yes
Method of scientific enquiry	Yes	Practical knowledge	Yes
Establish cause and effect relationships	Yes	Achieving concrete results	Yes
Verifiable principles	Yes	Creative in nature	Yes
Predictable results	No		
Universal application	Yes		

Table 1.2: Management as a science and an art

2.4 MANAGEMENT AS A PROFESSION

"A profession may be defined as an occupation backed by specialized knowledge and training and to which entry is regulated by a representative body and which is duly recognized by the society. The characteristics of a profession are as follows:

a) **Specialized Management:** Over the years, many thinkers have contributed to develop the systematic body of knowledge. Nowadays, management is being taught in many educational institutes at both undergraduate and postgraduate level.

b) **Professional Body:** The existence of a regulatory body is must for any profession. For instance, Institute of Chartered Accountants of India is the regulatory body for accounting profession. Some associations were established in India such as Indian Management association and All India Management Association, but these do not have any regulatory power over the managers.

c) **Formal Education:** There seems to be no standard qualification to become managers in India. Though, candidates with Master in Business Administration are preferred but candidate with other degrees such as psychology, engineering etc. can also get the manager's job. According to a study carried out by INSEAD, Business Today magazine the Harvard Business Review (HBR), only 40% of India's top CEOs have an MBA degree.

d) **Code of Conduct:** A code of conduct is essential for any profession. Though, All India Management Association have a code of conduct but does not have any power to take action against who does not follow.

e) **Social Status:** Any profession brings in higher social status for individuals. Similarly, managers enjoy respect and status in the society just as doctors, lawyers, etc.

Management cannot be called a full-fledged profession as it does not have all the characteristics of a profession. But the management is on the way of professionalism in India.

IN-TEXT QUESTIONS

3. Which is not the characteristics of science?

a) Systematic body of knowledge b) Personal skills
c) Method of scientific enquiry d) Verifiable principles

4. All India Management Association have a code of conduct for managers. True or False?

5. Management is ________ as it requires managers to have their distinct styles of applying acquired skills.

2.6 EVOLUTION OF MANAGEMENT

As per the Egyptian literature, the origin of management dates back to 1300 B.C. Around the time of construction of Great Pyramids which required someone to organize material; lead and direct workers and supervise so that everything is completed as planned. Similar examples of administration and management are found universally. In China, L. S. Hsu suggested the proper public administration and cautions in choosing skilled public officers. The Athenian Commonwealth of Greece describes the nature of management in the form of councils, board of generals, courts and administrators. The Romanians describes the organization of management in scalar relationship through the presence of Roman Magistrates (elected officials in Ancient Rome). From 1400s, the city of Venice has an early form of business enterprise which are engaged in activities such as creation of assembly line, production standardization, warehouse and inventory system and accounting system to supervise and control workers. In the Indian history, the architecture, water and sanitation management of Harappan civilization are classic examples of strategic planning. All these early examples indicates that organizations and management practices have been there from the beginning of civilizations. However, the development of systematic management thoughts and formal schools of study started only around the pre-twentieth century. Two significant historical events have played an important role in the evolution of management.

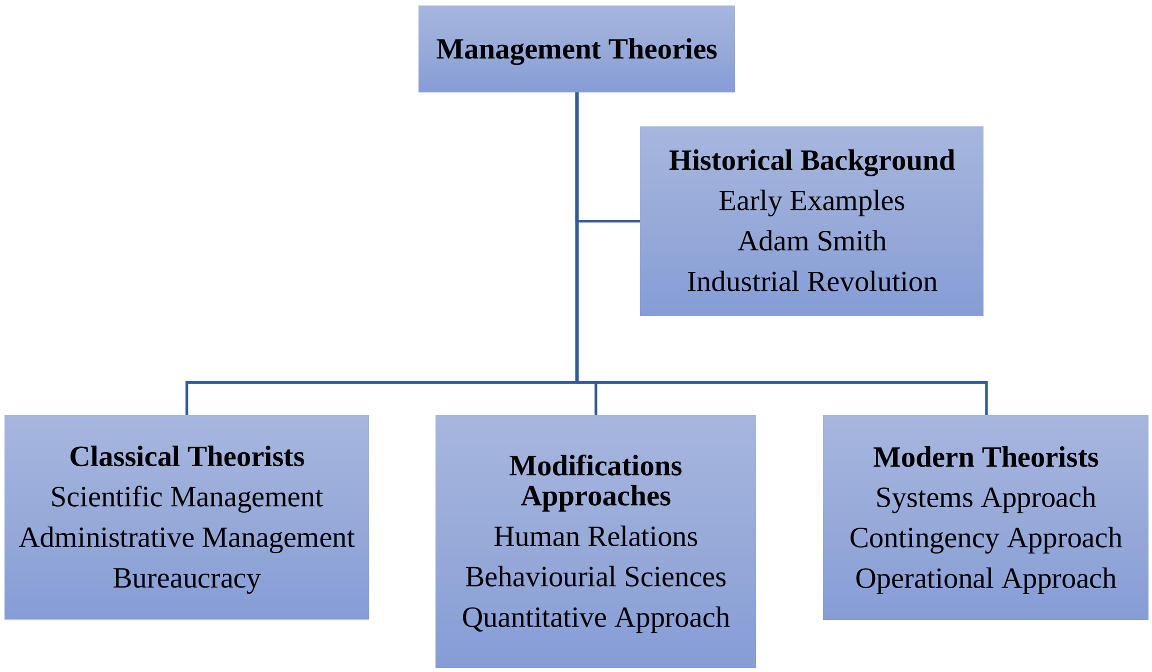

Figure 1.2: Evolutionary Phases of Management Theories

- In 1776, Adam Smith in his book 'The Wealth of Nations' suggested the use of division of labour and job specialization to increase productivity.
- During 1760 – 1820 Industrial Revolution took place in Britain. This phase saw many technological inventions such as steam engines, mule spinner, power loom etc. This technological boom resulted in mass productivity using power driven machines, sole proprietorship expanded into partnerships and join stock companies, cottage factories replaced by factory system and functional specialization.

The evolution of management thought has been characterized by different phases based on what managers do and how they do it. Contributions from pioneers have resulted in different approaches to understand management, which is termed as 'the management theory of jungle' by Harold Koontz. The next sections present the contributions of each phase.

2.7 CLASSICAL MANAGEMENT THEORIES

Industrial revolution posits challenge for efficient management of workforce which led to the emergence of pioneers of management thought.

- Robert Owen (1771-1858): Known as Father of Personnel Management, Robert Owen suggested human treatment of the workers by providing them with lesser working hours, housing facilities, education of workers and their children and system of discipline and justice. He actively participated in introduction of British Factory Act 1819.

- Charles Babbage (1792 – 1871): Babbage conceived the first automatic digital computer. In his book, "On the Economy of Machinery and Manufacturers", Babbage suggested to use division of labour and scientific principles to supervise men and materials to get best results. He also suggested the profit sharing among the workers to increase productivity.

- Henry Varnum Poor (1792 – 1871): H. V. Poor was the editor of 'American Railroad Journal'. While managing railroads in America, he came to the conclusion that railroad's managers need to be guided by principles of organization, communication and information.

- Daniel C. McCallum (1815 – 1878): McCallum was an associate of H. V. Poor. His method of dealing with the railroad inefficiencies was to employ a system of common sense, reports and control. He suggested the use of job descriptions, merit- based promotions and setting up of responsibility- accountability relationships.

The classical perspective of management includes three revolutionary theories that builds the framework for many contemporary ideas on management and organization.

2.7.1 Scientific Management:

He was an American mechanical engineer, Frederick Winslow Taylor (1856 – 1915) who is known as Father of Scientific Management. F. W. Taylor defined, "Scientific Management is the substitution of exact scientific investigations and knowledge for the old individual judgement or opinion in all matters relating to the work done in the shop". He focussed on the use of scientific methods to identify the 'one best way' for every job.

F. W. Taylor in his book, 'Principles of Scientific Management (1911)' proposed the five principles of management. Taylor was not alone in the development of theory of scientific management. Henry Laurence Gantt (1861 – 1919) devised a bar graph to measure the duration of planned and completed work under each stage of production, known as Gantt Chart. A husband-wife duo, Frank B. Gilbreth (1868-1924) and Lillian M. Gilbreth (1878 - 1972) worked extensively to devise the use of time and motion study to eliminate wasteful hand and body motions. They developed a classification system to label seventeen basic hand motions (such as search, grasp, select, hold, etc.), well known as 'therbligs'. The system helps in analysing exact elements of worker's hand motions. For her contribution to human resource management, Lillian M. Gilbreth is also known as first lady of management. Harrington Emerson (1853 – 1931) promoted the ideas of scientific management and efficiency to a mass audience. He differentiated from Taylor's scientific management and called his system 'Efficiency'. He promoted unity of direction and efficiency-based wage system. The principles of Scientific Management are as follows:

A. Science, not rule of thumb: Managerial decisions should not be based on opinions and intuitions, rather they should be backed up by scientific facts and inquiry.
B. Harmony, Not Discord: F. W. Taylor advocated for a friendly and pleasant working environment between employees and management. The value of each other should be recognised by management and employees.
C. Mental Revolution: It demands for changing the mental attitudes of both workers and management. Mental revolution has three aspects - making every attempt to increase productivity; establishing a culture of confidence and trust; and establishing a mindset for scientifically solving problem.
D. Cooperation, not Individualism: This is an extension to Harmony, Not Discord that emphasises on collaboration between employees and management.
E. Maximum Output: Development of all the workers to their fullest efficiency and prosperity to achieve maximum output.

To put the theory into practice, the contributors of scientific management suggested some techniques. The techniques of Scientific Management are as follows:

A. Setting the standard task to be done during a working day, known as fair day's work.
B. Work study is a system for evaluating methods in order to maximise production and efficiency. It includes method study (to know the best method of doing a job), motion study (to eliminate useless movements while doing a job), time study (to know the standard time for doing a job) and fatigue study (to reduce the fatigue among the workers).
C. Planning department must plan the tasks with detailed instructions on type, quality and quantity of products to be manufactured.
D. Scientific selection and training to ensure right men are selected for right job.

E. Differential piece-wage system asks for paying the worker at higher piece rate if he finishes the work in standard time or produces more than standard output in within the allotted time. A lower piece rate will be paid to the workers who produces below the standards.

F. Functional foremanship brings in specialisation by employing eight foremen - route clerk, instruction card clerk, time and cost clerk, shop disciplinarian, gang boss, speed boss, repair boss and inspector.

2.7.2 Administrative Management or Functional Approach:

The scientific management theorists focussed on the individual productivity whereas another group of theorists focussed on entire organization. They constituted general administrative theories that states what managers do and what good management practices look like. The pioneer of this school of thought is a French industrialist, Henri Fayol (1841 - 1921), known as the father of administrative management. In his book, General and Industrial Management (1916), Fayol laid down fourteen principles of management which are still popular and practiced in today’s era. He also classified all the operations in the business under six categories - technical, commercial, financial, security, accounting and managerial activities. Fayol was the one to define management as the process of five functions – **planning, organising, controlling, commanding, coordination and controlling.** The principles of Administrative Management are as follows:

a) Division of work amongst the workers improves the productivity, accuracy efficiency and speed of the workers.

b) Authority provides the management with the power to work efficiently, and Responsibility makes them accountable for the work done.

c) Discipline requires a set of organizational rules, philosophies, and structures in place for every worker.

d) Unity of command states an employee should receive orders from only one manager.

e) Unity of direction states employees must work in harmony towards the same objective, using only one plan, under the direction of one manager.

f) Subordination of individual interest to the general interest states that organizational goals should come before individual goals.

g) Remuneration states that employees should be paid fair wages for the work done.

h) Fayol suggested balancing the centralization (concentration) of power and let decisions be taken by both management and employees.

i) Scalar chain facilitates hierarchy in the organization and how the communication flows between management and employees.

j) Order states that there should be a logical placement of resources (manpower, materials, money, etc.) in the right place at the right time.

k) Equity suggests that managers should be fair to all employees.

l) Stability of tenure of personnel suggests that employees must be ensured job security because instability can lead to inefficiency.

m) Employees must be encouraged to show initiative and must be heard in the organization.

n) Esprit de Corps requires organizations should try to promote team spirit.

2.7.3 Bureaucracy:

A German sociologist, Max Weber (1864 – 1920) is the one to develop the theory of authority structures where he described organizations are based on authority relationships within them. Weber focused on three types of authorities that are present in an organization.

a) Rational – legal authority says that people obey to legally established hierarchy in any organization, for example, police, courts, elected government, etc.

b) Traditional authority says that people obey to customarily established classes or positions in the society, for example, royal family, Tibetan Buddhism, etc.

c) Charismatic authority says that people obey to persons whom they think have some extraordinary power or appeal, for example, Jesus Christ, Mahatma Gandhi, Hitler, etc.

Weber believed that organization developed on rational – legal authority is more efficient and dynamic as they are based on formally defined structures and not on informal relations. He termed the ideal organization, 'Bureaucracy' (having six distinct characteristics) in his book 'The Theory of Social and Economic Organizations'(1947). The characteristics of Ideal Bureaucracy of Weber are as follows:

a) Division of labour into smaller well-defined tasks.

b) Organizations to have authority hierarchy so that people know whom report and whom to supervise.

c) Formal selection of employees based on their technical competence.

d) Formal Organizational rules and regulations to ensure uniformity in work and behavior.

e) Impersonality in implementing the rules and regulations to avoid decision making based on emotions and sentiments.

f) Career orientation of managers are required as managers are hired professionals and not the owners.

IN-TEXT QUESTIONS

6. Following is not a classical theory to management:

a) Scientific Management b) Bureaucracy

c) Administrative Management d) Neo-classical theory

7. Management should find ' One best way ' to perform a task. _______ technique of scientific management supports this sentence.

8. The main aim of Taylor was to __________

a) improve labour relations b) improve productivity

c) to attempt a general theory of management d) none of these

9. Who is the father of administrative management?

10. Max Weber's theory of management is known as __________.

11. Principle of ____________ requires only one boss.

Another major contributor of general administrative theories of management was Ralph Currier Davis (1894 – 1960). An engineer by training, Davis had written several books on management due to his exposure to managerial philosophies of Alfred P. Sloan (President, General Motors, 1920s through 1930s). Davis work was more of an extension to the Fayol's work. In his book, 'The fundamentals of Top Management' (1951), Davis defined management as the 'function of executive leadership'. He called planning, organizing and controlling the 'organic' functions of management which are universally applicable.

2.8 HUMAN RELATIONS MOVEMENT

The major drawback of the classical theories is the absence of human aspects in it. The neo-classical theorists are the one who focused on human aspect of management. The humanistic perspective of management theories focused on understanding human behaviors, their needs, attitudes, and the social relations build by them in the organizations. The human relations approach identified the important social and psychological factors in determining workers' productivity and satisfaction. The theory focused on inter-personal relations and informal groups in the organization. The basic canons of human relations approach lie in –

a) Organization being a social system;
b) Individual's behavior is dominated by informal groups in organization;
c) Social and psychological needs are important to motivate employees which further leads to higher productivity;
d) Cooperation among employees yields result; and
e) Social and leadership skills are as important as technical skills.

One of the early advocates of humanistic approach were **Mary Parker Follett** (1868 – 1933) whose work in the field of management focused on worker participation in setting up the goals and thereby empowering them rather than controlling workers. Follett's ideology on ethics, power and leadership was further extended by **Chester I. Barnard** (1886 – 1961) and others. Barnard is famous for his definition of formal organization, "*……. is a cooperative system in which there are persons able to communicate with each other, and are willing to contribute towards a common purpose*".

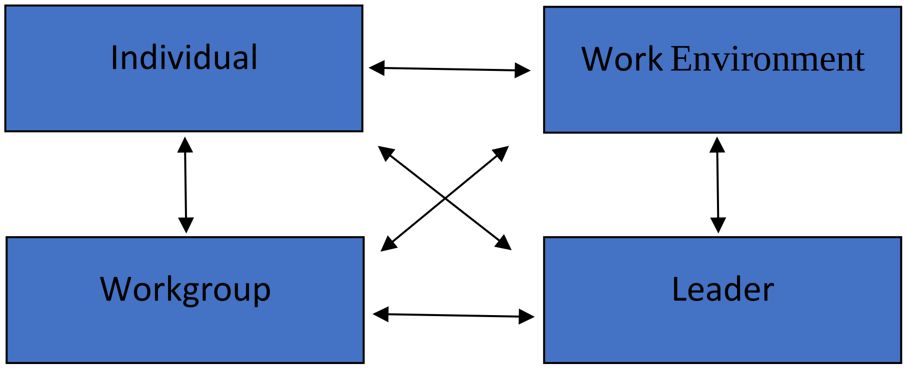

Figure 1.3: Factors affecting Human Relations (source: Chhabra, T.N. (2011). Principles & Practice of Management, Dhanpat Rai & Co.)

In his book, 'The Functions of the Executive' (1938), Barnard laid down six functions of executive – maintenance of organizational communication, security of essential services, and formulating and defining the purpose. As the motive of his work was to improve efficiency of the social system through cooperation between workers and management, he is also known as *father of Social System School.*

IN-TEXT QUESTIONS

12. Who is not the advocate of human relations movement?
a) Mary Parker Follett b) Chester I. Barnard
c) Elton Mayo d) Max Weber
13. Who is father of Social System School?
14. Human relations movement is also known as ___________ .
a) Classical theory b) Neo-classical theory
c) Bureaucracy theory d) Systems theory
15. Human relations movement suggest that individual behaviour is dominated by formal organization. True or False?

Among the others the most pioneering work under the Human Relations Movement was of **George Elton Mayo** (1980 - 1949) known as the *father of Human Relations School*. Mayo with his associate **Fritz J. Roethlisberger** (1898 – 1974) developed a series of experiments known as Hawthorne Studies (explained in detail in next lesson). The results of the study stressed on the importance of social factors in the working environment.

2.9 BEHAVIOURIAL MANAGEMENT APPROACH

The behavioral science approach to management is one ground-breaking approach among the theories of management as it requires to extract knowledge from different disciplines such as sociology, psychology, and anthropology. In fact, this approach is extensively developed into the discipline of Organizational Behaviour, study of actions of people at work (Robbins & Coulter, 1999).

The theories developed under the approach are based on the following propositions:

- Organization is social-technical system.
- Every individual is different and hence, they behave differently to different stimulus under different situations.
- Individual goals are different from organizational goals and hence there is a need to balance both.
- Many factors are responsible for inter-personal and group behavior in organizations.

The behaviorial theories developed are around different themes of motivation, leadership, group dynamics, communication, participative management etc. Some of the important theories of motivation are as follows (explained in later lessons):

a) Maslow’s Need Hierarchy Theory
b) Herzberg’s Motivation Hygiene Theory
c) McClelland’s Need Theory
d) McGregor’s Participation Theory
e) Urwick’s Theory Z
f) Argyris’s Theory
g) Vroom’s Expectancy Theory
h) Porter and Lawler’s Expectancy Theory.

Some of the important theories of leadership are as follows (explained in later lessons):

a) Contingency Theory
b) Situational Leadership Theory
c) Transformational Leadership Theory
d) Transactional Theories
e) Great Man Theory of Leadership
f) Trait Theory of Leadership

2.10 QUANTITATIVE MANAGEMENT APPROACH

The behavioral scientists of management were not able to reach to the precision of physical sciences in exact predictions of behavior. Thereby, a new school of management approach emerged with mathematical and operational precision known as Quantitative Management. This school of management is derived from the techniques developed for managerial decision making by the team of scientists from different disciplines including statistics, operational research, information technology, economics, accountancy etc. These techniques include Linear Programming, Games Theory, Queuing Theory, Break-Even Analysis, Critical Path Method (CPM), Programme Evaluation Review Technique (PERT), etc. The techniques developed under the approach are based on the following propositions:

- The main function of the management is decision-making.
- Organizational efficiency is dependent on quality of decisions taken.
- Problem can be expressed mathematically.
- Different variables can be quantified and expressed in equation form.
- Decision makers may require skills from different disciplines.
- The models can identify significant relationship among the variables that can be controlled.

The quantitative management model may look like an equation:

$$E = f(mi, ni)$$

where, E is effectiveness of the system (profit, cost, revenue, etc),

mi is variables of system that could be controlled,

ni is variables of system that could not be controlled.

IN-TEXT QUESTIONS

16. The behaviorial theories developed are not around different themes of

a) motivation b) leadership

c) group dynamics d) cooperation

17. This school of management uses mathematical techniques developed for managerial decision making

a) Behavioral science approach b) Quantitative approach

c) Human relations approach d) Scientific management

18. Who gave two-factor theory of motivation?

2.11 MODERN MANAGEMENT APPROACHES

It was the post-World War II period during which the modern management theories were being developed. These theories continued to keep human aspect of managing alive till today. The new concepts included systems approach, contingency approach and operational approach to management.

2.11.1 Systems Approach:

According to Robbins and Coulter, "A system is a set of interrelated and interdependent parts arranged in a manner that produces a unified whole". Thus, an organization does not exist in isolation, in a broader sense it belongs to the industry, economy and society. There are two basic types of systems – closed systems that are not influenced by their external environment, and open systems that are influenced by their external environment. As we talk today of organization system, we mean an open system. No organization can sustain in today's world without interacting with its external environment. For instance, if the marketing department does not bring in true consumer feedback, the production department cannot efficiently produce a quality product. Following are the characteristics of systems approach to management:

- Organizations need to be dynamic in the open system.
- Organizations have interdependent subsystems (e.g. production, sales, finance, etc.)
- Output of the organization is always greater than the sum of its sub-systems.

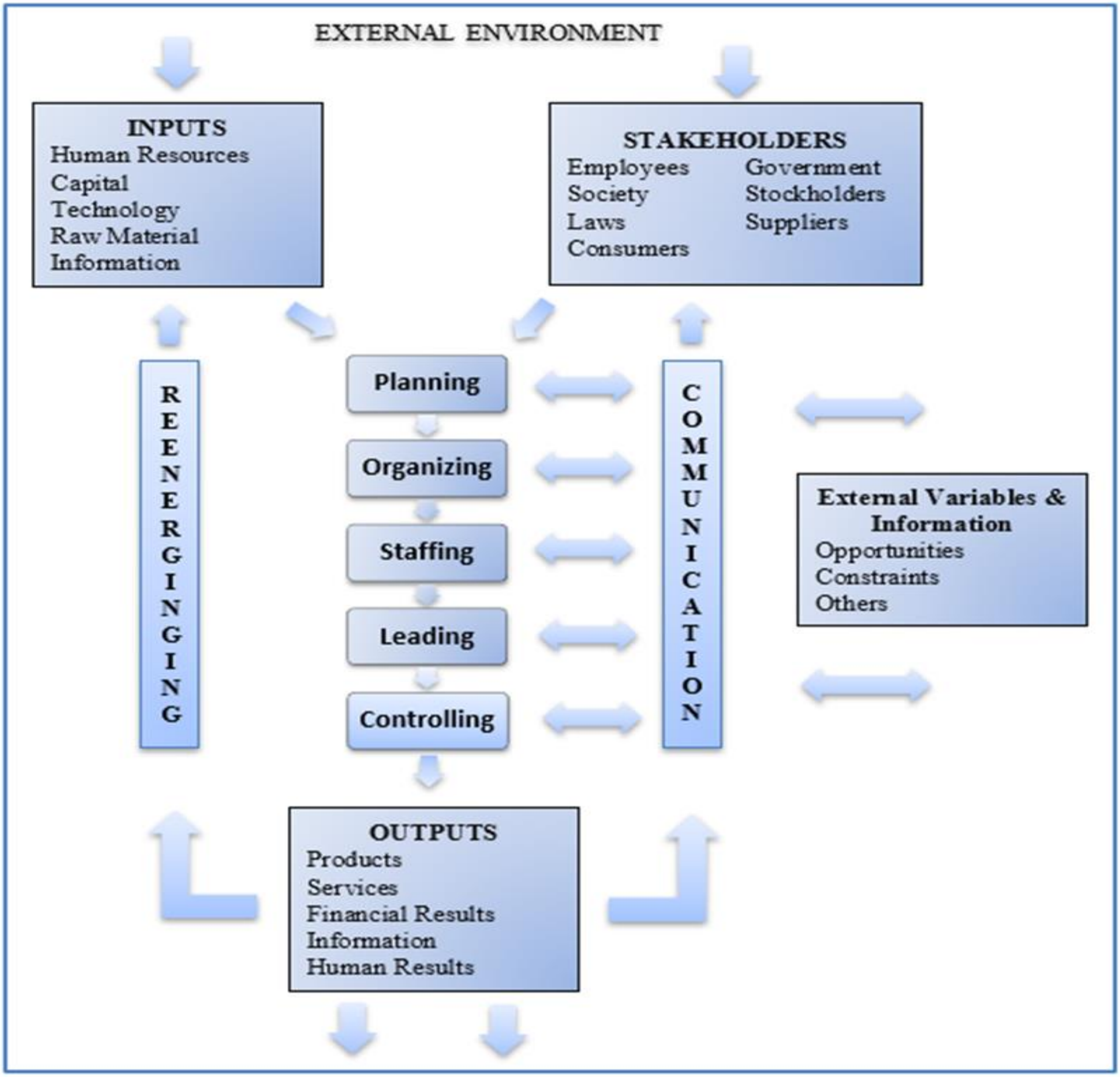

Figure 1.4: Systems Approach to Management (Source: Adapted from Koontz & Weihrich, 2015)

- Systems approach is multidisciplinary including contributions from psychology, sociology, economics, etc.
- System is goal oriented and every stakeholder have their own goals.
- System transforms organizational inputs into output. The transformation process includes planning, organizing, staffing, directing and controlling functions of management.
- Systems can be reenergized by putting the output back into the system as input. For instance, profits are reinvested in the business.
- A good communication system not only integrates managerial functions but also help to interact with external environment.

2.11.2 Contingency Approach:

This approach suggests that there is no 'one best way' for managers to follow in their jobs. The applicability of management principles and practices should be different for every situation based on the circumstances. Any of the approach discussed so far (functional, scientific, behavioral, quantitative, system) should be applied situationally. The contingency model can be explained using 'if-then' analogy. Considering the environment of the organization to be an 'IF' which is an independent variable and the management to be a 'THEN' which is a dependent variable. The goal of the contingency management is to fill a solution between the 'If' and 'Then'. For instance, 'If' there is a manufacturing company like Ford, 'Then' management-by-objectives works better for planning and controlling purposes. Following are the characteristics of contingency approach to management:

- There is no best style of leadership.
- The approach rejects universal applicability of management principles.
- Managers need to tailor the principles and techniques to match the situation.
- Managers need to be adaptive of dynamic environment.
- It is an extension to system approach as it explains the relationship between sub-systems.

Popular Contingency Variables

a) **Organizational size** is a major influence on what managers do. For instance, a formal organization structure is required for a company with 50,000 employees while an organic structure is required for a company with 50 employees.

b) **Routine technologies** require organizational structures, leadership styles, and control systems that are different from those required by non-routine technologies.

c) **Environmental uncertainties** may require organic structure while a stable environment will require a mechanistic structure.

d) **Individual differences** influence the selection of motivation technique, leadership styles and job designs. For instance, young employees may want challenging jobs and opportunities for development.

(Adapted from Robbins, S. P. & Coulter, M. (1999) Management, Prentice-Hall)

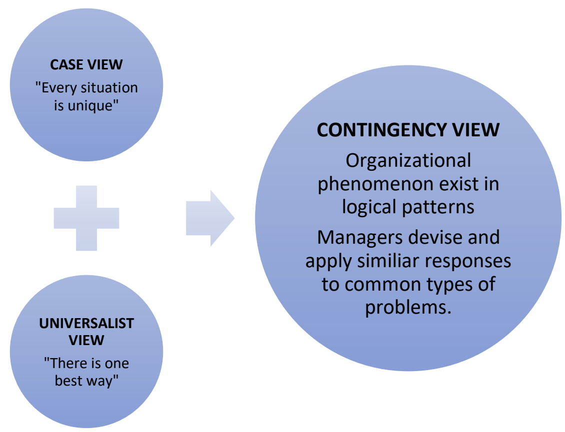

Figure 1.5: Contingency View of Management (Source: Daft, R. L. (2014). New Era of Management, Cengage.)

2.11.3 Operational Approach:

According to Koontz and Weihrich, the operational approach to management 'draws together the pertinent knowledge of management by relating it to the managerial job, i.e., what managers do'. The approach suggests that there is central knowledge that exists in management such as line and staff, authority-responsibility relationship, organizational structure, span of management, controlling techniques, etc.

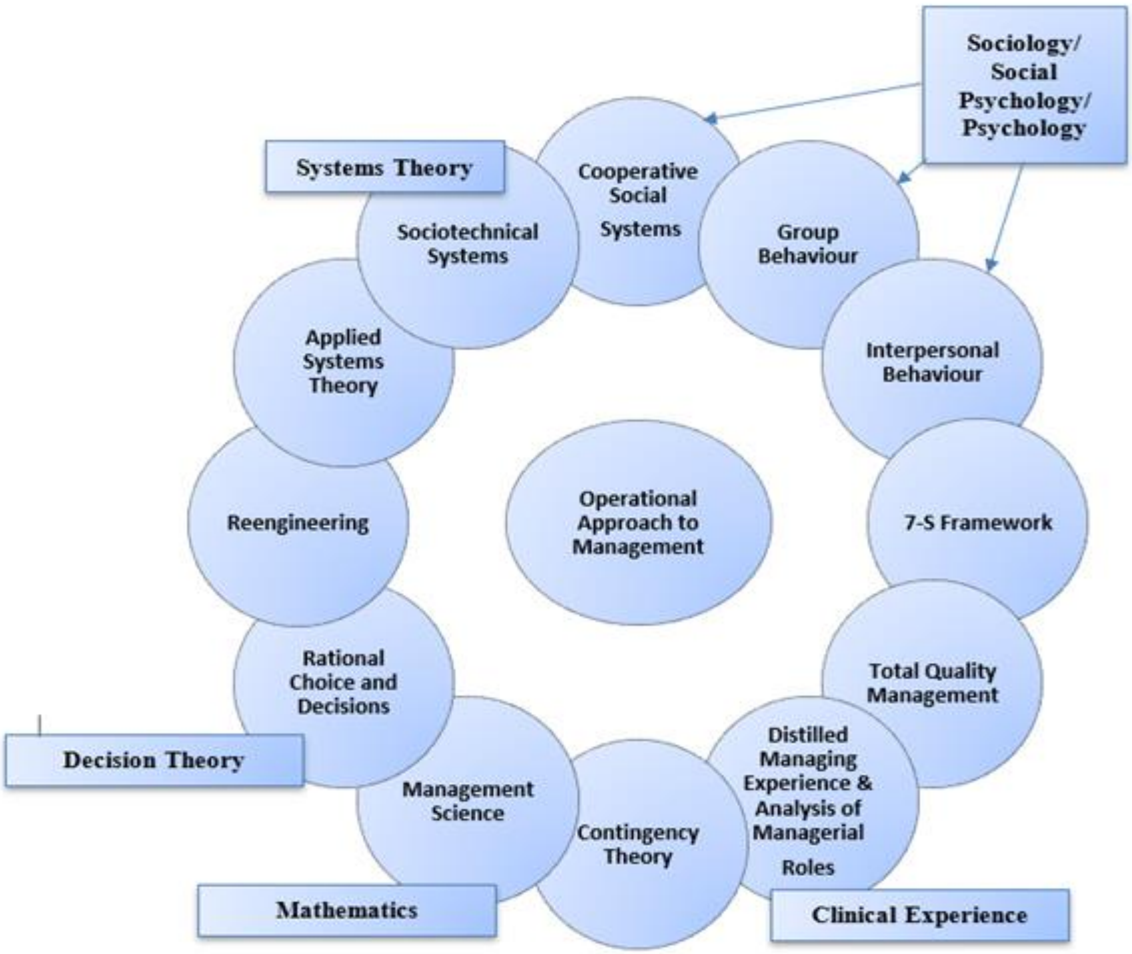

Figure 1.6: Management Process or Operational Approach (Source: Koontz, H. & Weihrich, H. (2015). Essentials of Management – An International Innovation, and Leadership Perspective, McGraw Hill Education.)

Other important concepts of management are derived from different disciplines as shown in Figure 1.6. This approach is based on following propositions:

- Management is an operational process of management functions.
- Clear concepts of management are important for effective management.
- Management is universally applicable body of knowledge.
- The problems faced by managers and the environment they work in differ from company to company.
- Management is an art relying on underlying science concepts, theory, techniques and principles.

Case Study

ABC ltd was about to install a new incentive plan for the operative worker force in all its factories. The new plan was designed to enable high producing workers to earn 20 to 25 percent more in monthly earnings. The rationale of the new plan was stated by the CEO of the company in the following words:

"We are installing the plan to discourage the workers from socializing so much. Their output is satisfactory now, but they would give all of their attention to the work and stop talking to each other about other things, they could produce a lot more. I know the work is not too difficult; anyone can learn of these jobs in a few days. But we need more commitment to high performance".

Q. Can company's productivity problem be solved using:

Classical theory of management
Human relations theory of management
Modern theory of management

IN-TEXT QUESTIONS

19. True or False:

Operational approach to management 'draws together the pertinent knowledge of management by relating it to the managerial job.

There is no best style of leadership.

Organizations need to be dynamic in the open system.

System approach was developed by Robbins and Coulter.

2.12 SUMMARY

- Management is a trinity of science, art and profession.
- Administrative management involves development of goals and policy whereas operative management involves implementation of these policies to achieve those goals. Every manager's job has both the elements. Top-level managers have more of administrative functions while lower-level managers have more of management functions to follow.
- According to Koontz and O'Donnell, there are five major functions of management – planning, organizing, staffing, directing and controlling.

Theory	Contribution	Appraisal	Criticism
Classical Theories	Analysis of organization structure.	• Focus on universal nature of management. • Principles are flexible. • Scientific basis for management practices. • Use of financial	• Ignored human behavior aspect. • Assumption of closed system. • Lack of empirical verification. • Focus on rules and regulations. • Lack of universal

		incentives for motivating. • Importance of organization and its objectives.	application of principles.
Scientific Management	Principles and techniques of Scientific Management.	• Replacement of rule of thumb method. • Scientific selection and training of employees. • Stresses on harmonious relationship. • Equal division of work. • High quality products through standardization. • Incentive wage system. • Efficient utilization of resources.	• Concerned with production management. • Functional foremanship violates unity of command principle. • Undermines human factor. • Wage increment was not proportional to increment in productivity.
Administrative Management	Principles of administrative management.	• Focus on management process as a whole. • Regard to human element. • Retain sound financial position. • Increases output. • Assist in achieving objectives.	• Concepts focused on Management. • Based on military science. • Ignores dynamic environment. • Emphasis on formal structure. • Mechanistic approach.

		• Customer and employee's satisfaction. • Promote data-driven decision-making.	
Bureaucracy	Theory of authority structure and organization governed by rules.	• Proper delegation of authority. • Consistency of actions. • Rational and predictable human behavior. • Efficiency in organization. • No scope for partiality and bias.	• Rigid and mechanical operations. • Red tapism leading in delay of work. • Too much focus on rules than goals. • Long chain of communication. • Strict classification of jobs. • Serves self-interests of top-level managers. • Does not allow inter-personal relations.
Human Relations Movement	Significance of social and psychological factors in increasing productivity.	• Organizations are a social system, effected by the social variables. • Informal organization and co-exist with formal organization. • Informal leader and co-exist with formal	• Lack of scientific validity. • Limited focus on technical aspect of the job. • Groups may create resistance. • Not all problems can be solved through human

		leader. ● Two-way communication. ● At workplace, people work in groups than being individuals. ● Non-economic rewards.	relations. ● Undermines economic rewards. ● Conflict cannot always be destructive. Lack of positive aspect of conflict.
Behavioral Management	Scientific understanding of human behavior at workplace. Established Organization Behaviour as a discipline.	● Understanding human behaviour from multi-dimensions. ● Lead to development of many theories – motivation, leadership and group dynamics. ● Positive aspects of conflict. ● Goal orientation.	● Ignores other aspects of organization effectiveness such as technology, environment, etc. ● Cannot exactly predict human behaviour.
Quantitative Management	Scientific tools for managerial decision-making.	● Mathematical models for decision-making. ● Views management as a logical process. ● Electronic data processing. ● Management information systems.	● Only focus on decision-making, ignores other functions of management. ● Ignores human element. ● Faulty data may produce bias solutions.

		• Solves problem at all levels of management.	• Not all variables can be quantified. • Mathematical models may not present real situation.
Systems Approach	Open system organizations interact with external environment.	• Interdependency and inter-relationship of sub-parts of the organization. • Integrated thinking of the organization. • Organizations are dynamic, adaptive and multi-dimensional. • Helps to understand the complexity of organizations.	• Not a unified theory of organization. • Abstract and vague. • Fails to examine the nature of interdependency between organization and external environment. • Does not provide action framework for all types of organization.
Contingency Approach	No one best way of management. Management is situational.	• Appeals to common sense as it rejects universal application of management principles. • Action orientation. • Managers need to be adaptive of environmental changes. • Managers can be pragmatic, flexible	• Ignores influence of management principles and techniques on environment. • Limited literature.

		and open-minded. ●	
Operational Approach	Draws concepts and knowledge from varied disciplines.	● Attempts to draw scientific theory with practical application. ● Distinguishes between managerial and non-managerial knowledge.	● Does not specify coordination as function of management.

2.13 GLOSSARY

- **Administrative Theories:** General theories of what managers do and essentials of good management practice.
- **Behavioral Theories:** Leadership theories identifying behaviors that differentiate effective leaders from ineffective leaders.
- **Bureaucracy:** A form of organization marked by division of labor, hierarchy, rules and regulations, and impersonal relationships.
- **Classical Theories:** Early management theories which established the framework for many of our contemporary theories.
- **Division of Labour:** The breakdown of jobs into narrow and repetitive tasks.
- **Hawthorne Studies:** A series of studies during the 1920s and 1930s that provided new insights into individual and group behaviour.
- **Industrial Revolution:** The advent of machine power, mass production, and efficient transportation.
- **Leadership:** A process by which people get influenced by leader's actions and facilitate the movement of the group toward a common goal.
- **Motivation:** The willingness to apply high levels of effort to reach organizational goals as conditioned by that efforts ability to satisfy individual needs.
- Organizational Behaviour: The field of study concerned with people's actions and behaviour on

the job.

- **Principles of Management:** Universal truths of management that can be taught in schools.
- **Quantitative Approach:** The use of quantitative techniques for managerial decision making.
- **Scientific Management:** The use of scientific management to find a 'one best way' for each job to be done.
- **Theory X:** The assumption that employees dislike work, are lazy, seek to avoid responsibility, and must be coerced to perform.
- **Theory Y:** The assumption that employees are creative, seek responsibility and can exercise self-direction.
- **Therbligs:** A classification scheme for labelling seventeen basic hand motions.

2.14 ANSWERS TO IN-TEXT QUESTIONS

1. True 2. Utilization 3. b) Personal skills 4. True 5. Art 6. d) Neo-classical theory 7. Method Study 8. b) improve productivity 9. Henri Fayol 10. Bureaucracy 11. Unity of Command	12. Max Weber 13. Chester I. Barnard 14. b) Neo-classical theory 15. False 16. d) cooperation 17. Quantitative approach 18. Frederick Irving Herzberg 19. a) True b) True c) True d) False

2.15 SELF-ASSESSMENT QUESTIONS

1. "Historical events and societal situations have influenced the development of management thought". Discuss whether you agree or disagree to the statement.
2. Distinguish between scientific and administrative theory of management.
3. How behavioral science management is different from human relations movement?

4. "Mathematical tools can be applied to managerial decision-making". Explain in context to the appropriate theory of management.
5. "Bureaucracy leads to red-tapism". Discuss whether you agree or disagree to the statement.
6. "Management is a trinity of science, art and profession". Justify the statement using appropriate examples.
7. "Modern theories of management thought focusses on dynamic organizations and managers". Critically evaluate the statement.
8. "Administration and management are two-sides of the same coin". Discuss.

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2.17 SUGGESTED READINGS

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LESSON 3

Planning

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STRUCTURE

3.9 Suggested Readings

3.1 LEARNING OBJECTIVES

After reading this unit, the learner will be able to:

- Understand the concept of Planning
- Describe the importance of Planning for the organizations
- Distinguish amongst the different types of planning
- Understanding the steps involved in planning
- Describing Management by Objectives & Management by Exception

3.2 INTRODUCTION

With an increase in the highly competitive and dynamic workplace, solving the problem effectively, efficiently, and creatively is the fundamental and primary goal of management. The discussion of management principles has been used to assist managers in finding solutions to both immediate and long-term company issues. Due to this, management concepts have been divided into four fundamental roles, namely planning, organising, leading, and controlling (also known as the POLC framework).

These are crucial organisational responsibilities that guarantee the regular, efficient operation of commercial organisations and lay a solid foundation for their long-term survival and expansion. Planning is the first and most important duty that must be carried out, regardless of the bifurcation, for the other management tasks to operate effectively. In-depth explanations of planning as a management function are provided in this unit.

We all create and carry out certain plans in daily life to reach our objectives. For instance, we create a plan before travelling, including where and when to go, how to get there, how long the vacation will last, where to stay, how much luggage to bring, etc. For the proper execution of a trip, all these responsibilities necessitate developing an efficient plan that includes specific activities. Planning is the process of creating such plans to accomplish a goal or target. In other words, thinking is required now to carry out future actions, and this consideration is what is meant by "planning."

Managers at all organisational levels engage in planning. You'll observe that all managers plan, however, the kind and scope of planning can vary depending on the organisational level. For instance, a Chief Project Manager must plan for the entire project over a longer period, unlike an Assistant Engineer who plans for the completion of work at his site from day to day or two to three days in advance. The top management of a multinational corporation must similarly plan over a longer time horizon for a global market.

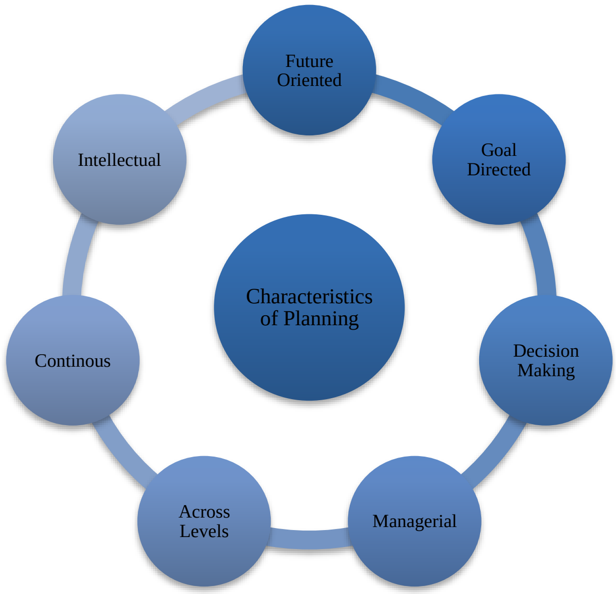

Fig 3.1: Characteristics of Planning

3.3 PLANNING

The core job of management is planning, which is choosing in advance what needs to be done when it needs to be done, how it should be done, and who will do it. It is an intellectual process that establishes an organization's goals and creates numerous action plans to help the organisation reach those goals.

Making decisions and planning are related processes. These are the elements of management functions that are most crucial. Several choices must be made in advance of to plan. Making decisions is the basis of planning. Good decision-making skills are necessary for the job of a planner because they must make many decisions at once. Therefore, making decisions is a crucial planning duty. A plan is the result of several simultaneous decisions. The questions of what, how, when, and who is planning cannot be answered in the absence of decision-making. Making decisions is necessary to carry out planned activities. As explained in Fig. 3.1 it elaborated on what characterizes Planning. These are important for the effective and smooth functioning of the organization and therefore, planning is crucial to decision-making.

Planning is described by Heinz Weihrich and Harold Koontz as "including identifying missions and objectives and the measures to attain them, which in turn requires decision-making, i.e., choosing from potential future courses of action." Planning, then, is the process of determining "what needs to be done in the future, by whom, how, when, and where" in the present.

"Planning is a mental propensity to do things in an organised manner, to deliberate before acting, and to act in the light of facts rather than guesses," wrote Urwick. It is a mental process of deciding which alternative resources will best help the company achieve its objectives while adhering to set standards.

"Planning is deciding in advance what to do, how to accomplish it, and who is to execute it," according to Koontz & O'Donnell. Between where we are and where we wish to go, planning fills the gap. It enables events to happen that otherwise would not be feasible.

3.3.1 Nature and Importance:

Nothing has a greater potential to determine a company's success or failure than its planning process. The extremely dynamic and globally oriented workplace aspires to efficient planning and administration. This important maxim is well known, and its fullest integration is only achievable with a grasp of what planning entails.

Setting corporate goals and choosing several actions and plans to carry them out are the first steps in planning, a management function. A successful and effective company manager examines the organisational environment and projects future business conditions. A manager must be visionary and capable of making decisions to scan and forecast the future business environment.

Fig 3.2: Nature of Planning

ACTIVITY 1:

List some of the planning activities that you get involved in your day to day life:

____
____
____
____

The nature of planning (Fig.3.2) can be understood as the following:

- Intellectual Process:
  Planning is a complex cognitive activity. At every level and function, planning calls on strong analytical skills, such as information analysis, problem-solving, decision-making, and critical thinking. This managerial role requires creative thinking to employ resources effectively for current opportunities. An organisation that does not adequately research today's potential and does not profit its profitability in due course, turns the potential into a problem tomorrow. Such an organisation can successfully create a balance between both the internal and external environments. Making essential plans Making good decisions is ensured by thinking and having a high level of cognitive process involved.

- Forecasting
  Forecasting future needs, or assessing and identifying future requirements, problems in achieving corporate goals, etc., are necessary for the planning process. Planning and forecasting often appear to be similar to one another. Although they have some things in common. However, there are many variances between them. Forecasting is the process of predicting what will occur if there is no means to flee. Planning, on the other hand, is about what one wishes to happen. Planning follows forecasting. For instance, a danger to natural resources might motivate a country and its citizens to plan for their conservation.
  Planning comprises evaluation, evaluations, estimates, and calculations, but these are done while taking into account the available resources, the available time, and the goals and objectives of the natural resources. In addition to this, planning is a constant process of evaluation and assessment to identify deviations and implement corrective actions. Planning in the twenty-first century is extremely complicated, data-driven, and encompasses a variety of data mining and analytics.

- Achieving Group/Organizational Objectives

The success of an organisation is dependent on the concerted efforts of many diverse individuals who bring their own set of characteristics and skill sets to the organisation, including their aptitudes, attitudes, learning styles, and levels of motivation. These diverse people, each with their values and personalities, combine to form a cohesive team that works well together to accomplish corporate objectives. Planning, therefore, entails achieving individual goals while keeping organisational and group goals in mind.

◊ Pervasive

For a goal-oriented company, planning as a management function permeates all other managerial tasks. It would be incorrect to say that planning is only the first phase; planning influences all managerial functions, including organising and managing. Furthermore, it is untrue to say that only top-level management is responsible for planning. The role of the middle and lower level of management in their separate activities cannot be ignored even if they invest a lot of time and discussion into the planning process. A variety of planning tasks call for managers at various levels. The top management is involved in the initial determination of the goal. However, other steps after that, such as operationalizing the strategy, also call for middle and lower-level participation. People at different levels within the organisation might have their motivation levels significantly increased by involving them in the planning process.

◊ Flexible

For an organisation to be successful, it is important to find ways for opportunities and resources to work together. An organisation does have a competitive edge if it can predict growth opportunities and adjust its resources accordingly. To make the most of the opportunity, you'll need to carefully look for the Knowledge, Skills &Abilities (KSAs) of people, man, materials, and money. Since the business world is often filled with uncertainty and change, it is very important to change the mix of materials and plans to stay alive and adapt to the changes.

◊ Integrated

With the creation of different policies, programmes, and procedures, the organisation set goals that it wants to reach as part of its planning process. When the organisation sets such goals and carries out the interventions, different people in the organisation, especially those who are involved in the planning process, may have different ideas. For example, a sales manager might look for different products to meet the needs of customers and get a bigger share of the market, while a production manager might try to keep production simple and avoid standardisation as much as possible. Effective planning takes into account these different goals and tries to maximise the organization's goals at the lowest possible cost to each person's goals.

The rapidly shifting nature of the corporate environment makes it necessary to engage in both development and planning. An organisation that takes a careless approach to the detection of changes in its surrounding environment will almost certainly struggle to maintain its current size and continue to expand. Planning thus becomes a critical part of all sorts of organizations (including both small-scale and large-scale industries and organizations). This is because businesses that plan for the future are more likely to succeed than those that don't.

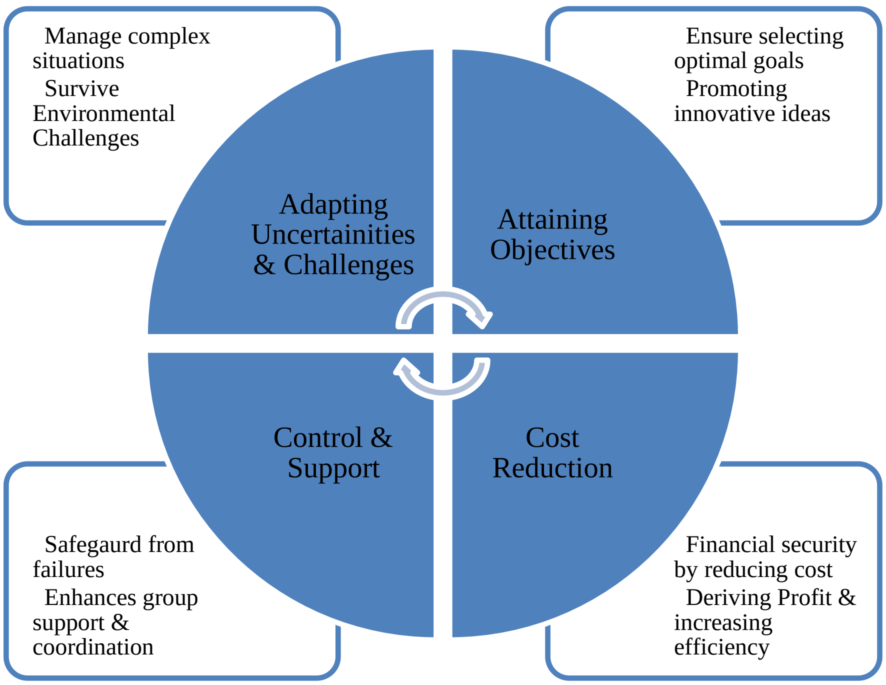

Fig 3.3: Importance of Planning

The importance/significance of planning can be understood under four broad goals, namely:

- Adapting Uncertainties and Challenges
- Attaining Objectives
- Cost Reduction
- Control and Support

These goals can further be elaborated on and explained further: (Fig. 3.3)

1. Adapting Uncertainties and Challenges

An organisation is a result of a diverse group of human resources, each of which contains unique KSA, values, beliefs, cultural norms, and levels of motivation. There will inevitably be conflict in terms of organisational and individual interests in a working environment as diverse as the one described. An efficient organisational plan finds a means to generate a shared interest among the members of an organisation so that they may collaborate on the achievement of organisational goals, many of which are also shared by the individuals themselves. Therefore, planning is a means to achieving goal-directed activities.

The nature of the corporate environment is subject to rapid shifts on occasion. The global business landscape has shifted from being based on a conservative corporate model to a democratic one, which has forced company houses to remain current to keep up with changing expectations and a shifting environment. Alterations in demand, as well as shifts in technologies, fashion, preferences, and societal values, can have a substantial impact on an organization's typical day-to-day operations. The management team has a responsibility to make every effort to seize the opportunity presented by the altered circumstances and benefit from them. This can be done by changing and modifying the company's inputs to satisfy the customers' evolving demands and preferences. In the tumultuous situation that has been produced as a result of environmental change, proper, scientific, and systematic planning helps survive.

2. Attaining Objectives

Planning is an intellectual and cognitive activity that involves picking the optimal course of action from several different available possibilities. It is also about selecting one course of action that has a sound chance of being profitable, feasible, achievable, and economical and rejecting the other courses of action that are not as feasible and profitable as the one you selected to take because it has a sound chance of being profitable, feasible, and achievable and economical. The chosen path of action assures the overall growth of an organisation while also taking into account the constraints that the organisation has in terms of its resources, the available amount of time, its goals, and its methods. It is vital to optimise the overall operation of the organisation while simultaneously sub-optimizing the performance of other departments to further the overall development of the organisation.

It should be obvious that planning allows for the selection of the optimal option from among the numerous that are available. It is up to the management to seek out all of these different options; they do not simply present themselves to the manager. During the course of carrying out such an extensive research endeavour, a great number of novel concepts are conceived of, and those concepts are subjected to in-depth analysis to decide which ones have the greatest potential. The ability to think critically is one of the many skills that may be acquired via planning. It is the catalyst for the conception of original and inventive ideas. Take for instance a business that is looking to grow its customer base. This concept causes the manager's mind to start working through the planning process, which is very helpful.

3. Cost Reduction

Planning helps keep expenses down by placing a premium on running businesses in the most effective manner. It lays out in a very specific manner what is necessary to be done and guides the efforts towards the accomplishment of the goals. It avoids wastage by precisely identifying the goals, which helps it to effectively coordinate the work of the entire organisation.

Planning enables one to make use of the by-products generated by any activity, thereby maximising the exploitation of every component of the resources that are at their disposal to maximise profits.
Makes managers more effective by giving them a focus, which enables them to move on a unified path in the direction of the organization's goal. This increases overall productivity.

4. Control and Support
The coordination and control functions of management are supported by the planning function. when what How and by whom a function is to be performed, as well as their planning and working out, are all done well in advance. This makes it simple and quick to evaluate performance and identify any deviations. Without preparation, neither the performance nor the ability to create the level of performance would be of high quality. Poor performance, delays in finishing duties, waste, disorder, and ultimately a loss of control and coordination will result from this. Planning effectively may ensure that performance criteria are established scientifically and methodically, that performance is measured timely and effectively, that deviations are quickly identified and eliminated, and that there is peaceful operation at work. Effective planning encourages innovation and creativity, improves coordination, control, and operational efficiency, and reduces duplication of effort.

Unpredictable changes in customer tastes and preferences, fierce rivalry, quick technical advancement, a slowing economy, and political unrest all have a big impact on the country and corporate houses. These adjustments can occasionally be so detrimental that an entire firm fails. However, a lack of competent planning and poor decision-making meant that many companies were unable to withstand these extreme shifts. Although planning never completely prevents business failures, it may undoubtedly aid in identifying and assessing business opportunities and dangers as well as considering the many courses of action that may be taken in the future.

3.3.2 Types of Planning:

Planning helps many organisations to set their intended goals and choose the best course of action to take to achieve them. Planning operations have increasingly become the standard in enterprises nowadays. Today, corporations essentially plan out every working activity they undertake. From delivering, designing, and creating new information management systems to building new structures, this process starts.

It is crucial to remember that planning is a challenging process that heavily depends on the size and sophistication of an organization's activities. According to Upton, Teal, and Felan (2001), businesses must establish formal protocols for the types of tactics to use, as well as the goals and frequency of meetings to attend, to obtain the intended results while implementing the organisational change or creating projects.

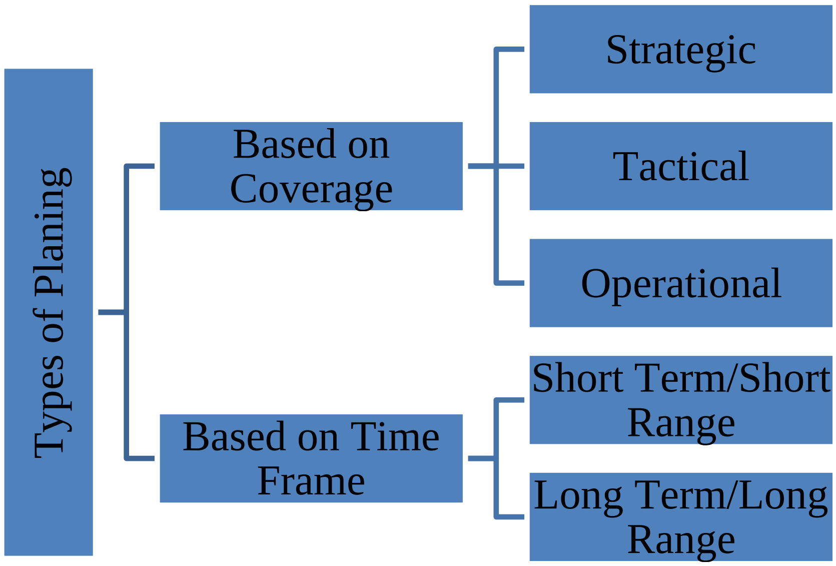

Fig 3.5: Types of planning

Additionally, a firm's prior planning and activity prioritisation will play a significant role in how successfully the aforementioned criteria are delivered. The analysis in this paper demonstrates how important planning is to helping businesses find untapped opportunities, project the future, and also avoid mistakes. This essay examines the numerous forms and tiers of planning that can be carried out within organisations.

Types of Planning: Based on Coverage

1. Strategic

   The definition of the term "strategic planning" is "the strategies created by management to meet the organization's objectives." Additionally, it contains the assignment of directions and resources for the execution of the plan. The purpose of strategic planning is to assist business owners in making long-term choices. The vision and mission statement of an organisation serves as the basis for the development of a strategic plan.

   The process of strategic planning comprises articulating a clear vision for the future, amassing and evaluating relevant data, developing a strategy, putting it into action, monitoring its effectiveness, and making necessary adjustments.

The planning process should begin with an organization's strategic plan as its foundation. The purpose of strategic planning is to assist a firm in selecting and organising its operations in such a way that the organisation will continue to be profitable despite unanticipated setbacks that may occur in any of its particular companies or product lines.

For instance, if the organization is facing increased employee turnover, to address the problem it strategizes ways in which it could be reduced. The strategic plan will act as a guide for the development of effective sub-plans, which are then used to carry out the organization's goals as explained in Figure 1.6 below.

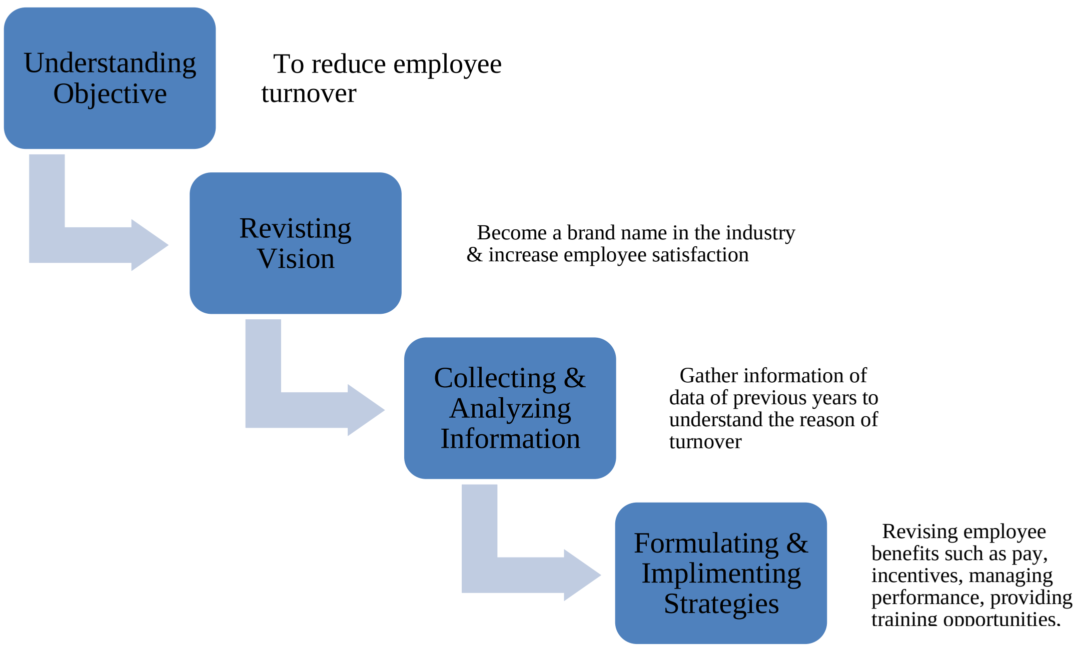

Fig 3.6: An example of strategies (sub-plans) to reduce employee turnover in the organization

2. Tactical
   The phrase "tactical planning" refers to the preparation of plans inside an organisation to accomplish short-term objectives through the determination of the specific application of available resources. To put it another way, these point to the steps that need to be followed at the departmental level to put a strategic plan into effect.

The most senior managers in an organisation are the ones who decide which tactics should be prioritised to meet the organization's objectives. Establishing a facility to provide raw materials for the organization's manufacturing activities is one example of a strategy. Another example would be exploring the North-East market or something similar.

These strategies are interpreted by middle managers, who then build tactical plans for their departments that adhere to the strategies to make their department's contributions to the organisational goals.

To establish tactical plans, middle management needs detailed reports (financial, operational, market, external environment).

In comparison to strategic plans, tactical plans are characterised by shorter time horizons and more limited scopes. Planning at the tactical level generates particular ideas that can be used to put the strategic plan into action. It is the process of making precise judgments concerning what should be done, who should do it, and how it should be done.

Following are the important characteristics of Tactical Planning:

- ◊ It is largely concerned with the stage of the planning process known as implementation.
- ◊ It is the process by which a plan is translated into action. It typically has a period of one to two years.
- ◊ In most cases, it is thoroughly entwined with the procedure for creating the annual budget.

3. Operational

The plans that are devised by managers at lower levels to accomplish the objectives of the tactical planning are referred to as operational planning. They serve as the department manager's guide to day-to-day operations, i.e. they state the things that must be performed within a certain amount of time to meet the operational goals that have been set.

The supervisor is responsible for providing an interpretation of how the strategic and tactical management plans related to his/her unit. By doing things in this manner, he/she can build operational plans to complement tactical strategies. These plans contain the specifics regarding how the strategic plans will be carried out. When it comes to planning, examples of what supervisors do include things like arranging the work of employees and determining what kind of staff and resources would be required to deal with upcoming changes.

Over the course of a relatively short period, operational strategies are typically monotonous and rigid. Only when it is clear that predetermined plans and defined action procedures are not producing the desired results will change occur.

There are two primary categories of operational plans: single-use plans, which are developed to achieve particular goals and are scrapped once those goals have been reached, and standing plans, which are standardised strategies for dealing with situations that occur frequently and can be anticipated.

Take note that the strategic plan serves as the foundation for the organization's tactical strategy. The tactical plans of the organisation serve as the foundation for the operational plans of the organisation. These are the detailed plans that are required for each task or activity that contributes to the overall endeavour. Controls need to be a part of every level of planning, including strategic, tactical, and operational.

The purpose of activities such as tracking progress or organising follow-ups is to guarantee that plans will be carried out as anticipated and on schedule. Adjustments may need to be made for the organisation to handle changes in either the external or the internal environment.

Types of Planning: Based on Time Frame

When it comes to planning, time is a crucial component. The period that is covered by planning should preferably include sufficient time to fulfil the administrative duties that are involved, according to George Terry.

1. Short Term/Short Range versus Long Term/Long Range
   Long-term or long-range planning (LRP) refers to a plan that is for 3 to 5 years or more, in contrast to short-term or short-range planning (SRP), which refers to a plan that is for 1 to 2 years. Even though this split could be seen as arbitrary, it might yet be acceptable in most contexts. Naturally, the type of the firm and its scale might have an impact on how long this time lasts.

   It is only normal for long-term planning to span more than five years when an issue has a long gestation time. For instance, due to their unique goals and objectives, businesses like oil or mining industries or airlines must establish long-term plans while on the other hand, a home video rental business or a bookstore might focus on seasonal or yearly objectives.

   However, planning shouldn't be overly rigorous, regardless of the time frame. Instead, it should be adaptable to take into account future aspects that are unknown. If a company uses both long- and short-term planning, the latter should complement the former. Understanding the functions of both long-range and short-range planning in the overall planning scheme is crucial for managers.

IN-TEXT QUESTIONS

Answer correctly by choosing the appropriate answer

1. ________ bridges the gap between where we are at present & where we wish to reach in the organization.
2. Planning is said to be a primary function of management. (True/False)
3. The purpose of operational planning is to assist business owners in making long-term choices. (True/False)
4. The nature of planning is:

a) Flexible b) Pervasive

c) None of the above d) All of the above

5. Planning is an ______________ activity that involves picking the optimal course of action from a number of different available possibilities.

3.3.3 Levels of Planning:

Planning is a crucial process that takes place at three different levels: functional, business, and corporate. According to Shelett (2002), many organisations develop strategies in either one or both of the aforementioned levels, but they make sure that the goals they set for each level are in line with one another to ensure that the efforts to achieve them are carried out with the greatest possible cohesion.

Ineffective corporate strategy and dual-purpose tasks, she continues, are consequences of an organization's departments not being aligned. Even while each of the three planning levels has distinct uses and goals, it is important to note that not all organisational managements successfully establish these differences.

It is seen that plans can be categorized based on duration (long term and short term plans), based on level (strategic/higher level, tactical/middle level, and operational/lower level plans), and based on management (corporate, business and functional).

Levels of plans based on management can be explained as:

1. Corporate Level

The general strategic direction of a company is often planned at the corporate level. According to Kuye and Oghojafor (2011), senior leadership within an organisation is responsible for carrying out planning at the corporate level. Given that it represents the level of decision-making that determines the actions of all other levels, this explains why this level of planning is frequently referred to as a grand strategy. In this situation, a leader offers the organisation the mission and vision that are essential for achieving the predetermined goals and objectives.

In addition, Sharma, Boo, and Sharma (2008) contend that at the corporate level, planning entails the identification and thorough analysis of a wide range of strategic options and core competencies that are centred on an operating environment in the future. This suggests that over the whole lifespan of an organisation, the corporate level of planning may not be completely disregarded as being necessary.

2. Business Level

According to Anderson and Joglekar (2005), all business enterprises can be classified as specific organisations that operate within particular industries on a business level. These companies create strategies that are effective at their level, represent their existing situation, and the number of resources they have or need to be compared to the market they are working in.

In actuality, price competition or a differentiator can be the form of competition at this level. According to Gustavsson (2008), at this level, a company can showcase its distinctiveness through the offering of goods or services, which it can exploit to demand larger profits.

3. Functional Level

A commercial enterprise's support functions are the subject of planning at the functional level. These support activities, according to Lichtenthaler (2008), include the production, marketing, and finance divisions. Strategies are defined at the functional level, which supports broader corporate and company strategies, according to Schellekens et al. (2010).

For them to align with and contribute to the achievement of predetermined goals, members of an organisation depend on the plans made by their leaders for goals and actions. Additionally, the functional level of a business organisation is responsible for making sure that every part of the firm is managed in a thoroughly professional way. In any case, this level of operation is recognised for carrying out the mandate to guarantee that the various organisational departments are in line with one another in terms of the predetermined goals and objectives that must be accomplished within a certain amount of time.

3.3.4 Steps of Planning

The steps in the planning process might vary from one organisation to the next because many variables can influence planning for a large organisation while not necessarily having an impact on planning for a smaller firm.

As a result, a small business may not approach planning in the same way as a large one or a multinational corporation (MNC) (Multi-National Companies).

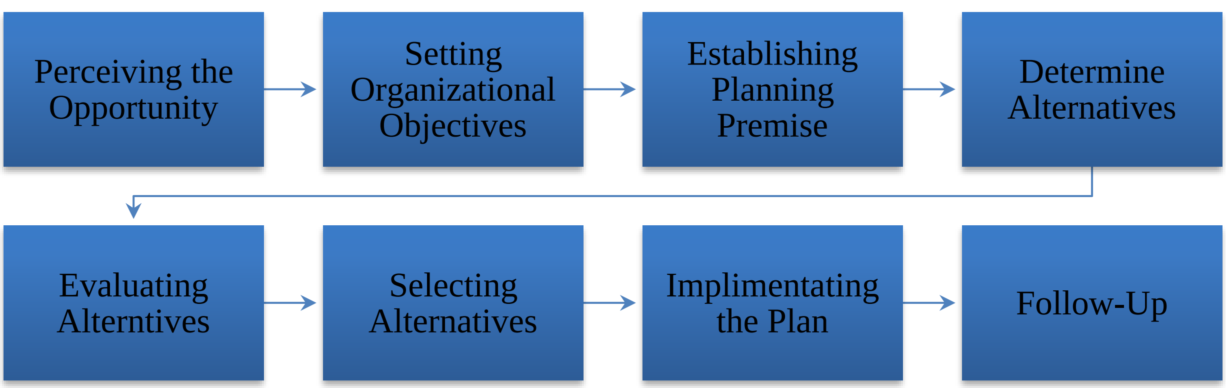

Fig 3.7: Steps/Process of Planning

1. Perceiving the Opportunity

   In the process of planning, having an awareness of the available opportunities at your disposal is quite crucial. It provides hints as to whether opportunities exist for taking up a certain plan, which leads to the formation of plans as a result of the process. A preliminary look at potential opportunities and the ability to see them in their entirety and with clarity are both included in the concept of opportunity perception.

At this point, managers are responsible for laying the groundwork upon which they will build the strategies that will get them to their goals. They investigate the current status of the organisation and where it stands in terms of its strengths and weaknesses in the context of the current situation.

The results of this study provide them with a first look at potential opportunities in the future. Following the discovery of potential prospects, the remaining stages of planning are carried out.

2. Setting Organizational Objectives

The various activities and the path that work should take are both determined by the objectives. The objectives for the planning function need to be articulated in a way that is both obvious and explicit, and there should be no room for interpretation. Ambiguous and unclear goals are a surefire recipe for mayhem and wasted resources. The planning process allows for the establishment of goals not only for the overall organisation but also for individual departments, divisions, and employees. Depending on what the organisation hopes to accomplish, it may have either a short-term or a long-term focus.

In addition to being unambiguous, specific, and clear, objectives should also be practical, viable, attainable, and realistic. For instance, one goal that can be attained by a manufacturing organisation to decrease the amount of time required for the processing of each step is to decrease the number of production hours. If you want your target to be understandable and attainable, you should explain it in quantitative terms. For instance, you may say the number of working hours, the percentage rise in sales or production, the wage that is paid to labours, and so on. Objectives that are expressed in qualitative terms have the potential to be hopeful but lack specificity. This, in turn, contributes to muddle.

3. Establishing Planning Premise

When conducting operations related to a business, planning entails making educated guesses about the unknown future. To make accurate projections of the future, the planning managers need to make several assumptions about the future. These presumptions are used as the foundation for constructing a premise that will serve as the basis for defining a plan of action. This is what's known as premises planning.

The predictions that are based on these assumptions are as follows: The process of acquiring information for building planning premises is known as forecasting. In the jargon of the everyday business, firms make forecasts regarding things such as the demand for a product, the prediction of inflation, the tax regime, interest rates, and various interventions by the government. Therefore, accurate forecasting is necessary to build a plan that will be beneficial.

Whereas external forecasting is required and can be difficult to make, internal forecasting is much simpler to make but still plays an essential part in the planning process. Internal forecasting factors, such as trade relations, policies for capital investment, and management philosophies, have a substantial influence on forecasting and, as a result, the planning process.

4. Determine Alternatives
   In the process of establishing objectives and creating assumptions, several different potential courses of action are uncovered to accomplish those objectives. Depending on the kind of project being worked on, this part of the process entails coming up with as many potential solutions as possible. When working on a significant project, it is necessary to investigate and identify all of the potential options, not just the general ones. The members of the organisation are given a comprehensive summary of the available options to facilitate discussion among them over the choice of available options.

5. Evaluating Alternatives
   The planner is responsible for analysing the potential outcomes in light of the presumptions and objectives. Finding out what options are available and doing an in-depth examination of their positive and negative aspects are both necessary steps in the evaluation process.
   Because there are so many different variables and constraints associated with the possibilities, the evaluation process is not an easy one.
   It is simple to evaluate some of the available options, while others could look like they would be the most profitable yet turn out to be prohibitively expensive. There is a possibility that some are less desired or effective than others. The one that is most aligned with the short-term objectives of the firm is the best option.
   As a result, a good manager needs to analyse these alternatives in light of the considerations regarding both their feasibility and their repercussions.
   The application of statistical methodologies and software has been of tremendous assistance throughout the review process.

6. Selecting Alternatives
   At this phase, the idea is either approved or rejected; it is at this point that decisions are made. Choosing the strategy is an important step in determining the best possible alternative. In most cases, managers will go with the option that, to their way of thinking, will provide the greatest assistance to the firm in achieving its objectives.

7. Implementation Plan
   At this point, a variety of other managerial duties enter the picture to assist with the execution of the plan that was picked as the best option.
   At this point, the action being taken is put into effect, which means that the necessary steps are carried out. If one of the goals of a production department is to boost output more than is possible with the current workforce, the business may choose to follow a strategy that calls for increased investments in machines.

8. Follow-Up
   This is the most important step since it entails determining if the strategy that was selected and put into action is working as intended or not.

This stage is vital and calls for close monitoring to identify any deviations in the selection and implementation processes and to ensure that the desired goals are met.

3.3.5 Making Effective Plans

For organizational success and to achieve the goals and objectives of the organizations, it is necessary that the primary function of management i.e. Planning is effective. The following are some of the ways which can ensure the making of effective plans in the organization:

1. Consciousness towards Planning
   Planning is only going to be useful when there is an appropriate environment for it. The superiors should make an effort to define objectives, evaluate a variety of goals, and rewrite them as necessary to ensure that the goals are effectively implemented. It is necessary to get rid of the obstacles that stand in the way of planning. The subordinates should be updated frequently with the progress that has been made with the plans. Everyone needs to be willing to work together for the plans to be successful.

2. Initiative at Top-Level
   For the plans to be successful, top-level management must take the initiative and provide their support. The highest level of management is responsible for formulating the organization's goals. The top management also decides how resources should be distributed to meet a variety of predetermined goals. The engagement of management at a lower level is also necessary because the execution will take place more frequently at these levels.
   The creation of plans at the top level will ensure that the plans of different departments will be coordinated with one another. The planning process will be guided by the thinking of senior management, which will be reflected in the final product. Participation from senior management is required for planning to be successful.

3. Appropriate Communication
   It is necessary for employees at all levels of a business to have open lines of communication. It is important for individuals who will be responsible for putting the company's goals into action to be aware of those goals. At the level of operations, everyone should be familiar with the policies, procedures, and programmes that are advised for accomplishing corporate goals. It is possible that the intended outcomes will not be reached if the persons responsible for carrying out the plans do not have a sufficient understanding of those plans.
   Communication must take place not only from the very top to the very bottom but also from the very bottom to the very top. The responses, recommendations, and points of view of subordinates regarding objectives must be communicated to higher-level management as quickly as practically possible. Communication serves as a

medium via which information can be shared between a variety of different people. Without an effective communication mechanism, the planning will inevitably be unsuccessful.

4. Incorporating all levels
   In the planning process, it is important to incorporate people from a variety of levels and areas. A functional manager will have the ability to plan well for his or her department. In a similar vein, those individuals who are responsible for the various tasks will be in a better position to plan for these activities. When planning is being done, management should make an effort to get the perspectives of a variety of different people.
   The mode of engagement, as well as the degree of involvement, will be determined by the type of organisation. There may be committees in charge of coming up with different plans. People with expertise in a variety of subjects might serve on these committees. Another way to participate is by helping to prepare budgets at the local level, and then working your way up through the organisation. The correct implementation of plans can be aided by the participation of individuals operating at varying levels.

5. Giving importance to both long-term and short-term plans
   The right amount of attention should be placed on both long-term and short-term plans. To ensure that both strategies are carried out effectively, they need to be combined. Most people have a propensity to centre their attention on more immediate goals. Short-term plans can only satisfy a portion of the needs outlined in long-term plans. The ultimate objectives will be determined by long-term plans, and the short-term plans should be designed to bring about the long-term objectives. Both long-term and short-term plans should be given the same amount of weightage to ensure the successful implementation of planning.

Limitations of Planning:

Even though planning is the foremost and most important function, it includes some constraints and limitations as well. These limitations include:

- ◊ If there is a lack of reliable information, it may lead to the creation of plans that are not only inaccurate but also misleading.
- ◊ The procedure takes a lot of time since gathering the necessary information and making necessary adjustments to the plans both take a lot of effort.
- ◊ The gathering of knowledge and the testing of several potential courses of action both need a significant investment of money. This can be a costly process.
- ◊ Lack of adaptability in planning can limit innovation and creativity.
- ◊ It may give the idea that once the plan is developed, the organisational process would automatically be efficient.

IN-TEXT QUESTIONS

6. Being aware of the available opportunities is crucial as it provides hints as to whether opportunities exist for taking up a certain plan, which leads to the formation of plans as a result of the process. (True/False)

7. ___________________ can be classified as specific organisations that operate within particular industries on a business level.

8. Without an_________________, the planning will inevitably be unsuccessful.

9. To ensure that both strategies are carried out effectively, what should be implemented:

a. Long-Term Planning c. Short-Term Planning

b. None of the above d. Both of the above

10. Planning should be rigorous and irrespective of the time frame. (True/False)

3.3.6 Management by Objectives (MBO)

Management by objective (MBO) is a scientific and strategic approach to advancing organisational goals, in which managers establish and communicate the organization's aims and objectives to all employees. Monitoring and evaluating employee performance about the specified objectives is an essential part of defining the aim under this strategy. Employees should ideally create their objectives and plans of action under this strategy to properly fulfil their obligations. In other words, MBO is a scientific technique that encourages managers and employees to jointly set goals and strive for both personal and organisational success.

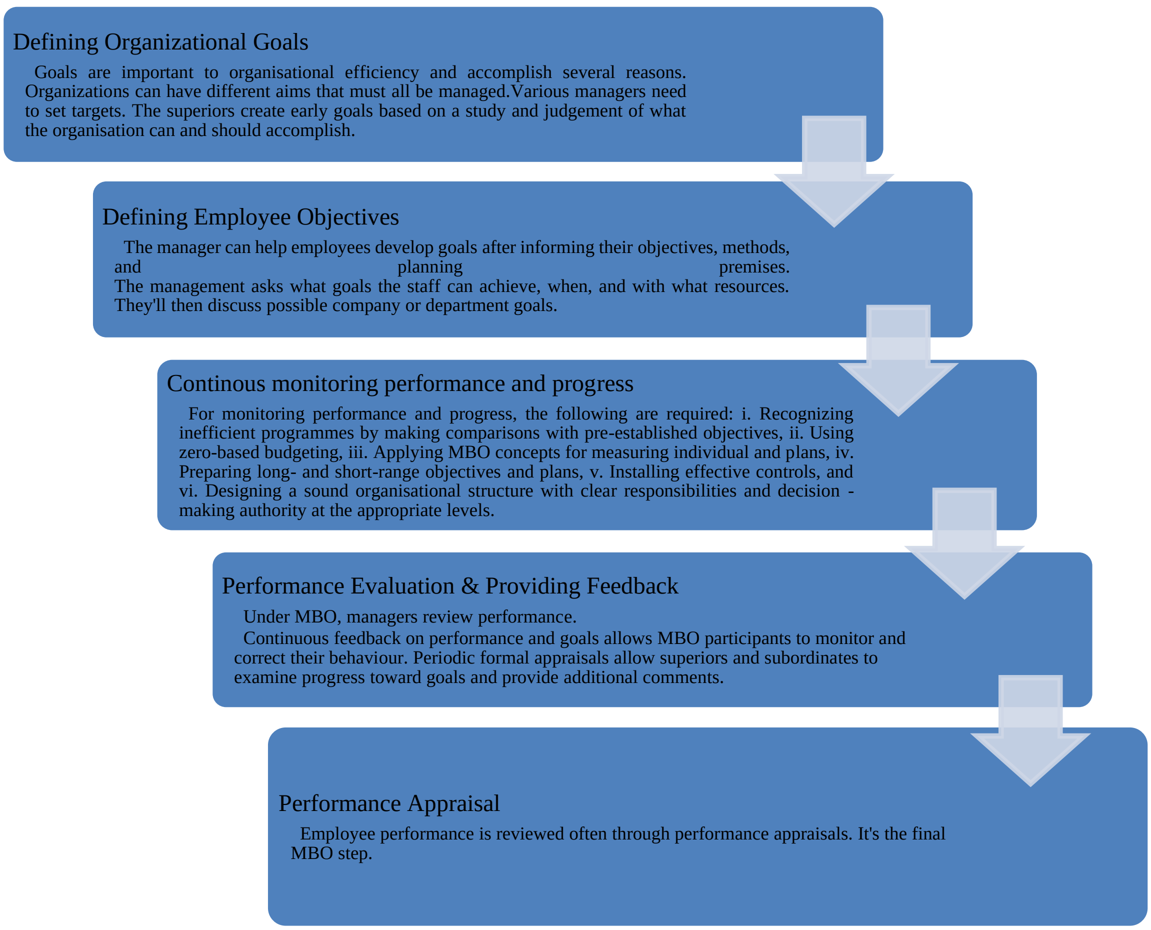

Fig 3.8: Process of Management by Objective (MBO)

It refers to the process of establishing goals for the staff so that they are aware of their responsibilities at work. With the aid of Management by Objectives, employees may plan out their future courses of action within the company and are given clear definitions of their tasks and duties.

The MBO method involves identifying the most important corporate goals and using them to set the goals of employees. The purpose of MBO processes is to define an employee's primary goals, which will then be graded with group feedback. This reinforces alignment between activity and outcome, which significantly boosts productivity by enabling all company contributors to recognise their accomplishments concerning the primary priorities of the business as they carry out their tasks.

Although MBO is meant to assist in defining and managing a set of objectives, the actual objectives will vary to some extent for each firm. It enables businesses to demonstrate their uniqueness, articulate their main priorities, and most importantly, carry those priorities through.

Advantages:

- MBO improves management. Better management entails creating and achieving goals for every activity and person. MBO helps set goals and balance resources. Better planning is needed to set goals. Management by objectives pushes managers to plan for results, not just work. Managers will achieve goals. The goals are also performance controls. MBO enhances management.
- MBO clarifies roles and structures. The tasks dictate responsibility and authority. Without authority, setting goals is useless. Positions should be based on predicted results. MBO helps discover organisational flaws.
- Encourages personal commitment of the employees to achieve specified objectives.
- MBO enables effective controls. Controls need setting norms and identifying deviations. MBO sets verifiable targets, and actual performance reveals results gaps. Everybody knows what's expected of them, and these standards operate as controls. MBO makes control easy.

Limitations:

- MBO only works with top-level support.
- In MBO, goals are quantified. It eliminates subjectivity. Some things are hard to quantify and assess.
- The paperwork burdens the manager. Too many meetings and reports overwhelm the management. Some bosses may resist the program's paperwork.
- Short-term goals dominate. Since most goals are quantitative, long-range planning is challenging because the continually changing socio-economic and technical context affects goal stability.

3.3.7 Management by Exception (MBE)

The project management technique recommends management by exception (MBE), a strategy of conducting business that focuses on spotting and resolving incidents that depart from the norm. A business intelligence application and a basic business application are both present in management by exception. General business exceptions are situations that depart from the norm in a business process and requirements for special handling, usually involving human participation. Their root reason could be anything from a process variation to connectivity problems, external deviation, subpar business rules, corrupt data, etc. Here, management by exception refers to the process of looking into, managing, and addressing such events with the aid of knowledgeable personnel and software tools. The effectiveness of company operations can be increased with good management. As unusual cases are not the whole focus of the administrative policy in these situations, the process is commonly referred to as exception management, which (as opposed to management by exception) suggests a more moderate use of the process.

Employees are given the authority to take charge of their own decisions and complete their job or projects on their own under management by exception. It focuses on and examines anomalies in the data that are statistically significant. If an uncommon circumstance or data deviation emerges that poses a risk to the company and cannot be handled by the employee at his level, he or she should refer the matter to the level above. For instance, only the data for one product will be provided to the managers for further investigation and the identification of the underlying cause if all other products are selling at their anticipated volumes for the quarter but one particular product is underperforming or over performing at a statistically relevant margin. Ineffective tactics that need to be changed, changes in the competitive environment, and new company prospects can all be brought about through management by exception. The goal of management by exception is to lighten the load on managers and give them more time to focus on tasks that will have the most impact on the organisation.

The term "management by exception" refers to the technique of reviewing a company's financial and operational outcomes and only alerting management to problems if results show significant deviations from the planned or anticipated level.

The goal of management by exception is to limit management's attention to the most significant deviations from the intended course or outcomes of the firm. Managers will likely spend more effort addressing and resolving these greater differences. The idea can be adjusted so that minor deviations are reported to lower-level managers, while a significant variance is communicated directly to high management.

Advantages:

- Management spends less time reviewing financial and operational results.
- This strategy allows employees to follow their approaches to reaching corporate budget results. Management will intervene only in exceptional cases.
- Large exceptions will be part of the company's annual audit, so management should study them in advance.

Disadvantages:

- ◊ It compares actual results to a budget. If the budget wasn't well-formulated, there may be many unimportant deviations that waste time investigating.
- ◊ Financial analysts provide variance summaries for management, which requires an extra layer of corporate overhead. Incompetent analysts may miss a significant issue and fail to alert management.
- ◊ This idea is built on command and control, where senior managers monitor conditions and make choices. Local managers may monitor conditions every day in a decentralised organisation, hence an exception reporting system is unnecessary.
- ◊ Only managers may correct variances, says the notion. If frontline personnel could handle most variations immediately, management by exception would be unnecessary.

IN-TEXT QUESTIONS

Fill in the blanks

11. ______ is a strategy of conducting business that focuses on spotting and resolving incidents that depart from the norm.
12. MBO processes is to define an employee's primary goals, which will then be graded with group feedback. (True/False)
13. ____________ recommends management by exception (MBE), a strategy of conducting business that focuses on spotting and resolving incidents that depart from the norm.
14. Management spends less time reviewing financial and operational results in MBO. (True/False)
15. _________ refers to the technique of reviewing a company's financial and operational outcomes and only alerting management to problems if results show significant deviations from the planned or anticipated level.

3.4 SUMMARY

The function of management that places the highest importance on planning is administration. It is the function that creates the groundwork for other administrative tasks such as organising, staffing, directing, and managing, and it is the function that lays down the foundation stone. Retrospection and improving the planning by removing the errors that were in the original plan are also important parts of the process to better prepare for future unpredictable events. Because planning is a cognitive process that is ongoing and focused on the future, it is fraught with a variety of advantages and disadvantages. Planning is not a straightforward and easy-to-carry-out function; rather, it is a cognitive and all-encompassing activity that involves the completion of several sequential actions in the correct order. For an organisation to be effective, its planning function needs to be defined by the organization's objectives, processes, regulations, strategies, and policies.

3.5 GLOSSARY

Analytical: Being adept at using analysis.

Cognitive: Process of learning and understanding via observation and experience.

Management by Exception: A corporate strategy that focuses on discovering and solving outliers.

Management by Objective: A scientific and strategic method for accomplishing organisational goals in which managers effectively explain aims and objectives to all personnel.

Planning: Planning creates plans to achieve a goal or target. "Planning" means considering future actions now.

3.6 ANSWERS TO IN-TEXT QUESTIONS

1. Planning 2. True 3. False 4. All of the above	9. Both of the above 10. False 11. Management by Objective 12. True

5. Intellectual & Cognitive 6. True 7. Business Enterprises 8. Effective Communication Mechanism	13. Project Management Techniques 14. False 15. Management by Exception

3.7 SELF-ASSESSMENT QUESTIONS

7. Define Plan and explain why planning is an important function of management.
8. Discuss the various types of plans based on coverage and time.
9. Elaborate on the process involved in planning.
10. How can you differentiate between Management by Objectives and Management by Exception?
11. Explain the advantages and disadvantages of Management by Exception.
12. Enlist ways in which planning can benefit the organization by giving suitable examples.

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LESSON 4

DECISION MAKING

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STRUCTURE

4.1 LEARNING OBJECTIVES

After studying the lesson, students will be able to:

- Understand the meaning of policy and strategy
- Explain the terms like Forecasting and Decision Making
- Gather information about Nature of Decision Making
- Explore the Types of Decisions
- Understand the steps in Decision-Making Process
- Interpret Rational Perspectives and Behavioural Aspects of Decision Making

4.2 INTRODUCTION

This lesson will be interesting as we will see the procedure hidden behind the simple day-to-day activity of making decisions. We will see how smoothly we take decisions without knowing the complex steps involved in taking rational decisions. In this we are going to learn some new terms like strategies which means planning, policies which means developing some guidelines which will give a structure. We will also be going to learn the meaning of forecasting and how forecasting helps in the process of decision-making and steps involved in the process of decision-making. We will also study the rational aspect of decision-making.

4.3 POLICY, STRATEGY, FORECASTING AND DECISION MAKING

Policies and strategies acts as a tool for making the future estimations and forecasting future projections. And these predictions helps in the process of decision-making.

4.3.1 Policy and Strategy:

A Policy is a statement which guide the decision-making. It is broad in nature and are flexible. It does not tell which alternative course of action needs to be chosen rather acts as a guide in choosing the optimum choice. It is not rigid and provides the decision-maker freedom to think and make his own judgements. The policy can be vin verbal form, or it can be in written form. Generally, the policy gives the direction to the decision-maker for thinking in a situation or problem arising. A policy helps channel the decision-maker's thoughts in the right direction. The policies are the general statements based on the rules or the principles made by top authority or top-level management. A policy is a long-term decision which helps in achieving the objectives of the organization.

Need for and Importance of Policies:

a) **Quick Decisions-** Policies helps in making quicker decisions by the lower-level management as they are already having a framework within which they have to make their decisions. Policies provide guidelines with the help of which organizational objectives can be achieved.
b) **Better Decentralization-** When the management have the proper guidelines w9ith them than they can easily delegate the authority and responsibilities to lower-level management. Policies states the subordinates what is expected from them by the superiors.
c) **Effective Coordination-** A well-defined responsibility and authority structure helps in better cooperation and helps in coordinating the activities so as to achieve the organizational objectives.
d) **Simplified Control-** When the work is delegated to the lower levels then the management can also ask for the accountability from the subordinates. And when they are made accountable, control can be exercised easily.
e) **Realisation of Objectives-** With the proper control procedures, goals and objectives can be achieved quickly.

Limitations of Policies:

a) **Static-** Policies are not static in nature but the situation keeps on changing. It does ne get revised which is a drawback of a policy.
b) **Not a formula-** Policies does not act as a formula which can be applied directly to the problems.
c) **Does not provide instant solutions-** Policies are only guidelines and does not provide readymade solutions to the problems.
d) **Not a substitute-** Policies are only guidelines which helps in making decisions but does not act as a substitute to the human thinking and judgement.
e) **Curbs creativity-** Policies suppresses the creativity of the lower-level management as they are given a framework under which they must make their decisions.

Factors Influencing Policy Formulation:

a) Amount of finance available
b) Policies adopted by competitors
c) Vision of the organization

d) Forces of the market
e) Rules and regulations by government
f) Values adopted by the business
g) Beliefs of the top-level management
h) Skills possessed by the employees
i) Technology upgradation
j) Business environment
k) Behaviour of the public.

Strategies- A strategy is a plan to achieve the business mission and objectives. A mission is a vision of the business, means where the business wants to see itself in like 4 years or 10 years. Objectives are the means to achieve the mission of the business. It helps in bridging the gap between the present situation and the future desirable position which the organization wants to achieve.

Nature of Strategy-

a) **Dynamic in nature-** Every problem needs a different strategy to solve it. Strategies needs to be revised to become more relevant as per the situation.
b) **Complex Plan**- Strategies is complex in nature because it includes many other plans to achieve the organizational objectives.
c) **Forward Looking-** Strategies nature is forward looking because it makes plan. It helps in taking the organisation to the desired position.
d) **Gives Directions-** Strategies shows the right direction to work so as to achieve the goals and the objectives of the organizations.
e) **External Environment-** Strategies are generally made based on future trends or the changes taking place in the policies of the government or any technology upgradation.

ACTIVITY

Imagine you are working in a FMCG company on a position of manager. There come unexpected changes in the policies of the government and the government introduced GST. Now, being a manager, prepare any two strategies and two policies about how you will implement this new law in your organization.

4.3.2 Forecasting and Decision Making:

Forecasting is a tool in the management which helps in predicting the future. It means the manager makes the future estimations like what will be the sale in the future or what would be demand for the product introduced in the market by the business. So, forecasting helps in giving a rough estimate of the future. Of course, anything which is predicted can't be accurate, but the results can be nearby to those estimations.

Forecasting needs research component to make statements about future. The predictions are not made just by the existing knowledge of the manager or the decision-maker. Forecasting involves scanning the internal environment as well as external environment to know the strengths, weaknesses, opportunities, and threats arising. It involves using the historical and past data for estimating the future. For example, while making budgets, the past data is used as a base for making future projections.

The purpose for forecasting is to act as a input for decision-making. The future projections which are made in the forecasting helps the decision-maker to make the correct decisions. Forecasting aids decision-making.

Decision is an action taken by a decision-maker in which he chooses a course of action among the various alternatives available. The decision is made based on the decision-maker's existing knowledge, past experiences, his intuition, his curiosity to discover, and his commitment for the decision. A decision is made to achieve some pre-decided objectives and goals. It involves analysing all the feasible and viable options and then choosing the optimum alternative amongst all options. A decision means to reach to a conclusion where a decision-maker has to see what should be done and what should not be done in a particular situation. This process of taking a decision is known as Decision-Making.

Therefore, decision-making is an activity where in the decision-maker chooses a course of actions from different available alternatives to achieve some pre-determined goals and objectives. It is a process of selecting the optimum option which will fulfil the needs of the decision-maker better than other options.

The decision-making process consists of four phases from which a decision-maker passes while choosing the optimum alternative. These phases are interrelated in nature. The phases are:

a) Explorative- This phase symbolises searching for an activity in regard of which decision-making has to be done.
b) Speculative- In the next phase, the decision-maker has to speculate or identify the factors which will affect the activity for which decision has to be made.
c) Evaluative- After the factors have been identifies, the next step is the analyse and providing weights to each factors according to their importance.
d) Selective- After all the factors have been evaluated, the decision-maker will choose the best option or alternative from all the factors.

Decision-making involves problem-solving. It is closely related to planning as decision making involves-

- Mental process
- Judgment and thinking
- Achieving goals
- Ongoing process
- Continuous process
- Making choice among alternative
- Scanning the environment
- Analysing various alternatives
- Choosing best course of option.

4.3.3 Nature of Decision Making:

The nature of decision-making is as follows:

a) **Goal-Oriented Process-** The decisions are made for achieving some kind of goals and objectives. It helps in reducing the distance between where we are today and where we want to be. The decisions help us in bridging this gap between the present situation and the desired future position.

b) **Involves Choice-** The process of decision-making includes choosing the best and optimum alternative from the various alternatives. When where there will be no choices available then there would not be a question of making a decision.

c) **Ongoing and Continuous Process-** The process of decision-making is an ongoing process because the managers have to make decisions in the business regularly. And the process is continuous because it is not a one-time activity, but it is a recurring process. Also when the decision has been made, after the follow up if revision is required then the whole process of decision-making has to be repeated.

d) **Intellectual Process-** The process of decision-making involves lots of thinking, past experiences, and knowledge. It also involves making quicker decisions, making judgments, giving reasonings, and taking a risk.

e) **Dynamic Process-** The decision-making process is a dynamic process which means it keeps on changing with the passage of time. It means the decision taken in the situation the previous year would not be feasible and viable in today's time. So, the manager has to constantly upgrade his knowledge and make decisions accordingly.

f) **Situational Process-** Of course, the decision-making depends from situation to situation. Let us say the manager takes a decision in one particular situation which was feasible at that moment, but that same decision may not be viable in another situation. Sometimes, some situation does not require any decision.

g) **Commitment of time, effort, and resources-** So, the process of decision-making is a cumbersome process that requires lots of time, effort, and resources of the decision maker. The decision maker has to find out various alternatives, then analyse them and find the best and optimum alternative.

h) **Pervasive-** The decision-making is all pervasive in nature and is applicable universally. This is true even in the case of businesses as the management has to make decisions for every level. Top-level management makes decisions to set goals and objectives for the organization. Middle-level management has to make decisions for the allocation of the work to the lower-level management.

Lower-level management has to take decisions to execute the plans made by upper-level management.

IN-TEXT QUESTIONS

1. Strategies are complex in nature. True/False.
2. Policies are general statement and ______ which helps in making decisions.
3. Forecasting helps in making future projections. Yes/No.
4. Forecasting helps in achieving goals and _____.
5. Decision does not involve thinking and judgements. True/False.

4.4 TYPES OF DECISIONS AND DECISION-MAKING PROCESS

There are various types of decisions available to a decision-maker from which he can choose according to the different situations and problems arising. There is also a proper process that involves various stages or steps which the decision-maker or the manager needs to follow to come to a solution to the problem. The types of decisions and the process of decision-making both are explained below in detail.

4.4.1 Types of Decisions:

The types of decisions a manager or a decision-maker makes depend on the situations they are facing. All organizations or businesses face different types of situations and problems with which they have to cope with. So, the manager has to analyze first the nature of the problem and then should make a decision. There are two types of decisions that the manager can make which are explained below:

A. Programmed Decisions and Non-Programmed Decisions:

a) **Structured Problems and Programmed Decisions-** Few problems are very familiar in nature. They are straightforward, they are well explained, they are defined properly, and they are complete. The decision-maker knows the problem very well understands it and his goal is very clear.
Example- When the customer returns are increasing or when the supply of raw material gets delayed by the supplier or the response of the employees towards reducing the break time. Such situations which are clearly known and defined are known as Structured Problems.

Let us understand the meaning of Programmed Decisions with an example. Suppose in a restaurant a waiter spills food on the customer's shirt and the customer is very angry about the same. So, the manager has to take a quick decision regarding it because this type of mishappening might not have taken place the first time. In the business of restaurants, this type of mishap probably takes place sometimes. So, the manager knows how to deal with such types of situations like the manager getting the shirt cleaned at the expense of the restaurant or offering free food as a way of compensation. So, the decision taken by the manager, in this case, is an example of a Programmed Decision.

A Programmed Decision is a decision taken in routine work or repetitive problems or issues arising. When the problem is structured, and the decision is programmed there is no need for the manager to go through the cumbersome process of decision-making When the problem is clearly defined then the solution can be clearly seen or if not clearly visible then the alternatives get reduced making the work of the manager easy.

The decisions are called programmed decisions because the pieces of information about them are already known prior hand. And this information can be processed beforehand. Some thumb of rules can be made in advance to tackle situations that can be predicted in advance. These types of decisions don't take much of the manager's time and effort and can be easily taken by lower-level management also.

Example- A high-level manager gave instructions to the manager of finance to buy all the securities which give interest of more than 20%. So, the finance manager does not have to think much and can take a decision quickly regarding the buying of security. So, this is an example of a programmed decision.

There can be three types of Programmed decisions:

i. Procedure- A procedure is the steps that need to be taken to complete a task. For example, a purchasing department has a procedure for buying the supply of raw material, he has to ask the production department how much quantity of finished goods has to be produced, and accordingly, he will order the quantity of raw material required.

ii. Rules- Rules are the statements that need to be followed. Rules define what can be done and what cannot be done. They ensure consistency and are simple in nature. For example, a manager can make rules for latecomers and for the leaves taken by the employees. It will help the manager in creating discipline in the organization quickly.

iii. Policy- Policies are the guidelines that help in taking a decision. These are general parameters rather than statements of rules which state what should be done and what should not be. For example, a policy statement can be- The first come, first served.

b) **Unstructured Problems and Non-Programmed Decisions-** Sometimes organizations or businesses face unusual problems which are completely new. Few problems are very unfamiliar in nature. They are not straightforward rather they are ambiguous in nature. They are not well explained and incomplete. They are unusual or new to the manager.

Example- When the organization comes up with totally new policies like when GST (Goods & Services Tax) got introduced, businesses didn't know how to deal with the new tax structure method. So, this situation in which the problem was unusual and completely new for businesses and organizations is known as Unstructured Problems.

When the problems are unstructured, the manager has to make non-programmed decisions so as to come to a solution. These types of decisions are non-recurring in nature which means they do not take place in a routine manner in businesses and organizations.

Non-Programmed decisions arise due to problems that are non-repetitive in nature. The manager or the decision-maker has to do lots of research, it requires a huge of time, effort, and resources because of the large alternatives available. These problems cannot be dealt with pre-determined notions or solutions. A lot of judgment of the manager is required in making the decisions as no ready-made solutions are available to the manager which becomes a difficulty. Some examples of non-programmed decisions can be how to build motivation among employees, and how to improve the quality of the goods.

Difference between Programmed Decisions and Non-Programmed Decisions:

S.No.	BASIS	PROGRAMMED DECISIONS	NON-PROGRAMMED DECISIONS
1.	Problem Type	When there is a structured problem then only programmed decisions could be made.	When there are unstructured problems, then the decision-maker or the manager makes the non-programmed decisions.
2.	Nature	Programmed decisions are recurring and repetitive in nature.	Non-programmed decisions are non-recurring and non-repetitive in nature.
3.	Goals	Programmed decisions are made when the problems are clear and goals are defined.	Non-programmed decisions are made when the problems are not clear and goals are not known.
4.	Level of management	Programmed decisions can also be taken by lower-level management due to their simplicity and routine nature.	Non-programmed decisions are usually made by upper-level management due to the difficulty of defining problems.
5.	Information about the problem	Information is readily available to the decision-maker or the manager.	Information is not readily available to the decision-maker or the manager.
6.	Solution of the problem	The solution is ready-made and can be prepared beforehand.	The solution is custom-made and is prepared as soon as the problem arises.
7.	Reliance of the solution	The solution to the problem relies on the three methods which are procedures, rules, and policies.	The solution to the problem relies on the creativity, knowledge, and judgment of the decision-maker or the manager.

B. **Strategic Decisions:** Strategic decisions are policy decisions that involve long-term decisions to be made. It has a long-term impact on the business. Taking strategic decisions requires judgment and effort from the decision-maker or the manager. Because of the long-term commitments of these types of decisions, majorly these decisions are taken by the top-level management. For example, buying a new building or introducing a new product in the market, or acquiring or merging with a firm, all these types of decisions require huge finance and these have a long-term impact.

C. **Administrative Decisions:** When the decisions do not involve much long-term commitment and do not have a huge long-term impact, then these decisions can also be taken by middle-level management. Examples of such types of administrative decisions are making the layouts for division, managing the flow of work, taking care of channels of distribution, providing training to the personnel, etc.

D. **Routine or Operating Decisions:** When long-term commitment is involved, we take strategic decisions but when short-term commitment is involved, we take routine decisions. When the impact of decisions is for a short run of time, operating decisions work perfectly. When there are problems that are recurring in nature and do not influence the future of the business much then these decisions are known as routine decisions. They do not require much judgment and effort on the part of the decision-maker or the manager. Therefore, these decisions can even be made by lower-level management. Higher-level authorities can give statements and the rules under which lower-level management can take decisions quickly.

E. **Individual and Group Decisions:** Individual decisions are those decisions that are made by individuals, these are not very complex in nature. Individual decisions are decisions that are routine and require rapid decisions. In such decisions, analyzing different variables of the decisions is quite simpler. For example, a manager takes a decision singlehandedly.

Group decisions are the decisions that are taken by a group of persons gathered for taking the decision. These decisions are a little complex in nature. But group decisions lead to more balanced decisions because of various opinions available. Everyone in the group brings his or her knowledge and past experiences and encourages a positive environment as everyone keeps their points. Group decisions do not aid rapid decisions and setting responsibility under group decisions is a task. An example of group decisions can be when the board of directors makes a decision in an organization.

Advantages and Disadvantages of the Group Decision Making are as follows:

S.No.	ADVANTAGES	DISADVANTAGES
1.	It encourages creativity.	More time is wasted in longer discussions.
2.	When there is a discussion on a topic then there comes more understanding and clarity to it.	Delay in decision-making. It cannot be used where rapid decisions are required.
3.	Due to various opinions, various alternatives can be found out.	Some people in the group which carries can influence their power and dominate others.
4.	The control of one person gets reduces as the power to take decisions is distributed.	Involves more costly as compared to individual decisions.
5.	When people with different domains interact their compatibility in taking a decision improves.	Group decision-making also creates pressure sometimes and leads to a decision that is not much appropriate due to the majority choosing it.
6.	More people bring more knowledge and more experience.	Lack of coordination in the group can prove to be a limitation.
7.	When one person in the group takes initiative, other people also get motivated to probe the facts.	Sometimes no conclusion can be drawn due to disagreements and conflicts in the group.

4.4.2 Decision-Making Process:

Every now and then we have to choose between various alternatives, or we make trade-offs because we can't choose every alternative due to the constraints of the resources. So, making a choice or doing a trade-off involves constant and rational thinking, and this is ultimately known as decision-making.

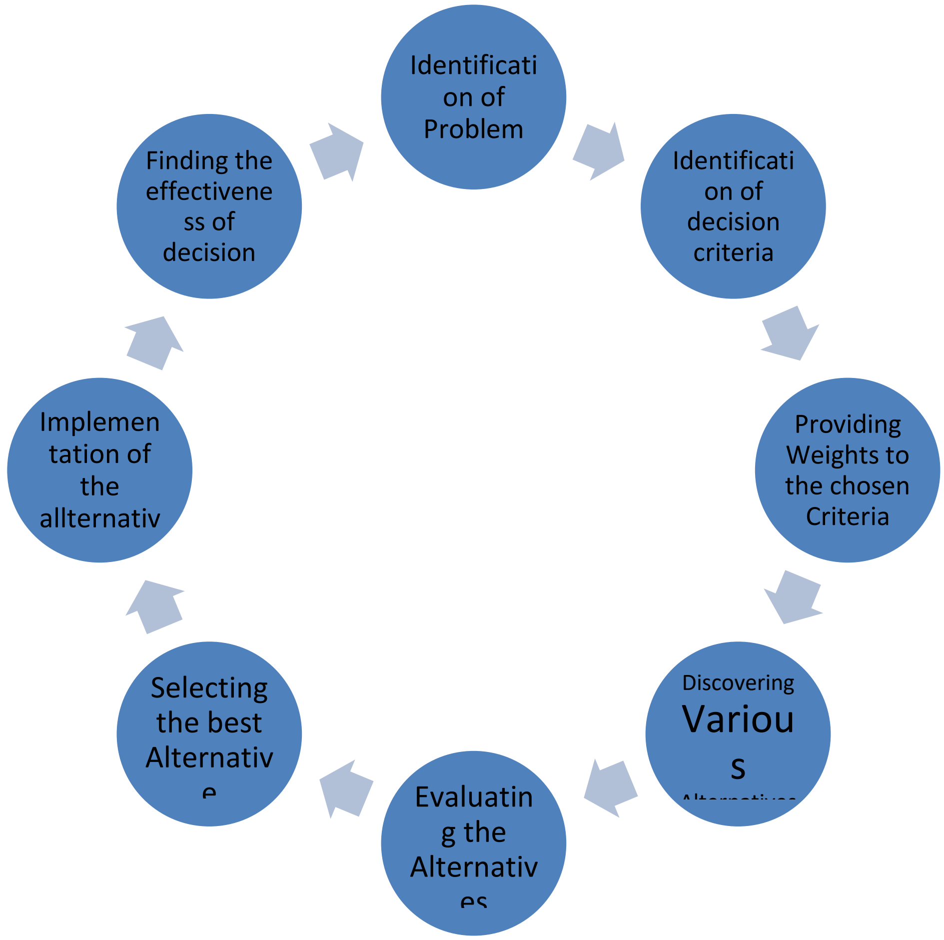
Rational decision-making involves when the decision maker finds out the problem in the organization systematically, analyses the various course of action, and finds the feasible and best alternative. The decision maker should use the relevant facts for problem-solving and should not depend only on his knowledge.

Decision-Making is a process that involves different steps which are explained below in detail with an example:

a) **Identification of Problem-** The first most step in the decision-making process is to identify a problem in the organization for which the management will make the decision. The problem may be because of things not working properly or due to what was planned and what was achieved. The threats from the external environment and weaknesses from the internal environment also pose some problems. To identify the problem, the manager must continuously monitor the environment.
Example- The manager found that the air conditioners which are there in the organization got old and do not work properly and need constant repairing and maintenance charges. After looking at the condition of the air conditioners, he found that he must buy new air conditioners for the organization. So, in the given example he has identified the problem.

b) **Identification of Decision Criteria-** After the manager has successfully identified the problem, he will identify the different criteria for decision-making. Every decision maker has some key points in his mind related to the solution for the problem.
Example- In our example, the decision criteria that the manager can find out are energy consumption, inverter-friendly nature, cost of the air conditioner, life of the air conditioner, and warranty period.

c) **Providing Weights to the chosen Criteria-** In making the decision some factors carry more importance while some carry less importance as compared to the others. So, the manager has to analyze all the factors or the criteria identified in the last step. Giving weights is not a difficult task, the factors can be assigned ranking like the most important criteria can be given a ranking of 1 and the least important can be given a ranking of 4.
Example- In the ongoing example, the manager can analyze the factors chosen for the decision-making and can provide them with a ranking on a scale of 1-4. Let us suppose the manager gave a ranking of 1 to energy consumption, rank 2 to the life of the air conditioner, ranking of 3 to cost of the air conditioner, a rank of 4 to the invert friendly feature of the air conditioner and the ranking of 4 to the warranty period of the air conditioner.



d) **Discovering Various Alternatives-** The fourth step in the process of decision-making is to find out the different options available to the decision maker. The manager has to find out all the possible alternatives which are feasible and viable. He should not jump to the conclusions too quickly but should take his time in finding out the various choices. He must use his creativity and his ingenuity in searching for alternatives.

Example- In our example taken, the manager can find out the various companies which offer air conditioners. He can search for the different companies offering different features. Let us suppose the manager found out some companies which are O General, Hitachi, LG, Lloyd, Samsung, Panasonic, Godrej, and Whirlpool.

e) **Evaluating the Alternatives-** After the decision maker has already identified the various alternatives available to him, he can move to the next step of evaluation of the alternatives. He will screen each alternative according to its feasibility and viability. Evaluation means analysing all the pros and cons of each alternative because of the cost involved. The decision maker must make a trade-off between the cost and benefit of every alternative. The knowledge of the decision-maker is very much required at this stage of the process.
Example- In the ongoing example, the manager will screen out all the companies according to the decision criteria made. He will ensure that the company fulfils all the criteria made by him for the decision-making. He will shortlist only those companies which will give him the best deals for the air conditioners with all the features.

f) **Selecting the best Alternative-** After screening out and evaluating all the alternatives, the decision maker must select the best alternative from all. The definition of the best alternative can be the alternative that is optimum in nature. The optimum alternative will be feasible and viable. Also, the optimum alternative will minimize the costs involved and maximize the benefits which can be achieved through that alternative. The decision maker uses his existing knowledge, his past experiences, and some type of research in finding out the optimum alternative.
Example- In the ongoing example, after the manager has evaluated the alternatives, he will apply his knowledge and find out the optimum company that will fulfil his demand at the lowest possible cost and will give him the maximum benefit. Let us say that the manager has chosen O General company which is the best alternative.

g) **Implementation of the Alternative-** Now, comes the stage of action means we will implement the chosen alternative or the optimum alternative which we have selected in the previous step. It does not only involve implementing but also includes communicating the decision made to the people who be executing it. The decision maker should also gain some acceptance from the executors about the decision made. If the decision is a long-term decision, then the decision maker should also check whether the selected alternative is still feasible and viable.
Example- The manager can buy the air conditioners from the company O General and can get them installed in the organization.

h) **Finding the Effectiveness of Decision-** The last stage or the last step in the process of decision-making is to take follow up on whether the problem we identified in the first stage got resolved or not. After implementing the alternative, the decision maker should constantly monitor whether the alternative is achieving the desired results or not. The feedback can be taken from the executors about the issues coming in the execution of the decision. If the desired results are not getting achieved, then the decision should be revised or modified.

Example- The manager will look at whether the air conditioners are working properly and fulfilling all the criteria and if not, then the manager has to look behind and see where they are lacking.

ACTIVITY

Suppose you are working in a department store that had a 30% drop in the sales over past one year, using this information analyse the problem with the help of decision-makings steps.

CASE STUDY

Making Decisions:

Mr. X has a distinguished academic record and excels in sports and other extra-curricular activities since childhood. He joined ABC as salesman. In the company it was noticed he was conceited and his interaction with other people was not exactly cordial. He was indifferent to suggestions from superiors and subordinates. However, he was a star performer as salesmen and always crossed targets, in the time he had spent with the company. The company needs a new regional sales manager to improve the performance of a loss-making region, should they appoint

IN-TEXT QUESTIONS

6. The problems which are clearly defined are known as _______.

7. The decisions which are taken with the help of structured problems are known as Non-Programmed Decisions. True/False

8. The process of decision making involves identification of _____.

9. Programmed decisions can be taken by lower-level management. Yes/No.

10. The decisions which are unusual in nature and ambiguous are called Non-Programmed decisions. True/False

4.4 RATIONAL PERSPECTIVES AND BEHAVIOURAL ASPECTS OF DECISION MAKING

Decision-making can be rational or irrational in nature. A rational decision-making involves making the decision systematically. A rational decision-maker is the one who uses facts, judgements and logics while making the decision with his existing knowledge. He will be called rational when he will identify all the factors affecting the problem, then he analyses those factors and finds the optimum alternative.

An irrational decision-making involves no research or not using any facts. An irrational decision-maker majorly depends on his intuition and does not use facts. He does not use relevant data which is necessary for making a decision.

Rationality is to apply logics and systematic approach towards decision-making. There are three factors of rationality or rational decision-making:

- Satisfaction of interests- A decision would be called rational if it is able to fulfil the human interests.
- Feasibility- A decision would be called feasible when the organization can adopt it at minimum cost and with minimum difficulties.

- Consistency- When the decisions are being consistent that means they are applicable whenever same type of situation arises.

There are two models given of human behaviour in decision-making. Both the models are given in brief below:

- The Rational Economic Man Model-Perfect Rationality: Adam Smith with other economists stated that the managers are always rational in making decisions and tries to achieve maximum gain from their decisions. This model believes that manager uses logics and is objective while decision-making.
- The Administrative Man Model-Bounded Rationality: Prof. Herbert Simon, gave the administrative man model with bounded rationality. This model suggested that in real life, managers are not always able to make rational decisions. There are some constraints in always making perfect decisions which are:
  - Problem in goal formulation
  - Problem in defining problems
  - Inadequate knowledge
  - Shortage of time and resources
  - Ever changing dynamics of the external environment.

IN-TEXT QUESTIONS

11. Decision-making can be rational and _______.

12. Is achieving perfect rationality in decision-making everytime possible. True/False.

13. There are two models for rational decision-making which are _____ and ______.

14. Problem in goal formulation and problem in defining problem are constraints of bounded rationality. True/False.

15. A rational decision is the one which is feasible and consistent. Yes/No.

CASE STUDY

Making Decisions:

John was the personnel executive of a reputed bank and had been working there for 14 years. During this period, he had developed a good rapport with the subordinates. The subordinates commonly sought his help for their personal problems. Frank was a clerk and had been working with the bank for the past 20 years. One day, Frank went to John and confessed to him an event of his past. He said that when he was a teenager, he was caught stealing and had been sentenced to prison for 2 years. But he escaped from the prison, when 6 months were left. This had been a secret since, but he often had nightmares and he asked John to help him. John expelled Frank from the bank and handed him over the police. When the Vice-President came to know about John's actions, he sacked John on the grounds that he had breached the faith of the employee. John wrote a letter to the President explaining that he was not a priest and so cannot be expected to remain confidential. Since Frank was a runaway convict, he had done his social duty by handing him over to the police. Moreover, it was company's policy not to employ any ex-convicts. Since all his actions were justified, he should be reinstated. What should the president do?

4.6 SUMMARY

The whole lesson revolves around the process of planning, estimating, predicting, and decision-making. We have already seen that decision-making is a vital process that is also followed by all of us in real-life situations and we follow the whole process without even knowing the steps of decision-making. We all tend to apply our existing knowledge and our past experiences to come to a conclusion and this process is known as a decision-making process.

4.7 GLOSSARY

Cumbersome: It means something difficult.

Ambiguous: Something which is not clearly defined or is confusing in nature.

4.8 ANSWERS TO IN-TEXT QUESTIONS

1. True 2. Guidelines 3. Yes 4. Objectives 5. False 6. Structured Problems 7. False 8. Problems	9. Yes 10. True 11. Irrational 12. False 13. Rational Economic Man Model-Perfect Rationality and Administrative Man Model-Bounded Rationality 14. True 15. Yes.

4.9 SELF-ASSESSMENT QUESTIONS

1. "Whatever a manager does, he does through decision-making." Amplify the above statement and describe the different steps in the process of decision-making.
2. "Management means making of decisions and execution thereof." Comment.

4.10 REFERENCES

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4.11 SUGGESTED READINGS

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LESSON 5

ORGANISING

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STRUCTURE

5.1 LEARNING OBJECTIVES

After studying this lesson, you will be able to:

- discuss how a business is organized,
- assess its hierarchical and organizational structure,
- determine the key elements of organisational design.

5.2 INTRODUCTION

In the last chapter we discussed essence of planning. Mere making plans are not sufficient to achieve predetermined goals of an enterprise. Plan needs to be properly executed so it requires bringing together the factors of production such as; human resources, financial resources, and physical resources etc. and estabilish relationship among them. Now we are going to discuss about the next function that is organizing.

5.3 ORGANISING

Organizing is a function which is performed after planning. It focuses on the structure and process of allocating jobs to achieve the objectives of the enterprise. Organizing in management refers to the development of productive relationship between people, work and resources to achieve the common objectives. Resources are in the form of people (human resource), assets (machines), methods, materials and money. Through organizing, we bring all the resources together which is essential for production. It involves:

i. Determining the activities that are important to accomplish goals.
ii. Grouping the activities that are similar in nature.
iii. Assigning the grouped activities to specific position.

Let us now discuss the definition as given by renowned authors:

Henry Fayol defines "to organize a business is to provide it with everything useful or its functioning i.e., raw materials, tools, capital and personnel's."

Louis A. Allen defines "Organising is the process of identifying and grouping the work to be performed defining and delegating responsibility and authority and establishing relationship for the purpose of enabling people to work most effectively together in accomplishing objectives".

Theo Haimann defines "Organising is the process of defining and grouping the activities of the entire process and establishing the authority and relationship among them."

Purpose of Organizing:

Once the organization's goals, plans and strategies are in place, management has to create a structure that will best facilitate the attainment of cherished goals by work done efficiently and effectively.

The aims of organizing are to answer of the following questions:

a. How should jobs be designed?
b. When should the organization implement a different structure?
c. How much centralization should there be in the organization?
d. How many employees should I have report directly to me?

5.3.1 Principles of an Organization:

1) **Principle of Objectives:**

First and foremost, enterprise has to set some common objectives so that the various departments further set their own achievable targets in line with the organizational objectives.

2) **Principle of Specialization:**

Each person is assigned a task as per his / her proficiency to achieve specialization. This principle will increase production along with cost saving.

3) **Principles of Co-ordination:**

Co-ordination between the activities of various departments and within the department is required for the achievement of organizational objectives.

4) **Principle of Authority and responsibility:**

According to this principle authority should commensurate with responsibility. Mismatch between the authority and responsibility will frustrate the employees and they will not be able to give their best to the organization.

5) **Span of Control:**

The span of control determines the maximum number of subordinates that can be supervised by a manager effectively. The ideal number of subordinates depends upon the nature of work. If work requires close supervision then span of control will be short otherwise tall span of control is required.

6) **Principle of Balance**

This principle indicates that the quantum of assigned work to an individual should be such that can be perform well. It means employee is neither over loaded with work nor under worked but work must be balanced.

7) **Principle of Continuity**

The organization should be dynamic and not static. Business environment is fast changing and successful organization keeps pace with the changing environment.

8) **Principle of Uniformity**

To avoid dual subordination and conflict among the employees, principle of uniformity is essential. Every employee should know their roles and organization structure should be in line to this principle.

9) **Principle of Unity of Command**

This principle advocates that a person should receive command from one supervisor and should be reporting to only one superior. The principle should be applied at all the levels of the organization to minimize conflict between the commands.

10) **Principle of Exception**

This principle states that subordinate is free to choose the means to accomplish the tasks, and the top management interferes only in exceptional circumstances. If things are done according to plan, then intervention of top management is not required. Management should leave routine things to be handled by the lower level and complex non routine matters on exceptional basis can be handed by executives.

11) **Principle of Efficiency**

The organization should aim to achieve minimum cost and efforts and organisation structure should focus on efficiency. Employees job satisfaction and performance is directly linked to this principle of efficiency.

12) **Scalar Principle**

Also known as "Chain command". The organization must have a clear line of authority. It should run from the person down through the highest hierarchy for effective and efficient organization.

IN-TEXT QUESTIONS

1. Which of the following statement is TRUE or FALSE"
   (i) Organising is the function of management that creates the organisational's structure.
   (ii) When managers develop or change the organisational's structure, they are engaging in organisation design.
   (iii) Scalar principle is concerned with organisation hierarchy.
   (iv) Principle of Balance is related to work load.
   (v) Principle of Exception is related to interfere in day-to-day work.
2. Arrange the following steps of organizing in proper sequence.
   (a) Assigning responsibility.
   (b) Identification of activities to be done.
   (c) Granting authority.
   (d) Establishing relationships among individuals and groups.
   (e) Grouping and sub-dividing activities within each function on the basis of similarity or relatedness.

5.3.2 Organizational Structure and Design:

Organizational structure defines how information flows from top to bottom and vice versa according to the roles, responsibilities and levels of authority within the enterprise. Most importantly, it identifies who supervises to whom and which employees reports to which superior.

Organizational Design provides the structure for business processes and the framework for an organization to deliver its core qualities.

There are five key elements in organizational design which are as follows:

a) Work specialization
b) Departmentalization
c) Authority, responsibility, and power
d) Span of Control
e) Centralization and decentralization

A good organizational structure and design develop an environment where employees can work effectively with improve communication, increase productivity, and inspire innovation.

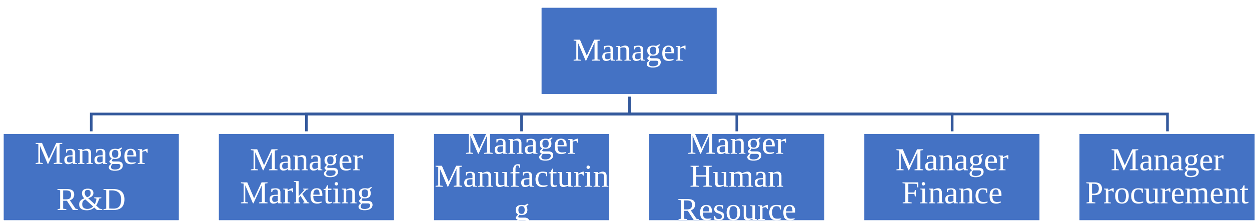
Steps in Designing Organization Structure

1. **Identification of Activities:**
   Planning is deciding in advance what is to be done in future. So the manager needs to identify the work and the tasks which are to be done to achieve the goals of the organization. It helps avoid miscommunication, overlapping of responsibilities and wastage of time and effort. It also helps management to concentrate on important activities.
2. **Grouping of Activities:**
   For the smooth flow of work and functioning of the organization, tasks and activities of similar nature should be grouped together. For this, we create departments within the organization and divisions within each department. Each department is represented by a manager at the top-level of the management.
3. **Assignment of Duties:**
   Once grouping of activities is done, each group of related activities is assigned a position (e.g., finance manager etc.) most suited for it. Every position is occupied by an individual. While assigning duties, the requirements of the job and the competence of the individual should be properly matched together. It creates responsibilities and ensures certainty of work performance.
4. **Delegation of Authority:**
   When a manager is assigned certain duties and responsibilities, he or she must also be delegated authority to carry out such duties effectively. Delegation of authority creates superior-subordinate relationships between various positions in the organization.

Forms of organizational Structure:

(a) **The functional structure**: A functional structure is an organizational design that group similar or related occupational specialties together. On the basis of specialization work and employees are divides. It is a hierarchical, usually vertically integrated, structure. This helps to determine organisation's leadership hierarchy and flow of information.

A functional organizational chart might look something like this:



Strengths:

a. Cost-saving advantages from specialization such as economies of scale, minimal duplication of people and equipment.
b. Employees are grouped with others who have similar tasks.
c. It boosts individual departments' and employees' self-sufficiency and innovation.
d. It scales easily for organizations of all sizes.

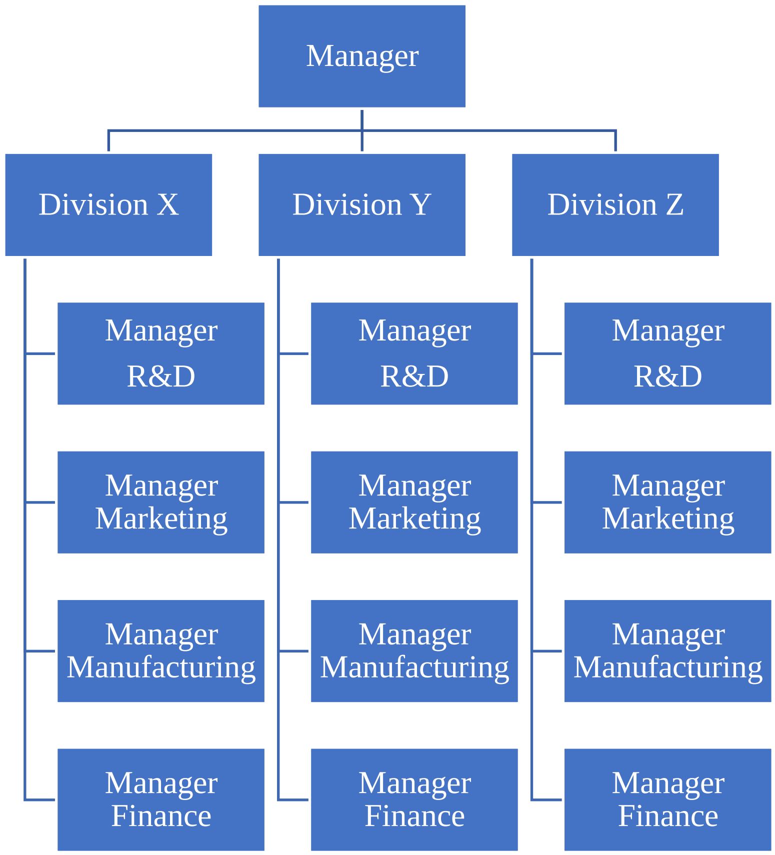
Weaknesses:

a. Pursuit of functional goals can cause managers to lose sight of what's best for the overall organization.
b. Functional specialists have little understanding of what other units are doing.
c. It doesn't encourage communication and interaction among different departments.
d. No one function is totally responsible for results.

(b) **A divisional structure:** It is an organizational structure made up of separate business divisions. In this structure, each division has limited autonomy, with a divisional manager who has authority over his / her unit and is responsible for performance. This type of structure is helpful when the product base expands in quantity or complexity. It can be in one of three ways:

- Product**:** men's wear, women's wear and children's clothing.
- Market**:** retail store, e-commerce and catalog.
- Region**:** Northeast, Southeast and Southwest.

A divisional organizational structure might look like this:



Strengths:

a. It focuses on result.
b. Divisional managers have full responsibility for a product or service.
c. The divisional structure releases the headquarters staff form being concerned with day-to-day operating details.
d. It's more adaptable to customer needs.
e. Individual departments have more autonomy and room for innovation.

Weaknesses:

a. Resources duplication is very common.
b. Organization's costs surges and efficiency decreases when functions are duplicated.

c. Departments have low interaction and less communication.

(c) Flat structure: A flat structure is one in which almost all employees in hierarchy have equal power with little variation where some executives may have just a bit more authority than employees. This organizational structure is common in startups.

Advantages:

a. Employees have more responsibility and independence.
b. Interaction and communication among the employees gets better.
c. This structure is capable of implementation of new ideas and practices in effective manner.

Disadvantages:

a. Employees don't get proper supervision.
b. Specialized skills are not developed in the employees.
c. Not much suitable when company grows. Scalability issues arise.

(d) **Matrix organizational structure**: The matrix structure is a combination of two organizational structures i.e., functional and project. Under the functional structure, each functional department is headed by a functional manager whereas in project structure, project manager leads the project. Uniqueness of this structure lies in the way employees work with two superior. Project manager exercise horizontal authority whereas functional manager authority vertically flows. Therefore, it is called matrix organizational structure.

The project teams are created from the functional departments and are placed under the project manager for the duration of the project.

Advantages:

a. Working with the specialists in project enhances employees' knowledge and skills.
b. Most suited and skilled employees can be picked by the supervisors for the projects.
c. The employees are sent back to their functional department once the project is completed.
d. Coordination and control are the key to success of project.

Disadvantages:

a. Timely progress has to be monitored by project manager.
b. Every employee has two bosses which violates the principle of unity of commands.
c. Profitability and productivity are compromised if employees are indiscipline.
d. Organizational relationships become very complex.

IN-TEXT QUESTIONS

3. Match the list A with List B:

List A	List B
1. Functional organisation	a. Grouping of similar occupational specialists together.
2. Divisional organisation	b. Making up of separate business divisions.
3. Matrix organisation	c. Specialist from different functional departments is assigned to work on projects led by a project manager.

4. Which of the following statement is TRUE or FALSE:
   (i) Functional structure has cost-saving advantages.
   (ii) In functional structure, employees are grouped with others who have similar tasks.
   (iii) In divisional structure, each division has limited autonomy.
   (iv) Divisional managers have full responsibility for a product.
   (v) In a flat structure all employees in hierarchy have equal power.
   (vi) Matrix structure creates a dual chain of command.
   (vii) Every employees in a matrix organisation have two manager.

5.3.3 Line and Staff Concept:

Chain of command is evident from organizational structure. Line personnel are a decision maker and staff personnel are an advisor.

Line functions have direct authority over immediate subordinates and are responsible for realizing the objectives. Line managers exercise authority and create chain of authority which is run from top to bottom.

Staff functions help the line manager to work most effectively in accomplishing the business objectives. In this way, Staff managers assist by their advice to line managers in discharging their duties efficiently.

Nature of Line and Staff Authority Relationship:

Line manager gets involve in decision-making and staff performs advisory function for the achievement of organizational objectives. Therefore, relationship between line and staff largely play an important role in achieving operational efficiency of the organization. Staff officials provide advisory and auxiliary services to line managers as an expert to help in carrying out the managerial functions. So, the well-defined authority and responsibility between them is pre-requisite conditions for the smooth functioning of the enterprise. Although Staff managers do not have authority over line managers but they have authority over people working in their staff departments.

Causes of Conflicts between Line and Staff:

People work in a well-defined structure in which they have formal relationship. Despite of the formal relationship, line and staff employees face conflict in between which are as follows:

A. Objection from the point of view of line manager against the staff people:

(i) Undermining the line authority in terms of proficiency which creates frustration in the minds of line officers.
(ii) Staff tends to assume line authority.
(iii) Advice of staff is only theoretical and unrealistic.
(iv) Staff people take credit of success and to lay the blame on line executive in case failure.

B. Objection from the point of view of staff people against the line managers:

(i) Line managers feel that taking advice of the staff officers is admitting incompetency so they do not ordinarily go for staff's advice.
(ii) Line managers are more cautious and slow to accept new ideas. They resist changing.
(iii) Staff specialists feel that if they have arrived at the best solution to a problem, they should be able to put it into action.

Resolving of the Conflict:

To resolve the conflict, the following point is to be taken into consideration:

(i) **Clarity in relationships:**

Relationship between the staff and line advisors need to be clearly defined with respect to their scope of authority and responsibilities.

(ii) **Proper use of staff expertise:**

Line managers must know how to use the trained and experienced staff expertise. Likewise, staff managers should also consider pros and cons of every possible recommendation or advice.

(iii) Holding staff accountable for results:

Accountability of staff needs to be fixed to make them answerable for their performance. This leads to confidence on staff recommendations.

5.3.4 Emerging Design Options

1. **Team Structures:** A team structure is one in which work teams are central to the entire organization and each team do the works towards a common goal. In this type of structure, no line of managerial authority flows from top to bottom. But, they design and do work in the way they think is best. The teams are held responsible for all work performance results in their respective areas. What type of team you have depends on its purpose, location, and organizational structure. A team is said to be the best if they possess the traits of psychological safety, dependability, structure and clarity, meaningful membership and purpose. An effective team would demonstrate:
    i. The willingness to teach one another,
    ii. Clear communication,
    iii. High morale to maintain inspiration,
    iv. Fill in gaps for one another (skill, time, circumstance),
    v. Strong as an individual, unstoppable as a group."

Advantages:

- Easy employment of experts
- A team can use the existing management structure
- No need for client training
- Disadvantages:
- Difficult assessment of project progress for the client
- Difficult to resolve political and organizational issues
- The client is the only judge of success

2. **Matrix Structure:**

The matrix structure utilizes functional as well as divisional chains of command simultaneously in the organization, commonly for one-of-a-kind projects. A key purpose of the matrix structure is to enhance horizontal coordination and the sharing of information.

Thus, matrix structure is a type of management system in which workers report to more than one person which means having two or more supervisors at the same time. Employees in the matrix have two bosses-their functional department managers and their product managers. Therefore, has a dual chain of command.

The project teams are created from the functional departments and are placed under the project manager for the duration of the project. The project manager has authority over the functional members who are part of his project team in areas related to the project's goals. However, any decision about promotions, annual reviews typically remains the functional manager's responsibility.

Advantages:

e. It achieves the economies of scale by providing the best resources and an effective way of ensuring their efficient deployment.
f. Working with the specialists in project enhances employees' knowledge and skills.
g. Most suited and skilled employees can be picked by the supervisors for the projects.
h. The employees are sent back to their functional department once the project is completed.
i. Coordination and control is the key to success of project.

Disadvantages:

e. Every employee has two bosses which violates the principle of unity of commands.
f. Profitability and productivity are compromised if employees are indiscipline.
g. Organizational relationships become very complex.

3. **Network Structures:**

A networking structure includes the linking of numerous, separate organizations to optimize their interaction in order to accomplish a common goal.
Company with multiple locations with different functions uses this structure to share resources with another company to collaborate with each other. Networking requires synergy and a high level of collaboration.

Advantages:

a. The outsourcing nature of network structure provides companies with the advantages of lower costs, more focus, and increased flexibility.
b. Outsourcing allows saving money as they don't have to bear the expense of setting up a department for the same purpose.
c. It gives the flexibility to change their processes and the ability to focus on their core functions.

Disadvantages:

a. Creates lot of confusion when similar things are done by many offices or freelancers.

4. **Spaghetti Structure:**

It refers to a flat, flexible or lack of organisational structure characterised by ambiguous job boundaries and extensive delegation of task and project responsibilities to autonomous teams.

Features:

i. Lack of structure of organisation
ii. No employee had a desk or office of their own, or a role except one they chose for themselves from a list of projects on a bulletin board.
iii. Project based organisation (staff initiate projects and assemble teams)
iv. Multiple roles
v. Transparency (knowledge is shared throughout the organisation)

The key characteristics of a spaghetti organization are choice (staff initiate projects and assemble teams; individuals invited to join a project can decline); multiple roles (the project approach creates multi-disciplined individuals); and transparency (knowledge is shared throughout the organization).

5. **Fishnet Structure:**

The fishnet organization is a new organizational form. It is a temporary flexible organization. It is dynamic and adaptable to situations, opportunities and influences from its environment.

Features:

i. Flexible
ii. Form and reform varied patterns
iii. Middle manager may be at one being at the apex, at another time in the middle.
iv. Rearrange it quickly while retaining its inherent strength.
v. Allows any structure to be woven together electrically and altered as needed.

6. **Virtual Organisation:**

The members of the virtual organisation may never meet each other face to face and communicate through telecommunications. With the business going global, emergence of virtual organisations facilitate quick decision making. The organization may form virtual groups, who work together to achieve a common goal using video conferencing supported computer technology, to communicate and achieve results.

7. **Learning Organisation:**

Learning organisation has the ability to continually change structure. Accordingly, based on the feedback internals processes are also modified to suit the present need of the organisation. Success *matra* of the organization depends on fast changing the structures to suit the specific need of the organization as per the changing environment.

IN-TEXT QUESTIONS

5. Which of the following statement is TRUE or FALSE:
   (i) A line-staff structure is that which distributes work responsibilities.
   (ii) Staff managers do not have authority over line managers.
   (iii) Staffs have authority over people working in their staff departments.
   (iv) Line Manager involves in decision-making.
   (v) Staff performs advisory function.
6. Fill in the blanks:
   a) To act is said to be the …………..manager's function,
   b) To think is said to be the ………..function.
   c) Within a staff department, the relationships are ………
   d) Line authority runs from the --------- to the ----------

5.4 DEPARTMENTATION

Departmentalization is the grouping of business activities which is similar in nature. An individual occupies managerial position of a specific department or division and has authority over the teams for the efficient performance of specified activities for achieving the organizational objectives.
According to Koontz and O'Donnell, "A department is a distinct area, division or branch of an enterprise over which a manager has authority for the performance of specified activities".

Key factors to be considered by management at the time of making basic departmentation:

a. Specialization: Benefits of specialization can be secured.
b. Coordination: It should ensure coordination between the activities which contributes maximum in the attainment of common objectives.
c. Control: It should facilitate control as a general rule.
d. Costs: Creation of new department increases various costs.

e. Jurisdiction of the departments: should be clearly laid down to avoid conflicts.

Reasons for Departmentation:

a. The department enables an enterprise to pick the benefits of expertise.
b. Departments are created with some degree of autonomy and independence which provides job satisfaction and motivation resulting in higher efficiency of operations.
c. Helps in development of departmental managerial skills.
d. Evaluation of managerial performance becomes easier.

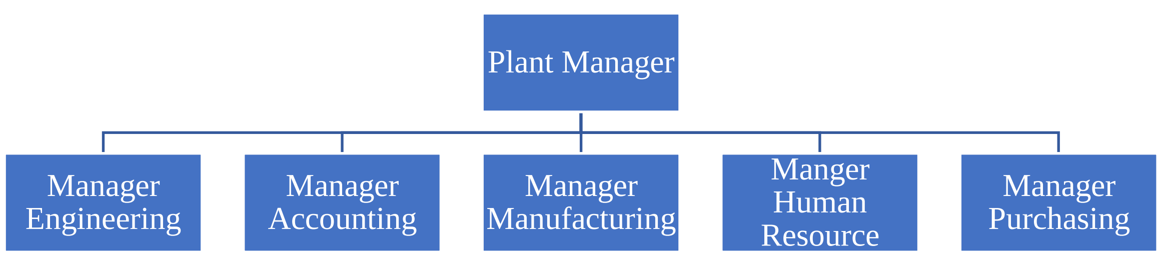
Aims of Departmentation:

a. Maintaining co-ordination and control of the various activities.
b. To promote the attainment of organizational objectives.
c. Specialization of activities for efficient performance.
d. Simplifying the task of management within a workable span.

Types or bases of Departmentation:

a) **Departmentation by Function:**

When department is created on the basis of organizational functions, it comprises of the basic functions and secondary functions. Basic functions involve the operations contributing to the organizational efficiency and secondary functions are derived from a basic function to take advantages of specialization.



Merits:

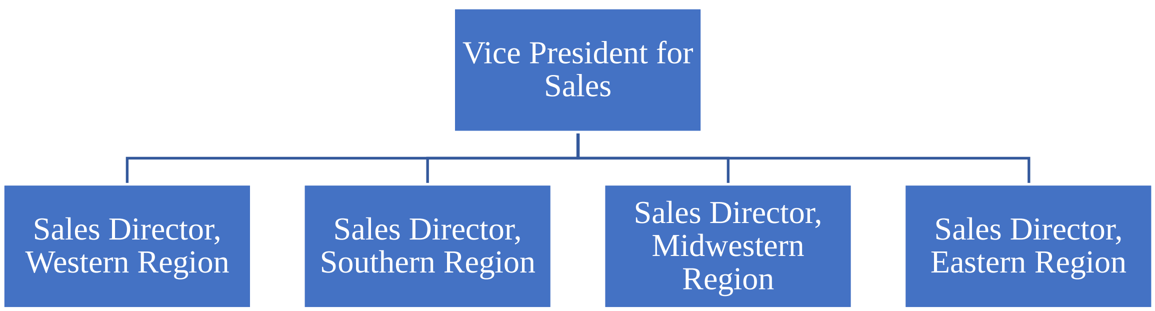
1. Time tested and logical method.
2. Helps employees getting specialized.
3. Clear and fixed authority and responsibility.
4. Effective controls can be exercised by the managers.

Demerits:

1. Heads of the departments are only held responsible for faulty work.
2. Coordination becomes tough between different functions.
3. Loyalty shifts towards functions from the organization.

b) Departmentation by Territories or Geographical Locations

Departmentation by geographical location is more suitable when a business that is geographically spread through its branches and same goods are manufactured and services are performed at various locations. Example of such departmentation is insurance business, banking business etc.



Merits:

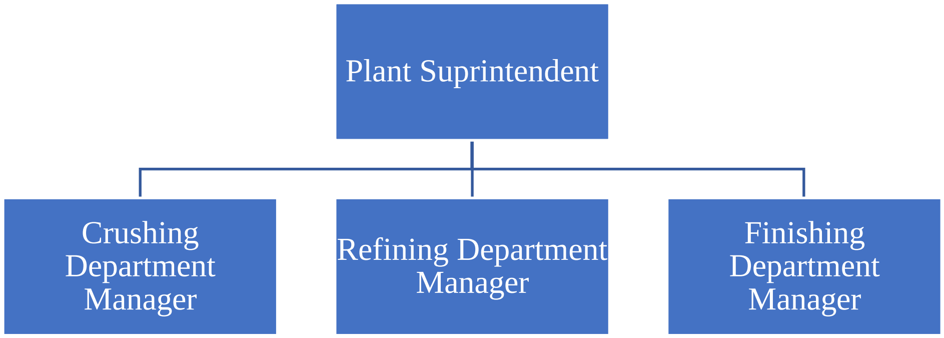
1. It caters the need of local customers very effectively to their satisfaction.
2. Localized operations provide economies to the enterprise.
3. Sales personnel can focus much on sales and putting efforts for sales rather than spending time on travel.
4. Role of territorial departments executives become crucial in emergency for spot decisions.

Demerits:

1. Requirement of employees in future will increase who have managerial skills.
2. Difficulty in coordination with more branches and scattered locations..
3. Territorial grouping may cause problems if authority over financial matters is decentralized.

c) Departmentation by Process

Department for all the process involved in production of a product is made. For example, an oil manufacturing organization creates department for each process such as crushing, refining, and finishing. The basic purpose is to find out the cost of each process by taking the advantage of specialization of each process.



Merits:

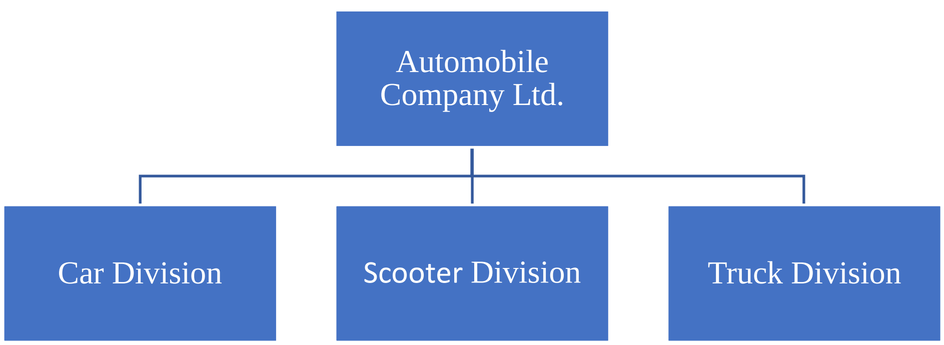
1. Equipment's can be utilized economically and to their maximum capacity.
2. Irrespective of the size it suits to all the organizations.
3. Timely and better customer service can be ensured.
4. Cost of production reduces which ultimately saves money.

Demerits:

1. More conflicts in process departmentation. Principle of unity of command is sometimes violated.
2. More suitable for large manufacturing firms.
3. Coordination becomes tough.
4. Issue in one process may collapse the entire process.
5. High cost.

d) Departmentation by Product

When an organization is producing two or more products and is of different nature but requires the same degree of attention, departmentation by product is suitable. For example, an automobile company manufacturing scooters, truck, and cars.



Merits:

1. Possibility of availing several economies at handling, assembly and production.
2. Optimum utilization of labour, skill, and capital is ensured.
3. Timely and enhanced customer service can be provided.
4. Effective coordination of the activities related to a particular product.

Demerits:

1. Organizational structure can create challenges in co-ordination.
2. Active control maintenance is required.
3. Duplication of work ultimately increases the cost of production.

e) Departmentation by Customer

Departmentation by customer is market oriented. Departments are created on the basis of market served or distribution channels used. Governement, wholesalers and retailers are considered distinctive categories of customers. Departments satisfy the needs of all the customers by targeting their specific requirements and fulfilling them.

Merits:

1. Customers are crucial for every organization and organizations primary responsibility is to cater the needs of the customers in best and possible way.
2. It is essential to target different categories of customers separately since marketing differs for all categories of the customers.
3. Wide variety of products or services uses different channels of marketing which calls for specialized customer handling.

Demerits:

1. During recession salesmen have to remain idle if department is not having enough work.

2. Coordinating various departments will pose many serious problems.

f) **Departmentation by Time**

This form of departmentation is suitable when an enterprise is functioning 24 hours, and the activities performed in each shift (morning shift, evening shift, night shift) are similar and identical.

g) **Departmentation by Number:**

Departmentation by number is said to be created when certain number of people perform together common activities grouped together. In business world this type of departmentation is not found. Example of this type of departmentation can be found in other organisations such as, in the army. Soldiers are grouped into squaders, battalions, companies, brigades and regiments. These grouping are based on the prescribed number of soldiers for each unit.

IN-TEXT QUESTIONS

7. Which of the following statement is TRUE or FALSE?
   (i) Indian Railway is the example of geographical departmentation.
   (ii) Malls are the example of departmentation by product.
   (iii) Nike is the example of product departmentation.
   (iv) The sales activity in an office supply firm is an example of customer departmentation.
   (v) Health care clinics are the example of process departmentalisation.
8. Fill in the blanks:
   a) How jobs are grouped together is called……………
   b) The purpose of departmentation is of ………… at all levels.

5.4.1 Span of Control

Span of control refers number of employees a manager can efficiently and effectively manage. It is related to the horizontal levels of the organization structure.

Factors Affecting the Span of Control:

Following factors affect the span of control:

(i) Nature of work: Routine jobs calls for wider span whereas complex work calls for narrow span. This rule decides the span of control on the basis of nature of work. Jobs which needs close supervision and direction typically has narrow span of control and vice versa.

(ii) Capability of Superior: A superior when possess the communication skills, decision-making ability, controlling power, and leadership skills, requires wider span of control and vice versa.

(iii) Capability of subordinates: trained and efficient subordinates can discharge their functions independently and need less supervision so wider span is preferred otherwise narrow span is preferred.

(iv) Degree of decentralisation: If degree of decentralization is higher, the wider span of control which is also known as flat structure is helpful.

(v) Communication Techniques: Choice of span of control is also impacted by communication techniques. If more face to face or direct communication with subordinate is required then narrow span is better but if the written communication is more required, a wider span can be handled well.

5.4.2 Types of span of control:

(a) Wide span of control or flat structure:

If a manger can supervise and effectively control a large group of persons say up to 20 at a time, we are referring to wide span of control. With the wider span, there will be less hierarchical levels, and would be flatter.

The features of span of control are:

- Less overhead cost of supervision
- Prompt response from the employees
- Better communication
- Better supervision
- Better co-ordination
- Suitable for repetitive jobs

Advantages:

1. In a wide span of control, the number of managers gets reduced in the hierarchy.
2. Saving in expenses in terms of remuneration.
3. Subordinates feel relaxed.
4. Subordinates develop their independent sprits in a free work environment.

Disadvantages:

1. Difficult for superior in managing a large number of subordinates at a time.
2. Supervisor may not listen to all efficiently.

(b) Narrow span of control or tall structure:

Under the narrow span of control, the hierarchical levels increases and the organizational structure would be tall. The manager supervises less number of employees which may directly report to the manager.

The features are as below:

- Narrow span of control is more suitable for jobs which require tight control and close supervision. For example, jobs which need craft-man-ship like handicraft, and ivory work etc., can be better supervised if span of control is narrow.
- Gaps in communication may creep in and problem due to distorted messages can become serious concerns.
- Lacks co-ordination.
- Due to close supervision employees may achieve specialization.

Advantages:

1. The manager can supervisor each of his subordinates intimately.
2. The cross communication gets facilitated, i.e., operating staff communicating with top management.
3. Effective communication between the subordinates and their manager.
4. Chance of promotion increases with the availability of several job positions.

Disadvantages:

1. If the span is narrow, less number of subordinates reports one supervisor, requires more managers to be employed.
2. It would be very expensive in terms of salaries to be paid to each.
3. With more levels of the hierarchy, the communication suffers drastically.
4. Lack of coordination and control as the operating staff is far away from the top level management.

IN-TEXT QUESTIONS

9. Match the following List I with List II:

List I	List II
1. Highly experienced Employees	a. Larger span
2. Untrained employees	b. Narrow span
3. More similarity of employees works	c. Larger span
4. More complex tasks	d. Smaller span

10. Which of the following statement is TRUE or FALSE?
    a) Span of control depends on the skills and abilities of the managers and the employees.
    b) Span of control determines the number of levels and managers in an organisation.
    c) A tall structure is one which has a small span of control.
    d) The flat structure has large span of control.
    e) The flat structure tends to have fewer levels.
    f) A tall structure results in a large number of levels.
    g) A flat structure will reduce both moral and efficiency.
    h) A flat structure is strong if its mangers are well trained.

5.5 AUTHORITY

Authority refers the formal right to take decisions. Authority comes with the position in the organisation. It is inherent in a managerial position to give orders and expect those orders to be obeyed. It comprises right to reward and punish. Thus, authority gives the right to issue orders and commands to the subordinates and to get the things done by subordinates. Authority flows from top to bottom because highest authority is assumed by top level management. With authority comes responsibility. However, accountability for completion of task remains with the person having the utmost authority.

Henry Fayol defined authority as "the right to command and the power of precise obedience."

Elements of authority:

a. It puts the persons in a position to regulate the behaviour of subordinates;
b. Authority is legitimate and can be delegated;
c. It enables in deciding what task is required to be done, who is going to do the task and when it will be done;
d. Authority is given to influence the behaviour of subordinates so that right things are done at right time.
e. The exercise if authority is always subjective.

Sources of Authority:

(i) *Formal Authority:* it is based upon the rank or position held by the person and may be given by law or by societal rules and regulations protected by law. For example, shareholders of a company delegate their power to the Board of Directors and Board of Directors delegates their power to the Chief Executive who delegates it further to the manager and so on.

(ii) *Charismatic Authority:* it rests on the personal charisma of a leader who commands respect of his followers. It depends upon the personality traits. The religious leader and political leaders come under this category.

(iii) *Traditional Authority:* This authority comes in the form of ruling lord and obedient subjects. This type of authority passes from the father to the son. This traditional authority is followed in Indian family system where the head of family govern the activities of the family and other obeys out of respect and traditions.

(iv) *Authority by competency:* The knowledge or competency of a person gives him /her a status where his / her authority is accepted by others.

5.5.1 **Responsibility and Accountability:**

Responsibility: It refers to the obligation to perform. To fulfil the responsibility proper delegated authority is required. It is the ability of a person to respond positively towards the assigned duty with matching quantum of authority. Flow of responsibility is opposite to the authority. It flows from bottom to top. More responsibility is shared by lower level and middle level management. In short, responsibility is the obligation of a person to carry out the assigned tasks to the best of his ability.

Features of responsibility:

a. It arises in case of a superior-subordinate relationship;
b. It always flows upwards, from subordinates to superior;
c. It arises due to the duty assigned with commensurate authority;
d. It cannot be delegated.
e. It is the obligation to complete the job according to instructions.

Accountability: means answerable to the superior for the work done, discharging responsibility and to exercise authority for completion of work to ensure the performance.

Features of Accountability:

a. Accountability cannot be delegated even if the work has been performed by a subordinate.
b. It always flows upwards.
c. Accountability is always unitary which means a subordinate should be accountable only towards one superior.

Benefits of Accountability:

a. It promotes operational excellence.
b. It safeguards organization resources.
c. It yields more accurate results.
d. It builds trust.

IN-TEXT QUESTIONS

11. Match the List I with List II:

1. Authority	a. It comes from the position, not the person.
2. Responsibility	b. It is related to obligation assigned work.
3. Accountability	c. It is always unitary.
4. Power	d. It refers to an individual's capacity to influence decision.

12. Fill in the blanks:
(a) Authority flows from _____ level to ______level.
(b) Accountability is being fully answerable to the _____ for the performance of the task assigned.
(c) Responsibility -------- ----- delegated.

13. Which of the following is TRUE or FALSE?
a) Responsibility is the obligation of a subordinate.
b) Responsibility is the obligation of a superior.
c) The superior has a authority and the subordinate has responsibility.

Difference between Authority and Responsibility

Basis of Difference	Authority	Responsibility
Definition	Superior has legal right to issue orders and command to subordinates.	Subordinate has responsibility to timely complete all the tasks assigned by the superior.
Basis of existence	Authority normally arises due to the position of the boss in the organisation.	Responsibility arises from superior subordinate relations, whereby the subordinates agree to perform such duties as he is assigned to.
Delegation	Authority may be delegated by a superior to his subordinate.	Responsibility cannot be delegated by the subordinate.
Flow	Authority flows downwards from superior to subordinate.	Responsibility moves upward from subordinate to superior.

Relationship between Authority and Responsibility

(i) The authority gives the power to issue orders and instruction to its subordinates' whereas, responsibility means duties entrusted to a person at the time of delegation of authority.

(ii) Authority may be delegated but responsibility cannot be delegated.

(iii) A superior can always share his authority with his subordinates but a superior cannot delegate his responsibility or obligation to a subordinate to perform his duty.

(iv) Responsibility is accounted to a person. Therefore, no subordinate can escape his responsibility by delegating certain rights to his subordinate. Responsibility always moves upwards and therefore cannot be delegated.

(v) Authority and responsibility are closely related. There should be parity between the two. The subordinate shall be accountable for the authority entrusted to him and not beyond.

5.5.2 **Delegation of Authority**

In any organisation, no single person can perform all the work. Manager has to perform different functions and has limited time. Managers prioritize their work and less important work or routine day-to-day tasks are assigned to the competent subordinates. Mere assignment or delegation of routine day-to-day work does not ensure completion of tasks unless adequate authority is delegated. Delegation of authority is entrusting subordinates to do tasks. It means passing of authority and powers to the subordinate downwards in the hierarchy.

Thus, Delegation of authority is a process wherein responsibility to complete a task is assigned to subordinate along with certain amount of authority to accomplish the task.

Elements of Delegation

i. **Authority:** Authority can be defined as right to take decision, giving orders and get things done to achieve the organizational goals. Highest authority is with the top level management which further flows to lower levels of the management. Authority has power to influence the conduct of others.

ii. **Responsibility:** It is the duty of the subordinates to timely complete all the assigned tasks as per the instructions given by the superior. While being in the formal setup, superior issues orders and the subordinate's has to carry out the work. Responsibility flows from bottom to up.

iii. **Accountability:** When a superior assigns some work to subordinate with enough authority, subordinate is answerable to the superior for its completion. Accountability cannot be delegated. Accountability means being answerable for the end results.

Steps of Delegation

Superior-subordinate relationship works out well with delegation of authority. Following are the steps of delegation:

(a) **Assignment of Duties to subordinates**: First, the delegator has to decide as per the job roles which tasks, duties are required to be delegated to the subordinate.

(b) **Granting of authority to perform the assigned duty:** At this stage, an adequate authority is to be delegated to subordinate which is essential to perform the duty and is assigned to the subordinates. If delegated authority is more than assigned duty, then it leads to its misuse by the subordinates. So, delegation of authority must commensurate with duty assigned to subordinates.

(c) **Creating Responsibility**: If the subordinate accepts the duty assigned with adequate authority to perform the same, it creates responsibility on the part of subordinates to fulfill the duty. Responsibility is absolute and cannot be transferred. Responsibility is the obligation to complete a task as per predefined terms and conditions.

(d) **Accountability**: The subordinate becomes responsible for the completion of the duty if assignment is accepted by the subordinate. Subordinate becomes answerable or accountable to the superior for the performance which may be linked with rewards or punishments for the performance.

Principles of delegation of authority:

(i) *Principle of functional definition:* Clearly defined objectives of each department will help the superior to determine the requirements of authority for that specific position.

(ii) *Principle of expected result:* The goals and standard of performance helps in determining the quantum of authority to be delegated for fulfilling the responsibility.

(iii) *Principle of parity:* Delegation of authority must be in parity with the responsibility.

(iv) *Principle of absoluteness of responsibility:* It asserts that the responsibility cannot be delegated. It means for the action taken by the subordinate, the superior will be responsible for the achievement of the end results.

(v) *The Scalar Principle:* There should be a proper hierarchy in the organization to clearly state the superior and subordinate relation. One should know who is delegating the authority and to whom he / she is accountable.

(vi) *Principle of Exception:* Once the task is assigned and required authority has been delegated to fulfill the assigned duty to a subordinate, the superior should not interfere in between the work. In exceptional cases, where the subordinate is crossing his / her limits by misusing the delegated authority, superior can interfere and even withdraw the delegated authority from the subordinate in the interest of the organization.

IN-TEXT QUESTIONS

14. Which of the following statement is TRUE or FALSE:
    (i) Delegation of Authority takes place between superior to subordinates.
    (ii) When a mangers delegate authority, they must allocate commensurate responsibility.
    (iii) Allocating authority without responsibility or accountability creates opportunities for abuse.
    (iv) Responsibility cannot be delegated.
    (v) No one should be held responsible or accountable, if he/she has no authority.
15. Fill in the blanks:
    a) Creation of departments leads to…………….
    b) Delegation of authority involve appraisal of capacities of the………. And needs of the ,,,,,,,,,,,
    c) A superior who has no…………….in his subordinates does not delegate.

16. Arrange the following steps of delegation in proper sequence:
    a) Creation of obligation.
    b) Assignment of duties
    c) Grant of authority.

5.5.3 **Centralization:**

Centralisation refers to the centralization of authority. When all important decisions are taken at top level management or are subject to the approval of top level management is said to be centralisation. In other words, all operational and policy directions are taken by the top management. **Its implication can be:**

a. **Decision-making power rests at the top level of management;**
b. **Middle level management has the operating authority; and**
c. **Operations are performed at lower level which is closely regulated by the top level.**

Advantages:

i. All decisions are made at one central point for enforcing uniform policies and to achieve coordination and conformity.
ii. To avoid duplication of efforts and resources for similar activities being conducted by different levels of the organization.
iii. It optimizes utilization of human and physical resources.
iv. Better consistency and stability in decision-making.

Disadvantages:

i. It can delay decision-making process.
ii. It leads to increase the burden on the top level.
iii. It hampers the development of lower level managers.
iv. It reduces motivation and moral of lower level managers.
v. Probability of misuse of authority by top level management.

Decentralization:

In simple term, everything that increases the role of subordinates is said to decentralization. Decentralisation is a systematic and selective dispersion of decision-making power at all levels of management and throughout the organization. In other words, it is dispersal of decision-making power from the top level management to middle level and to lower level of the organisation. It increases the subordinate’s responsibility.

Louis A. Allen defines “Decentralisation is the systematic effort to delegate to the lower levels of all authorities except that which can be exercised at central points.”

Newman defines “Decentralisation is simply a matter of dividing up the managerial work, and assigning specific duties to various executive skills.”

Factors responsible for decentralization:

a. When decision are required to be taken on the spot;
b. For Timely and successful completion of the work;
c. To introduce flexibility in operation during growth and expansion phase.

Advantages:

i. It leads to prompt and timely quick decisions and action.
ii. It helps to improve the efficiency of managers.
iii. It gives the freedom to act and freedom to make decisions.
iv. It improves the morale of the personnel working at lower level.
v. Every self-reliant manager knows what he is expected to do.
vi. This gives the central management more time to concentrate on planning, coordination, policymaking, and control.

Disadvantages:

i. Coordinating and controlling become difficult when authority is decentralised.
ii. Top management has to remain in constant touch with each department in the absence of which it will not be in a position to exercise effective control.
iii. Due to large number of executives and specialists engaged in the organization, the overhead cost gets increased which is another limitation of decentralized system.
iv. Decentralisation is possible only when the services of capable and competent managers are available in abundance.

Thus, centralisation or decentralization deals with the degree with which majority of the decisions are taken at top level or are dispersed throughout the organization. Centralisation or decentralization both is effective in different organisations if top management plans it well keeping the nature of work in the central place.

Difference between Centralisation and Decentralisation

Basis of Difference	Centralisation	Decentralisation
Definition	Decision-making capability rests with the top management.	Decision-making capabilities dispersed across multiple levels.
Flow of information	Vertical	Open and free
Ideal for	Small size organization	Large size organization
Decision-making speed	Comparatively slow	Significantly faster
People involved	Few handpicked people at top level are involved in the decision-making process.	A higher number of people from each level are involved in the decision-making process.
Burden	Only one group share burden	Shared among many levels

Difference between Delegation and Decentralization:

Basis of Difference	Delegation	Decentralisation
Nature	It takes between superior and subordinate.	It takes between top level to middle level to lower level.
Control	The delegator controls it.	The control lies with the concerned department.
Responsibility	Delegator takes the responsibility and also accountable for the task.	The responsibility is fixed at the departmental level.
Relationship	Creates better superior-subordinate relationship.	Helps in the creation of semi-autonomous units.

IN-TEXT QUESTIONS

17. Which of the following statement is TRUE or FALSE?
    a) Decentralised authority requires centralised control.
    b) Decentralisation places decision-making authority, responsibility and accountability to the place where the action takes place.
    c) Decentralisation allows the top management to concentrate on their important job.
    d) Centralisation and decentralisation is a matter of degree.
18. Fill in the blank:
    a) If all the decisions are made by a select few people, it is known as ……….
    b) If all decisions are pushed down to the level closest to the problems, it is known as…….
    c) Centralisation refers the degree to which decision-making takes place at ……
    d) Decentralisation refers the degree to which lower-level managers actually ……decision.

5.6 SUMMARY

The success of any organisation depends on how managers translate organisation goals into tangible achievable goals. For which managers has not only to sketch plans but also to arrange required sources in terms of human, physical and financial and establish fruitful relationship among them for the achievement of set goals. There are many elements of organising which one has to consider while organising an enterprise. The first element of organising is work specialisation which refers to dividing work activities into separate job tasks. The second element is departmentalisation, it means how job is grouped together. It can be of five types such as functional, product, customer, geographical or process. The third element is authority and responsibility. This helps in getting work done in an enterprise. The fourth element is span of control which refers to the number of employees a manager can handle efficiently and effectively. The fifth element is centralisation and decentralisation which deals with where the majority of decisions are made and depends upon the degree of delegation of authority.

5.7 GLOSSARY

Authority The rights inherent in a managerial position to tell people what to do and to expect them to do it.
Centralisation The degree to which decision making is concentrated at upper levels of the organisation.
Chain of command The line of authority extending from upper organisational levels to the lowest levels, which clarifies who reports to whom.
Conflict Perceived incompatible differences that result in interference or opposition.
Centralization The degrees to which lower-level employees provide input or actually make decisions.
Departmentalisation The basis by which jobs are grouped together.
Divisional Structure An organisational structure made up of separate semiautonomous units or divisions.
Formalisation How standardization an organisation's jobs are and the extent to which employee behaviour is guided by rules and procedures.
Functional Structure An organisational design that groups together similar or related occupational specialities.
Goals (objectives) Desired outcomes or target

Line Authority Authority that entitles a manager to direct the work of a employee.
Matrix structure An organisational structure that assigns specialists from different functional departments to work on one or more projects.
Organisation A deliberate arrangement of people to accomplish some specific purpose.
Organisational Chart The visual representation of an organisation's structure.
Organisational Structure The formal arrangement of jobs within an organisation.
Organising Management function that involves arranging and structuring work to accomplish the organisational goals.
Performance The end result of an entity.
Project A one-time-only set of activities that has a definite beginning and ending point in time.
Resources An organisation's assets- including financial, physical, human, intangible, and structural/cultural – that are used to develop, manufacture, and deliver products to its customers.
Span of Control The number of employees a manager can efficiently and effectively manage.
Unity of Command The management principle that each person should report to only one manager.

5.8 ANSWERS TO IN-TEXT QUESTIONS

Q1. Q2.	All true b, e, a. c and d
Q3.	1 (a) ; 2 (b) ; 3 (c)
Q4.	All True
Q5. Q6.	All true a) line; b) staff; c) line; d) top, bottom
Q7. Q8.	All true a) Departmentalisation, b) administration
Q9. Q10.	1 (a); 2 (b); 3 (c); 4 (d) All true
Q11. Q12. Q13.	1 (a); 2 (b); 3 (c); 4 (d) (a) top , lower; (b) Superior; (c) cannot be A) True; b) False; c) True
Q14. Q15. Q16.	All true. a) Delegation of authority); b) people ; job; c) confidence b); c) and a)
Q17. Q18.	All True a) centralisation; b) decentralisation, c) upper level, d) make

5.9 SELF-ASSESSMENT QUESTIONS

A. Very Short Answer Questions:
   a) Define the term Organising.
   b) Explain the meaning of authority
   c) Explain the meaning of responsibility.
   d) Explain the meaning of accountability
   e) Define the term delegation.
   f) Define Span of Control.
   g) What is departmentation.
   h) Give the meaning of Centralisation.
   i) Give the meaning of Decentralisation.
   j) Explain the concept of Line and Staff.

B. Short Answer Questions
   a) Mention the different steps of organizing.
   b) What is functional authority? How is it different from line authority?
   c) State the different elements of delegation.
   d) Differential between delegation and decentralisation.
   e) Differential between wider and narrow span of control.
   f) Discuss the relationship between line and staff.

C. Long Answer Questions
   a) Describe the steps in the organising process
   b) Describe the causes of conflict between line manager and staff and give suggestions to overcome.
   c) Describe the principles of organising.
   d) Describe the principles of delegation.
   e) Describe the difference between the functional and divisional forms of departmentation.

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LESSON 6
DIRECTING

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STRUCTURE

6.7 Learning Objectives
6.8 Introduction
6.9 Meaning
  6.3.1 Features of Directing
  6.3.2 Importance of Directing
6.10 Principles of Directing
6.11 Elements of Direction
  6.5.1. Supervision
  6.5.2. Importance of Supervisory Role
6.7 Motivation
  6.6.1. Features of Motivation
  6.6.2. Process of Motivation
  6.6.3. Significance of Motivation
6.8 Leadership
  6.8.1 Features of Directing Features of Leadership
  6.8.2 Importance of Leadership
6.9 Communication
  6.9.1 Significance of Communication
  6.9.2 Types of Communication
  6.9.3 Barriers to Communication
  6.9.4 Improving Communication Effectiveness
6.10 Summary
6.11 Glossary

6.1. LEARNING OBJECTIVES

After completing this lesson, you will be able to:

- define the meaning and significance of directing function;
- identify the elements of directing;
- explain the meaning and features of Supervision, Motivation and Leadership;
- describe the attributes of an effective leader
- discuss formal and informal communications in the organisations;
- identify numerous obstacles to effective communications and organisational strategies to overcome these obstacles.

6.2 INTRODUCTION

In the previous chapter, you have learnt about the nature of organising function, departmentation, delegation, and decentralization. The next essential function of a manager is to give direction. It is the heart of the management process. It involves communicating with subordinates, giving them direction, and motivating them to do the best they can to help the organisation reach its goals. In this chapter, you'll learn what directing function is, why it's important, and what its main principles and elements are.

Managers who are capable of leading others have always been valued by business organisations. A manager must use a variety of methods to lead, motivate, and inspire subordinates, as well as communicate effectively with them. These methods, which are discussed in this chapter, are referred to as the directing function of management.
Directing aids in the creation of an appropriate work environment that allows for the efficient

execution of duties. It is directing that initiates action. Other functions only generate preconditions. Directing is concerned with directing human efforts toward organisational goals and is related to dealing with human elements. The quality of leadership determines whether the organization's performance is satisfactory or not.

CARROT WITH NO STICKS - Opening Case

The company known as ABC Ltd. sells various consumer goods. It has 100 workers and 10 operative managers who advise and support the workers when they operate the machines. The workers make up the majority of the company's workforce. The organisation has a policy that allows employees to take time off according to their individual requirements. Workers are typically given time off for vacations, holidays, and other special occasions. Recent attendance at a certain event's festival resulted in a huge order for it. The management insists for staff work overtime, despite the fact that they are anxious to take Puja holidays. This situation was brought to the attention of the Personnel Manager, who arranged for a meeting of operative managers and employees in order to inform them of the modifications that have been made to the incentive plan. These modifications stipulate payment of double earnings for working overtime and triple wages for working on holidays. In addition, the incentive plan will continue to reward employees with a bonus if they work on holidays. Employees were able to increase their earnings by working extra and on holidays when they were not required to do so, thus they voluntarily took fewer vacation days. The Personnel Manager was entrusted with presenting an update on the company's management's attempts to enhance output while avoiding conflict with employees during a meeting of the Board of Directors. This task required the Manager to provide the information during the meeting. "I merely utilised a carrot with no sticks approach," the Personnel Personnel Manager said in response.

6.3 MEANING

Generally, directing implies delivering directions and leading someone in their task. There are several examples of direction in our daily lives, such as a shopkeeper directing his employees to accomplish particular tasks for the organisation of a function, a lecturer instructing his student to complete an assignment, etc. In each of these instances, we can observe that directing is performed to attain a predefined goal. Concerning the management of an organisation, the term "directing" refers to the "process of instructing, guiding, counselling, motivating, and leading individuals within the organisation toward the accomplishment of the organization's goals".

According to Ernest Dale, "Direction is telling people what to do and seeing that they do it to the best of their ability. It includes making assignments, corresponding procedures, seeing that mistakes are corrected, providing on-the-job instruction and, of course, issuing orders." Direction entails communicating with subordinates, offering leadership, and motivating people to participate to the best of their abilities in the fulfillment of organisational goals. It includes all the actions a manager does to influence and motivate subordinates to achieve the desired performance.

As a continuing process, direction includes:

i. Issuing directions that are explicit, comprehensive, and within subordinates' capabilities
ii. Instructing and training subordinates to carry out their responsibilities in the current situation
iii. Motivating subordinates to attempt to achieve the manager's objectives; and
iv. Maintaining discipline and rewarding those who perform effectively.

6.3.1 Features of Directing

The main characteristics of directing are discussed below:

i. **Generates action:** Directing is a fundamental managerial role. A manager must do this job in addition to planning, organising, staffing, and controlling in order to fulfill his responsibilities inside the organisation. While other organisational roles prepare the environment for action, directing results in action.

ii. **Pervasive function**: Every management, from the most senior executive to the lowest-level supervisor, is responsible for directing. Wherever there are superior-subordinate relationships, there is direction.

iii. **Continuous activity**: Directing occurs throughout the organization's existence, regardless of who holds managerial positions. In organisations such as Reliance, Apple, Infosys, and Tata, managers may come and go, but the directing function process prevails, as the organization's activities cannot continue without direction.

iv. **Flows from top-bottom**: Direction flows from the top down. It means any manager can lead and be led by his direct supervisor.

v. **Focus on performance**: Direction is a creative function that produces results. It transforms plans into actions. Direction is a function focused on performance that assures the continuity of activities. Effective leadership facilitates the attainment of group objectives at the lowest possible cost.

ACTIVITY

You have the responsibility, as a director of a multinational corporation, to organise a gathering of customers for the following Monday. Create a list of the directions that will be given to the people under your supervision.

6.3.2 Importance of Directing:

Direction is an essential managerial role. In the absence of guidance, subordinates may not perceive the organization's objectives. It must be clear to subordinates what the organization's goals are, how they should achieve them, etc. In addition, the direction is directly related to people, thus it must be executed properly to get the intended outcome.

The significance of direction can be summarised as follows:

- It directs subordinates to complete tasks correctly and on time.
- It instructs subordinates on how to complete the assigned assignment effectively and on schedule.
- It is useful for upholding discipline and providing incentives for those who perform brilliantly.
- The act of supervising work is a crucial component of directing, as it is necessary to ensure that tasks are carried out in accordance with orders and guidelines.
- In the organisation, various individuals do separate things. All of the activities fit together. It is important to direct in order to make sure that activities done in different parts are coordinated and done well. So, it helps to connect the different activities and, by extension, the individual goals with the goals of the organisation.
- Leadership is a part of directing, which helps create a good work environment and build up team spirit.

6.4 Principles of Direction

- **Synchronization of goals**: Every individual working in the organization has his/her own goals. Individual goals should be synched with the goals of the organisation. Direction should be set up so that people can combine their own goals with those of the organisation.
- **Maximum individual contribution**: Every member's input is vital to the organization's growth. Management should employ a directing strategy that maximizes member contribution. One supervisor should provide orders to an employee. If not, there will be indiscipline, confusion, and disorder.
- **Efficiency**: Subordinates should participate in decision-making for efficiency and commitment. This will boost subordinates' efficiency and decision-making.
- **Direct supervision**: Managers should supervise directly. Directing subordinates successfully requires face-to-face communication and personal touch.

- **Feedback**: Direction doesn't end with commands and instructions. Subordinates' suggestions help management evolve. Feedback systems give management reliable ideas.
- **Effective communication**: The superior must ensure subordinates understand plans, policies, and obligations.
- **Appropriateness of direction method**: The management can use one of three ways to give directions. They are authoritative, consultative, and free rein but the selection of direction method is contingent on the situation.
- **Effective control**: To control subordinates effectively, management should keep an eye on how they act and how well they do their jobs. Effective control ensures effective direction.
- **Comprehension:** How well subordinates understand orders is more important than what orders they are given and how they are given. This is very helpful for showing subordinates the right way to do things.
- **Follow-up**: Direction is a process that never stops. It's not enough to just give orders or instructions. We need to know what to do. So, the management should keep an eye on whether or not the subordinates follow orders and whether or not they find it hard to do so.

6.5 Elements of Direction

Directing entails coaching, training, encouraging, and leading people to achieve organisational goals. For instance:

- A manager tells an employee how to use a machine tool.
- A mining engineer discusses safety rules that workers in a coal mine should follow.
- A manager motivates his or her staff by taking the lead in doing a job.

All of these instances can be classified into four aspects of directing, which are as follows:

- Supervision
- Motivation
- Leadership
- Communication

To gain a deeper understanding of directing, these aspects of directing are explained in depth.

6.5.1 Supervision

Two distinct meanings can be attached to the word "supervision." In the first place, it may be seen as a component of directing, and in the second place, it can be understood as a role that is carried out by supervisors in the organisational hierarchy. Since supervision is a component of directing,

IN-TEXT QUESTIONS

1. Which of the following statements are True and which are False?
    a. Directing simply means telling other people what to do.
    b. Rewarding people who perform well is a part of the directing function of a manager.
2. Complete the following incomplete words by taking clues from the statements given for each. Every blank represents one letter only.
    a) D_____E___T_____G
    b) ___E A_____R_____I P
    c) M___T___V_____I O ___
    d) S U_____R_____S___O ___

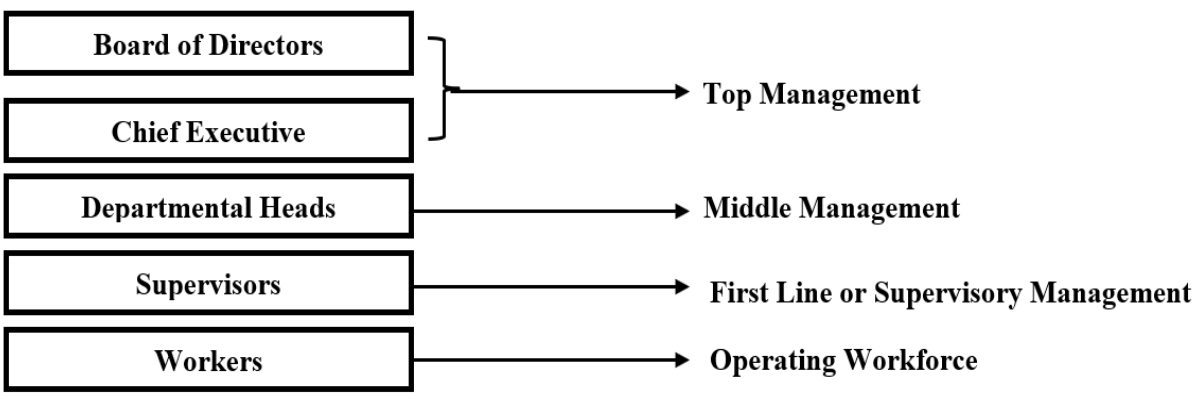
Clues

a) It guides and helps the subordinates to complete the given task properly and as per schedule.
b) It helps in creating an appropriate work environment and building up team spirit.
c) It makes sure that work is performed according to the orders and instructions.
d) It ensures that work is done according to orders and instructions for each.

every manager in the organisation is responsible for supervising his or her employees. When viewed in this light, supervision can be understood to be the process of leading the efforts of employees and other resources to meet the planned goals. It entails keeping an eye on what subordinates are working on, and providing them with instructions to ensure that the available resources are utilised effectively to achieve work goals. Furthermore, supervision can also be interpreted as the function of a supervisor, a managerial position above the worker in the organization's hierarchy. The supervisor's functions and performance are crucial to any organisation since he works directly with workers, whereas other managers don't.

Managers at all levels supervise subordinates' work. Middle-level managers supervise first-line supervisors under top management. First-line managers communicate directly with operatives. All layers of management supervise their direct reports. First-line supervisors supervise basic operations staff. Figure 13.1 depicts first-line managers as supervisors.

Figure 1: Position of Supervisor in the management hierarchy



Supervisors oversee divisions and their personnel. He's responsible for production quantity and quality, equipment performance, and subordinates' productivity. A supervisor's authority comes from the departmental manager's improved work performance. He gives orders, directs their operations, and reports on their performance to departmental managers. Leadership, counselling, and communication are key to effective supervision.

IN-TEXT QUESTIONS – 6.5.1

3. Supervision is a ……………………….of the directing function.
4. Supervisors may also be required to undertake ....duties besides the prescribed supervisory functions.
5. Issuing instructions, providing guidance, leadership and motivation are known as.........................responsibilities of supervisors.

CASE STUDY

Anurag is now working as a manager in a medical facility. It has not escaped his attention that the people who provide support are not operating at their full potential. They have developed a callous attitude toward it as a result of a continuing disagreement with management regarding pay rates. The workforce has become unmotivated and actively seeks to avoid work. In addition, there are various differences amongst the employees themselves. In order to stimulate them, he begins to provide them with praise and encouragement, resulting in a gradual improvement in their work performance.

Q1: Please describe the contentious issue at hand in this instance.

Q2: If you were in Anurag's position, what action would you have taken and why?

6.5.2 Importance of Supervisory Role:

A supervisor's responsibilities should show his relevance in the organisational setup. He is a critical link between upper-level management and workers, as he is in frequent contact with them. He explains management policies to workers and acts as a communication bridge with senior management.

The supervisor is responsible for completing operational-level tasks. Based on his influence on the work environment and his humane approach to employee concerns, the supervisor can help significantly to ensure the cooperation and support of workers. Otherwise, even the most effective organisational designs may be of little benefit. In fact, if supervision is inadequate, the policies and efforts of the executive team may be wasted. The supervisor's role is crucial. He delivers management's thoughts, goals, and attitudes to workers and vice versa. He must fulfil organizational and employee needs.

6.6 MOTIVATION

Motivation is the stimulation or induction to act or move. With respect to the organisational setup, it refers to the procedure of influencing employees to perform in a particular way in order to achieve certain organisational objectives. Motive, motivation, and motivators are three interrelated terms that must be understood while addressing motivation. Let us attempt to understand these terms:

- Motive: Motivation is an interior condition that infuses, motivates, and leads behaviour towards goals. Individuals' needs inspire their motivations. Realization of a motive induces unease in a person, prompting them to take action to alleviate this unease. For instance, hunger is caused by the demand for food, on account of which a man looks for food.
- Motivation: Motivation stimulates action to achieve goals. People's needs drive motivation.
- Motivators: A motivator is an organisational strategy used to motivate employees. Managers use a variety of motivators, such as salary, reward, promotion, and responsibility, to inspire employees to contribute their best in the workplace.

6.6.1 Features of Motivation:

The following are the features of motivation:

- Motivation comes from inside. People act the way they do because of their internal urges, drives, desires, aspirations, goals, or needs. People may feel the need or want to have a motorbike, a nice house, or a good name in society, among other things. These urges come from inside a person.
- The result of motivation is goal-directed behaviour. For instance, a promotion may be granted to an employee to improve his performance. If an employee desires a promotion, it aids in producing performance-enhancing behaviour.
- Motivation can be positive or negative. Positive motivation leads to good things like pay raises, promotions, public praise, etc. Negative motivation uses things, like punishment, stopping raises, threats, etc., to get a person to act the way you want them to.
- Motivation is a complicated process because everyone has different expectations, ways of seeing things, and responses. Any kind of motivation might not work the same way for everyone.

6.6.2 Process of Motivation

The process of motivation is grounded on human needs. Below is a simple figure, Fig 2, for explaining the motivational process.

This example shows how human wants are met. Pradeep skipped breakfast and is starving. In the afternoon, he felt restless and began searching for a snack-and-meal establishment. After a few kilometres, he found a hotel, offering a meal for Rs. 20. Since he barely had Rs. 25, he spent Rs. 20 for dinner. He felt energised after eating. Unmet desire increases a person's drive. These motives cause searching to meet requirements. When a need is met, the tension eases.

6.6.3 Significance of Motivation:

In the case study cited above, the CEO of Stell Ltd. utilised Motivation, an aspect of the directing function of management, to effectively deal with the situation. While performing a task, two requirements must be met. Both the ability and willingness to work. Without willingness, the

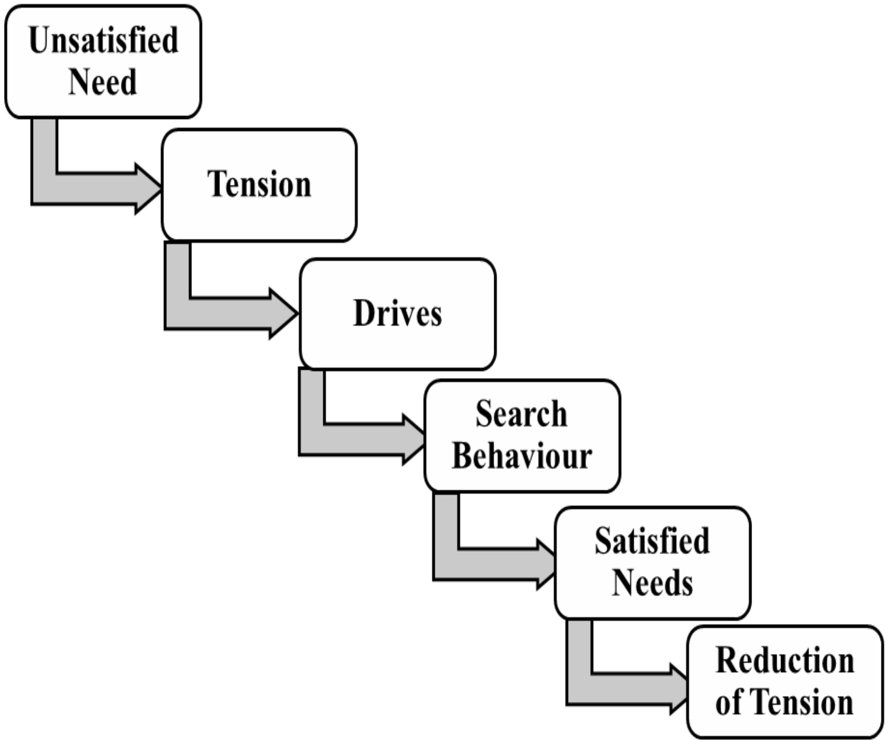


Fig 2: Process of Motivation

capacity to work cannot yield results. The significance of motivation resides in transforming this capability into a desire to work. Performance is dependent on both talent and willingness, and willingness is determined by motivation. Thus, motivation is a crucial factor in directing people to complete a task. Other benefits and relevance of motivation include:

- With the right motivation, production factors like people, money, materials, etc. can be used to their fullest;
- If employees are motivated, they will be less likely to quit or not show up for work;
- Motivation promotes in employees a sense of belonging to the organisation and also boosts their morale;
- People have fewer problems and complaints when they are motivated. The number of mistakes and waste also goes down, and with the right techniques for motivation, management can find and hire the best employees.

CASE STUDY

ABC company was in the business of providing services related to renewable energy. For the purpose of acquiring the company, the team leader and his colleagues would go to several states to provide presentations to potential customers. The policy of the company dictates that the team leader will fly, while the rest of his staff will go by either road or rail. In addition to being a time sink, it also required the female members of the team to occasionally venture out on their own. As a direct consequence of this, the subordinates were not performing the actions necessary to achieve the goals of the organisation. The Chief Executive Officer of the organisation became aware of the situation. After discussing the problem with the group leader over the phone, he reached the conclusion that the travel policy of the company should be modified. It was decided that in the future, all of the members, including the leader, would travel together and make constructive use of the time by discussing the next client presentation while they were in transit. This included the leader. This had a positive effect, as a result of which every member of the team started behaving in accordance with the expectations of the team leader.

1. Describe the qualities of the component of the management function that is used by the Chief Executive Officer.

6.7 LEADERSHIP

Leadership is the ability to persuade and motivate people to perform in the desired manner to achieve the objective, whereas motivation is the process by which individuals are induced to contribute willingly to work. Thus, a leader is a guy who can influence others and convince them to follow his directions. In one organisation, for instance, the management wishes to replace old machines that the employees oppose. However, one of the employees takes the initiative, explains to his coworkers the benefits of working with the new machines, and convinces them to accept the decision made by management. Now he is considered a leader since he can influence a group of workers who have followed him. In practice, managers must advise and direct their employees toward the attainment of objectives; therefore, to be effective, a manager must be an effective leader. Leadership is the process that encourages and inspires people to willingly achieve the organization's goals. The primary objective of managerial leadership is to secure the willing participation of the workgroup in pursuit of the set objectives.

6.7.1 Features of Leadership:

The features of leadership can be explained as follows:

- Leadership demonstrates influence over others
- Leadership endeavours to alter the behaviour of others.
- Leadership is characterized by interpersonal relationships between leaders and followers.
- Leadership is practised to attain the organization's shared objectives.
- Leadership is an ongoing procedure.

IN-TEXT QUESTIONS

6. _______ is the process of guiding the efforts of employees to accomplish the desired goal.
   a) Supervision
   b) Directing
   c) Controlling
   d) Motivating

7. The other members of Madhu's team look up to her as a positive example to follow. She is going to great lengths to ensure that her squad excels and claims the title of conference champion. Her intention to accomplish this objective can be described as:
   a) intrinsic motivation
   b) extrinsic motivation
   c) drive
   d) need

8. Motorcycle riding is something that Kevin takes a lot of pleasure in. It brings him a lot of satisfaction on a personal level. Which of the following factors contributed to his decision to pursue his passion for riding motorcycles?
   a) extrinsic motivation
   b) drive
   c) intrinsic motivation
   d) need

Leadership gives rise to the term leader. A leader is a person who possesses the characteristics of leadership. It is crucial to comprehend the leader-follower relationship when addressing leadership. Frequently, the success of an organization is credited to the leader, but the followers are not given their full credit. Numerous aspects of a person's relationship with his or her followers, such as their abilities, knowledge, commitment, readiness to cooperate, team spirit, etc., make them effective leaders. By accepting leadership, it is believed that followers make a person a
good leader. Both the leader and the follower play essential roles in the leadership process.

CASE STUDY

Ten years ago, Anjali was a district sales manager for ABC business firm. She was acknowledged by her peers and superiors as a department manager who performed admirably. Nonetheless, everyone understood that Anjali was exceedingly ambitious and was seeking a management job at a higher level. When one of her sales representatives performed well, she would seek to take credit herself. She believed that if an issue happened, it was not her fault. Upon the retirement of the marketing manager, Anjali applied for the role. When the search was complete, the decision was made to hire from outside the organisation. They believed that if she attempted to take credit for their work, she would anger the other managers, and as a result, their performance would suffer. Aarti got despondent as a result, and her job suffered. She began to submit her sales reports late. Despite the fact that her sales team remained productive. When the new marketing manager assumed her position, one of the first important challenges she faced was restoring Aarti's former performance level.

Q1. Identify one of the elements of one of the management functions that Anjali lacked in the preceding scenario.

Q2. Identify and explain the characteristics of the other part of the same function that the new manager can use to restore anjali's performance level.

6.7.2. Importance of Leadership:

The goals of an organization can only be attained if the people who work there are working toward those goals. To get people to work the way you want them to, you need to give them the right instructions and guidance. And this way of giving directions works well when the people giving the directions have leadership skills. Leadership is important because:

- Leadership boosts staff performance. Leaders can motivate followers and boost their performance.
- Leaders may enhance followers' trust through constant assistance and direction, enhancing speed, and accuracy, and reducing waste.

- A leader's friendly and cooperative efforts boost employee morale and productivity.

6.7.3. Leadership Qualities:

A successful leader needs particular traits. A good leader should be knowledgeable, analytical, critical, and fair-minded, with honesty, sincerity, integrity, and responsibility. He must be proactive, attentive, and honest. He must also interact well with subordinates. Leaders necessarily require human skills.

Previously, it was considered that a leader's success or effectiveness is contingent on his features or qualities, such as physical appearance, intelligence, self-confidence, alertness, and initiative. This method is no longer considered appropriate. Experiments have demonstrated that the success or effectiveness of a leader is contingent upon his behaviour pattern or leadership style concerning his followers. Managers must exert influence over their subordinates and seek their cooperation to accomplish tasks. If their leadership is not founded on appropriate behaviour or style, they will fail. When leaders involve followers in defining goals and fostering team spirit, there is a greater likelihood that followers will follow them voluntarily.

6.8 COMMUNICATION

Communication is a fundamental organizational activity that refers to the transmission of information or messages from one individual (the sender) to another (the receiver). In organizations, the objective of communication is to deliver orders, instructions, or information in order to influence the performance and/or attitude of the personnel. Supervisors provide information to subordinates within an organization. Effective communication yields clarity and the cooperation of subordinates.

Ineffective communication may result in misunderstandings between superiors and subordinates. The subordinates must comprehend the message conveyed accurately. Therefore, in communicating:

- sender and receiver are two parties;
- the sender sends the recipient a message; and
- the recipient receives and comprehends the message.

The direction of communication can be downwards (superior to subordinate) and can be upward (subordinate to superior). For instance, subordinates can provide the superior with information regarding difficulties on the assembly line. Thus, it is a two-way process.

IN-TEXT QUESTIONS –

9. ____________ is increasing Leadership rapidly:

A. Strategy
B. Command
C. Control
D. Getting others to follow

10. Following are certain statements about a good leader. Rectify if any statement is found to be wrong-

a) He is empathetic and listens to others.
b) He is competent thus, does everything alone.
c) He has to be very good-looking else people will not like him.
d) He likes to generate team spirit and works with the people as a team.

6.8.1 Significance of Communication:

Organizations typically refer to communication as their lifeline. The manager's interaction with subordinates affects his leadership. Effective communication at all levels can boost output quantity and quality. The following are a few benefits of communication:

- Clear communication helps employees perform well.
- It promotes coordination and mutual understanding, which boosts production and industrial harmony.
- Communication increases management and workforce cooperation.
- Effective communication helps shape attitudes and boost staff morale.

6.8.2 Types of Communication:

Within an organization, communication is possible from supervisor to subordinate,

subordinate to supervisor, and between supervisors at the same level. It is possible to communicate orally, in writing, and even through gestures. Communication can occur via formal or informal routes. Thus, the following are the various types of communication:

a) **Formal and Informal Communication**

A communication channel is where information flows. Formal and informal channels exist in every organization. Formal channels are management-established communication lines. For example, the General Manager may inform the Production Manager, who may then advise the Foremen.

Informal communication is based on social relationships among personnel. As friends, a production supervisor and accountant may share information. Due to member friendships, informal channels are mostly used.

IN-TEXT QUESTIONS –6.8

11. Name the parties involved in the process of communication.

12. Classify the following into various types of communication on the basis of channel, direction and mode of communication-

a) The General Manager seeking explanation from a supervisor for poor performance in his department.

b) The supervisor sending an explanation to the General Manager stating the performance of his department.

c) The sales assistants discussing with his friend regarding customers' behaviour.

d) A boss frowning at his subordinate for a job done wrongly.

b) Upward, Downward, Horizontal and Diagonal Communication

Organizational communication can flow upstream, downward, horizontally, or diagonally. When employees request, appeal, report, recommend or transmit ideas to a supervisor, communication flows upward, from bottom to top. When a typist submits a suggestion or a foreman reports a machine problem, communication flows upward. Upward communication fosters employee participation in department operations. Downward communication is communication from supervisors to subordinates. Downward communication is when superiors provide directions to subordinates. Communication flows downstream when the General Manager orders supervisors to work overtime. Bulletin boards, memos, reports, speeches, and meetings are all kinds of downward communication. Diagonal communication is when persons in different departments or organizational levels communicate. For distribution cost analysis, a cost accountant may request sales representative reports, not the sales manager. This communication is rare.

c) **Verbal and Non-verbal Communication**

Verbal or nonverbal communication depends on the medium of communication. Managers can communicate with subordinates face-to-face, by phone, or by letters, notes, or memos. These all are examples of verbal. Oral and written verbal modes exist. Oral communication includes interviews, meetings, and seminars. Oral communication includes phone orders and intercom directions. Letters, circulars, notices, and memos are written communications. Facial expressions and body language sometimes support verbal communication. For instance, waving, smiling, frowning, etc. These are known as gesture-based communication.

6.8.3. Barriers to Communication:

Communication failures or barriers cause many challenges for managers. These obstacles may prohibit or filter communication or carry wrong meanings, causing misunderstandings. Management must identify and overcome such barriers. Semantic, psychological, organizational, and personal barriers hinder organization-wide communication.

Below are some:

a) **Semantic barriers:** Semantics examines word and sentence meaning. Semantic barriers are difficulties and barriers in message encoding and decoding. Incorrect language, bad translations, conflicting interpretations, etc. sometimes cause such hurdles. These are discussed below:

- *Poorly articulated message:* Subordinates may misinterpret the manager's intention of communication. These poorly stated messages may be the result of an insufficient vocabulary, the use of incorrect words, the omission of necessary terms, etc.
- *Symbols with different meanings:* A single word may have multiple meanings. The recipient must recognize the meaning of the word used by the communicator. Consider the following three statements where the word "value" is used: (a) "What is this ring's value?" (b) "I value our friendship." (c) "What is the value of learning computer skills?" You will discover that the term

'value' has distinct meanings in various settings.

- *Faulty translations:* Sometimes, English-written communications must be translated for workers into some other language (e.g., Hindi). If the translator isn't fluent in both languages, inaccuracies may result in misunderstandings.
- *Unresolved assumptions:* Some messages may have ambiguous assumptions. A boss may say, "Take care of our guest." It might be possible that the boss wants a subordinate to handle guests' transportation, food, and lodging till he goes. The subordinate may interpret "carefully escort the guest to hotel". In actuality, the guest is harmed by these unclear assumptions.
- *Technical jargon:* It is common for professionals to employ technical jargon when communicating with individuals who are not experts in the topic. Consequently, individuals may not comprehend the real essence of many of these terms.
- *Body language and gesture decoding:* Every gesture has meaning. Body language and gestures are important in communicating. If words and body language don't match, messages may be misinterpreted.

b) ***Psychological barriers:*** Communication is also hindered because of emotional or psychological reasons. For instance, an anxious person cannot communicate effectively, and an angry recipient cannot comprehend the true meaning of communication. The state of mind of both the sender and the recipient influences the effectiveness of communication. Some of the psychological obstacles include:

- *Premature evaluation*: people analyze a message's meaning before the sender finishes. A premature evaluation may be related to prejudices and biases against the message.
- *Inattentive towards communication:* Pre-occupied minds and non-listening messages operate as psychological barriers. E.g.: An employee communicates his difficulties to a manager who's busy with a file. The supervisor misses the point, and the employee is upset.
- *Loss by transmission and poor retention:* When communication goes through multiple levels, successive transmissions result in the loss of information or delivery of erroneous data. This is especially true for verbal communication. Insufficient retention is another issue. If a person is inattentive or uninterested, they are unlikely to remember the knowledge for a long period.
- *Distrust:* Communication is hindered by mistrust. If parties don't trust one another,

they can't grasp each other's messages.

c) **Organizational barriers:** Organizational structure, power relationships, and rules and regulations can sometimes make it hard for people to talk to each other effectively. Some of these obstacles include:

- *Organizational policy*: If the organization's express or tacit policy doesn't allow free communication, it may hinder efficacy. For instance, in a centralized organization, open communication may not be fostered.
- *Norms and Procedures:* Rigid rules and complicated procedures can make it hard to talk to each other. In the same way, delays can happen when people talk through the channels that have been set up.
- *Status:* Superior status can alienate superiors from subordinates. A superior who is conscious of his position, may not let subordinates express themselves freely.
- *Complexity in organization structure:* As the number of filtering points increases in an organization with multiple layers of management, communication becomes delayed and distorted.
- *Organizational facilities:* Communications may be hampered without smooth, clear, and timely facilities. Frequent meetings, suggestion boxes, complaint boxes, social and cultural gatherings, transparency in operations, etc. foster communication. Insufficient facilities can hinder communication.

d) ***Personal barriers:*** Both sender and receiver's personalities can affect communication. Some superior and subordinate personal barriers are:

- *The challenge to authority:* If a supervisor believes communication will undermine his authority, he or she may withhold it.
- *Lack of confidence of superior in his subordinates:* Superiors may not seek subordinates' advice or opinions if they don't trust them.
- *Unwillingness to communicate:* It is forbidden for subordinates to interact with their superiors if they consider that doing so will be detrimental to their interests.
- *Lack of appropriate incentives:* Without motivation or incentive, subordinates may not communicate. If subordinates aren't rewarded for good suggestions, they may not offer them.

6.8.4 Improving Communication Effectiveness:

In many organisations, there are challenges to effective communication to varying degrees. Organizations interested in developing efficient communication should take the required efforts to overcome hurdles and improve communication efficiency. Several of these measures are detailed below:

- *Clarify the concepts before communication:* The problem to be addressed to subordinates should be crystal clear to the executive in its entirety. The entire situation should be thoroughly examined, analysed, and concisely communicated to subordinates.
- *Communicate as per tailor-made requirements:* The communicator should know the receiver's knowledge level. Managers should communicate based on subordinates' education and understanding.
- *Seek opinions before communicating:* Before presenting the message, create a communication strategy with others. Engaging subordinates might help win their acceptance and cooperation.
- *Pay attention to the words, tone, and content:* Effective communication involves message content, tone, language, and delivery. Language should be understandable and not offend listeners. The message needs to be engaging for those who are listening to it.
- *Transmit information that is beneficial to and valuable to the audience:* When communicating with others recognise their interests and needs.
- *Ensure proper feedback:* Communicators can ensure message success by asking questions. Encourage the recipient to respond to messages. Feedback can make communication more responsive.
- *Communicate for the present as well as the future:* Communication is essential not only to fulfil already-established commitments and ensure continuity but also to advance the long-term objectives of the firm.
- *Follow-up communications:* Instructions issued to subordinates should be regularly reviewed and followed up on. Such procedures assist in removing potential obstacles to the implementation of the instructions.
- *Be a good listener:* An efficient manager listens. Listening carefully fixes half the issues. Managers should listen to their subordinates.

6.9 SUMMARY

To get things done, supervisors have to guide, inspire, and lead the people who work for them to reach the same goals. So that they can do this, managers need to give orders and instructions related to the job, keep an eye on their subordinates at work, and keep them motivated. This is what a manager does when he or she is "directing." So, directing is about “instructing, guiding, and motivating people in an organisation to help it reach its goals, through effective communication, supervision, motivation, and leadership.”

Communication is the transmission of information or message. The method helps leaders issue orders and instructions to subordinates. It helps employees understand policies, procedures, and decisions.

The direction of the communication might be either upward or downward. It can be both formal and informal. When communication occurs between managers of the same level, it is referred to as horizontal communication. Diagonal communication is communication between individuals who are neither in the same department nor at the same level of the organisational hierarchy. Communication may be vocal, written, or even nonverbal, such as through gestures.

Supervision entails ensuring that subordinates execute tasks in accordance with provided instructions. The supervisors make sure that all of the employees understand the instructions and direct them to work together as a team. Even if there is a need for supervision at each successive level of management, it is of the utmost importance at the entry-level position. At this level, supervisors engage in one-on-one communication with their staff members. They serve as an avenue between upper-level management and workers.

Inspiring workers is another directing function. This is known as motivation. Motivation involves fulfilling wants and desires to inspire people to work hard. People's needs vary. Most people have physiological, safety, social, ego, and self-actualization requirements. No single method motivates everyone. Managers must determine employees' unmet needs and motivate them accordingly. Managers benefit from employees' motivation. Motivated staff will fully use organisational facilities and work hard.

A manager must be an effective leader to get things done. Leadership is the capacity to influence people to operate in accordance with one's desires. Thus, a leader is someone who can persuade others to follow his directions voluntarily. Certain attributes, such as professional skill, intelligence, the capacity to analyse, honesty, sincerity, and integrity, are essential for leadership.

6.10 GLOSSARY

Communication: Circulation of information throughout the various levels of an organization.

Delegation: Delegation is allocating work to subordinates and providing them with the authority to do so.
Direction: Providing advice to others while monitoring their performance to ensure they are meeting expectations.
Leadership: A process of influencing the actions of a group of people towards the accomplishment of specific objectives.
Motivation: The process of inspiring individuals to work together and provide their best efforts to achieve the objectives of an organisation.
Order: A key instrument of directing that is utilised to initiate, direct, modify, and ultimately conclude the execution of various tasks.
Supervisor: A person who is responsible for delegating work to subordinates as well as monitoring those subordinates' actions and performance.

6.11 ANSWERS TO IN-TEXT QUESTIONS

1. a. False, b. True
2. Directing, Leadership, Motivation, Supervision
3. Sub – function
4. non-supervisory
5. prescribed
6. Motivating
7. Extrinsic motivation
8. Intrinsic motivation
9. Getting others to follow

10. (a) Correct, (b) He is competent but cannot do things alone, (c) Need not necessarily be good-looking, (d) Correct
12. (a) Formal, Downward, Verbal, (b) Formal, Upward, Verbal (c) Informal, Horizontal, Verbal, (d) Informal, Downward, Non-verbal

6.12 SELF-ASSESSMENT QUESTIONS

1. Describe the essential elements of the managerial function of directing.
2. What is communication? Explain how communication is an important element of

directing functions of management.

3. What is meant by the term supervision in management? Explain briefly the functions of a supervisor.
4. Explain the term leadership and state the qualities of a good leader.
5. In an organisation, all the employees take things easy and are free to approach anyone for minor queries and problems. This has resulted in everyone taking to each other and thus resulting in inefficiency in the office. It has also resulted in the loss of secrecy and confidential information being leaked out. What system do you think the manager should adopt to improve communication?
6. "Leadership is considered as the most important element of the directing function of management". In light of this statement, explain the importance of leadership.

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LESSON 7

CONTROLLING AND CONTEMPORARY ISSUES

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STRUCTURE

7.1 LEARNING OBJECTIVES

The lesson's objective is to understand the role of controlling function in an organization. After completion of this lesson, you will be able to understand the following:

- Concept of control, its nature, its type and processes
- Importance of control and its essential requirements
- Characteristics of a robust control system in the organisation.
- Different techniques are available for controlling an organisation.
- The behavioural implications of the control.
- Difference between control, coordination and cooperation
- Contemporary issues

7.2 INTRODUCTION

We have studied the essential functions of management in the previous lessons, like planning, decision-making, organizing, and directing. The organization's management sets objectives and plans strategies to reach those goals. Build the organizational structure, hires people, train them and direct them to perform their respective jobs and expect the results as good performance. Nevertheless, how do the managers know that work is going in the right direction and will meet the goals? How do they know they created the right plan or strategies or hired people for the right job? How will they ensure that there are no deviations and how to fix those deviations, if any?

7.3 CONTROLLING AS CONCEPT

Things can go out of hand in the business environment if not controlled. The process of monitoring, measuring, analyzing, and fixing the deviation is called controlling.

As per Koontz & O'Donnell, "*Controlling is the process of measuring and correcting the activities to carry them according to the set plan and established standards to ensure the performance*". We control the tasks, people, finances, methods, processes, wastage, and over cost.

It is an economic instinct of an organization. In Controlling, we compare the observed results with pre-decided expected results, analyze the gap, and find a solution to fulfil the gap and achieve the target. In other words, controlling is the process of monitoring, measuring performance, analyzing, and taking corrective actions if required to keep the project on track. It provides accurate and reliable information about the problems and issues to ensure transparency in the system and enable the manager to make targeted decisions.

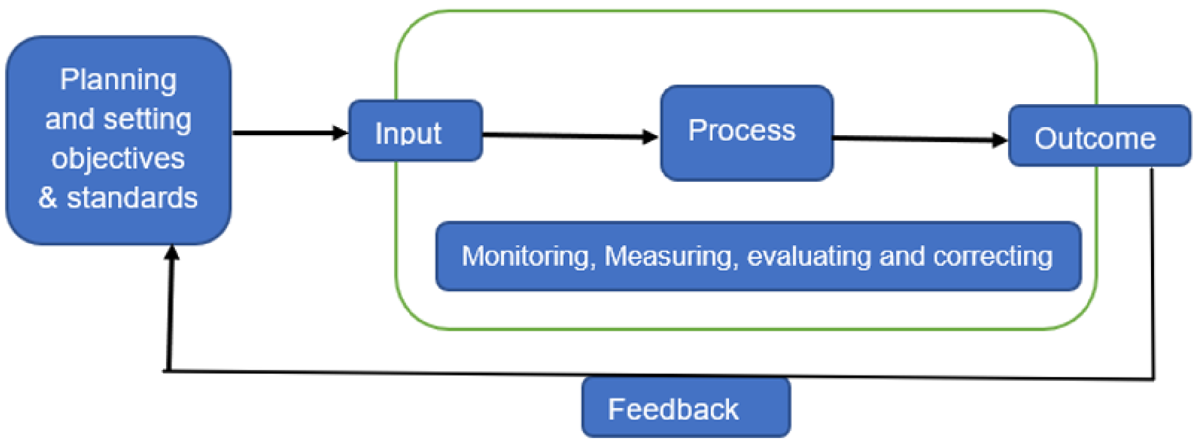


Figure 2 Controlling

Earlier it used to be considered past-oriented, which could only correct mistakes. It's acceptable for use in financial accounting and performance control. However, the concept widens over a long period and is broadly used in decision-making, information management, planning, and coordination. The internet and information technology outbreak is vital in enlarging its acceptance to new dimensions.

CASE STUDY

Delhi metro rail corporation (DMRC) in the National capital region of Delhi revolutionize the mass transportation system in India. It was registered on 3rd May 1995 under the companies act 1956 with equal equity participation of the Government of the National Capital Territory of Delhi (GNCTD) and the Central Government of India. Presently, Delhi metro network consists of 390.14 Km with 286 stations. It is the life of Delhi and NCR. It was started on 25th December 2002. Million people travel daily through it. Recently, DMRC experienced a line service disruption on 5th October 2022 during peak rush office hours in the morning, affecting thousands of passengers. What went wrong? As per the officials, a portion of a catenary wire (part of the overhead equipment) got damaged and broke in the section between Akshardham and Mayur Vihar Phase I Metro stations, impacted the blue line for three hours. Train operations were regulated as a team was sent to control and fix the damages in the minimum period. During this period, regular train services were maintained at other stations by creating different train loops at each extreme as work was to fix the damaged catenary wire in the section the down the line. The train services resumed after three hours at 10:15 am. To inform passengers about the glitch and the regulation of trains, regular announcements were made at all stations and on trains on the Blue Line. DMRC managed to resolve the technical problem very quickly, restoring the fine-tuned system and ensuring the safety of passengers. It also maintained the regular services at other stations effectively and not let affecting the entire line. With the help of a robust controlling system, DMRC is able to reduce the damages. The deviations are inevitable no matter how strong the controlling system is, the organisation should aim to control and minimize them, create a robust system first to identify the deviations, and a system to repair in lesser possible time without affecting the entire system. The necessity of controlling is fiercer in modern organisations. High volatility in the system and the ever-changing environments make controlling functions essential to support management. Controlling helps management to face these challenges with innovative solutions. Now think or discuss with your friends and try to answer.

1. Whether a prior maintenance check could prevent this damage to the catenary wire?
2. What is the different course of action taken by DMRC to handle the situations?

7.3.1 TYPES OF CONTROL

Feedforward control: It is future-oriented. It anticipates the problems beforehand and implements control before the activity starts. In other words, it is proactive. It is the most desirable by managers and hard to achieve. The scheduled preventive maintenance measures taken by the Indian railway and Indian aviation industries are the best examples of feedforward control. Those measures correct any structural damage or parts and prevent any mishap.

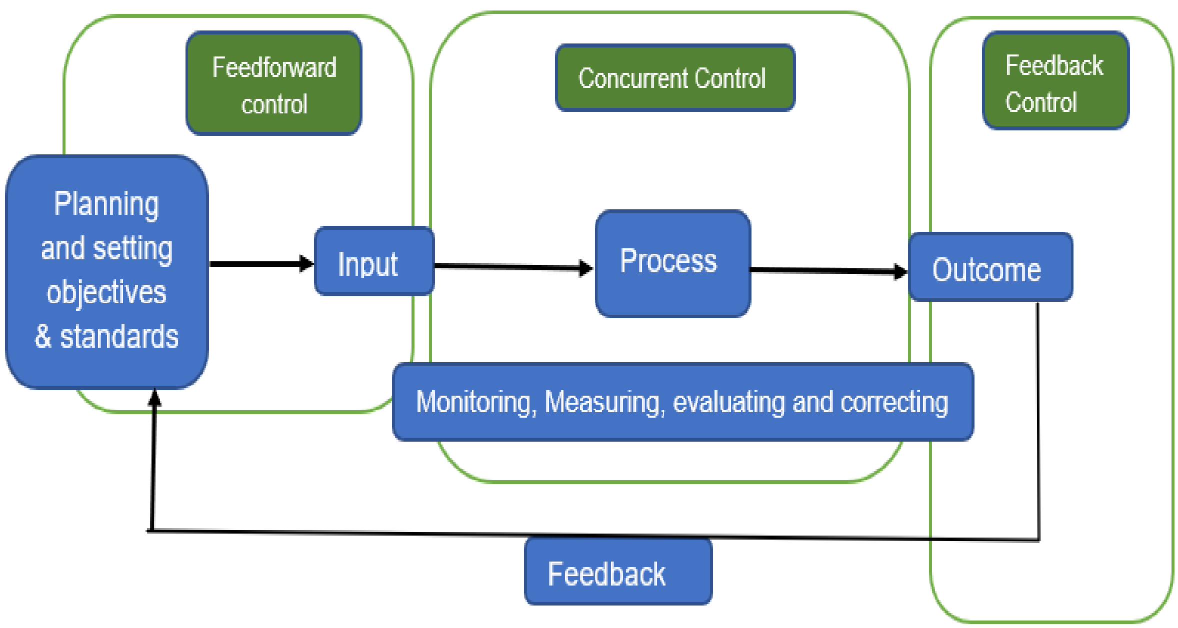


Figure 3 Types of Control

Concurrent control: It is present-oriented; the controlling takes place during an activity in progress. Monitoring, measuring, analyzing and correction all take place during the activity. It requires the direct involvement of management within the process. The control department of Indian railways provides accurate real-time information on tracks and routes to the drivers.

Feedback control: It is past-oriented and reactive. This control system depends on the feedback after the activity is completed. It implements corrective actions based on past performances. The major problem with this control is that managers have the information after the damage is done. Feedback control is widely used and provides an organization with an upward experiential learning curve. It also motivates employees, as they always want to know how well they performed and how they can improve further. A virus attack on the website of a big tech organization blocks access to the website, and management resolves these issues after they occur; it is called feedback controlling.

It is always advisable to implement all three types of control simultaneously.

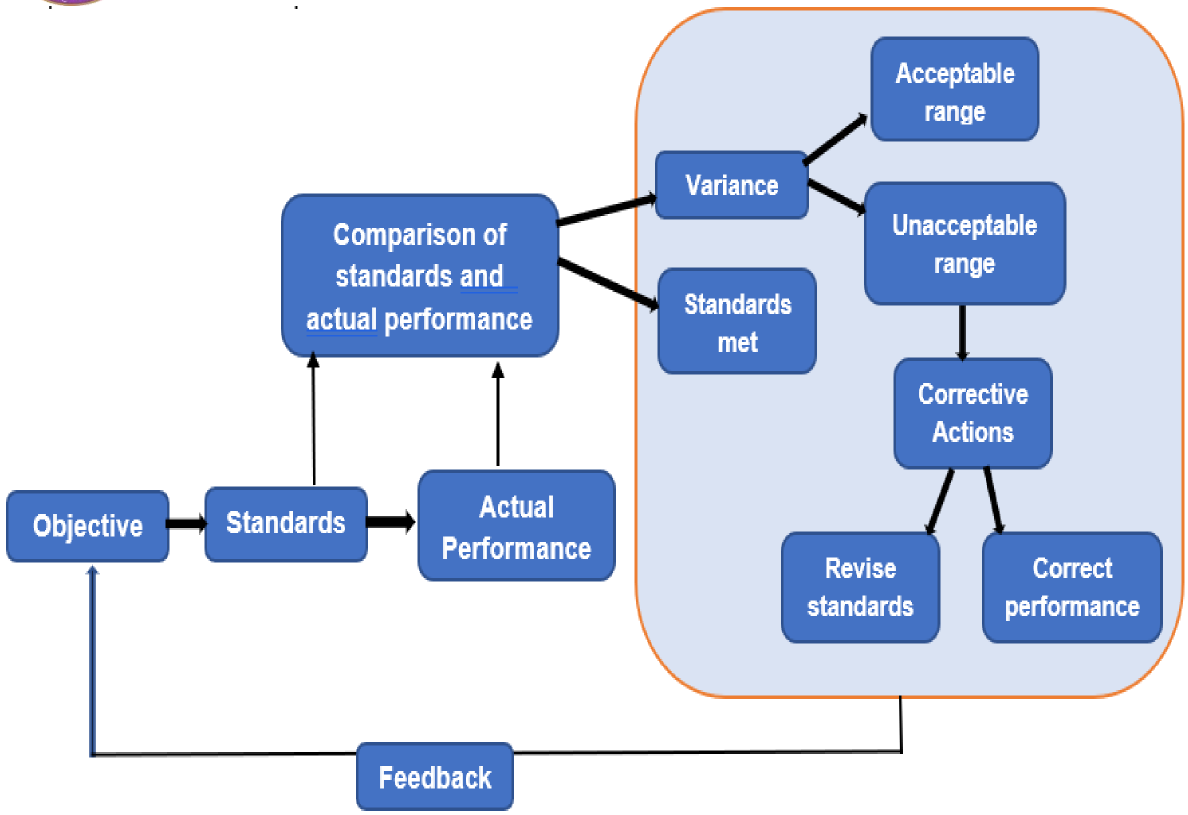
ACTIVITY

Create a control system for your preparation for a class test using different types of control. Plan for your preparation, set the Standards marks to obtain, measure actual performance and compare it with standards. Analyse the outcome, try to find the corrective actions, if any, and provide feedback to self. Go back again to planning

7.3.2 THE PROCESS OF CONTROL

Establishment of Performance Standards or Benchmarking: International Organization for Standardization (ISO) defines standards as the formula that describes the best way of doing something. It gives the highest benchmark to which we can compare our actual performance. The standards should be SMART (specific, measurable, attainable, relevant and time-bound). Standards should always be widely accepted in organizations. The clarity and uniformity in standards help to reduce the deviations. It is part of the planning process. Standards are of two types Tangible and intangible. Tangible standards included financials, profit, sales volume, timing and ranking. Whereas quality, safety, brand image, and employee job satisfaction are forms of intangible standards.

The origin of scientific management principles was itself from control function. F.W. Taylor was a person by rules, designs, planning and everything in control. His objective was to establish standards of work. He studies the work to find the best way and person to perform a job to increase productivity and reduce deviations. He established standards for work, staffing, training, and remuneration.



Measurement of Actual Performance: Actual performance describes as the ground reality. It includes continuous monitoring, collecting and measuring the data on the performance. The manager can implement various techniques for measuring the actual performance. One technique is "management by walking around"; a manager directly interacts with employees on a real-time basis to know what and how things are going. However, it is not possible for a manager to always keep an eye on the system. The critical point checks and uniformity in the process help. The other methods of collecting data are statistical, written and oral reports. Technological advancement makes it easier to measure actual performance. Moreover, robotics keeps an eye on the entire controlling system and corrects any minor deviations, inform management at the earliest and produces statistical reports in seconds.

Comparison of Standards with Actual performance: Compare the actual performance with standards to determine the variations in performance and how much. Various factors interplay to cause variations in real-time performance. With the involvement of humans, it is natural to have some deviation in the workflow. However, we should determine how much variation is allowed. Suppose the variation is in the acceptable range. In that case, we could maintain the status quo, but corrective actions must be taken if the variation is out of the range and unacceptable. Let us say a person owns a potato chip filling company; He fills 50 gm chips in each packet. The variation accepting range is (+3 or -3). These inaccuracies are inevitable, but our acceptable range should not be breached. The deviations can be over variance and under variance; both situations need immediate attention from the management. In the former, management needs to upgrade the standards to meet the market demand and revisit the objectives or study the factors that cause hindrances.

Take corrective actions: The managers have three courses of action, do nothing, corrected observed performance or reset the standards. The manager maintains a status quo when actual performance meets the established standard, and the minimal variations fall under acceptable variation.

When the actual performance does not meet the established standards, identify the cause of variation. In this case, managers have two options: correct the actual performance or revise the standards. Management can take various steps to cure the low performance based on the type of cause. The second is to revise standards. Unrealistic or too challenging to attain standards can cause variations.

Feedback: Whether the actual performance meets the established standards or not, feedback provides this information back into the system. Feedback makes the process a circular flow and connects links back to the planning and other management functions. If actual performance meets established standards, then feedback sends positive results and continuation of the practices. If actual performance does not meet established standards, then feedback sends negative results indicating managers to take corrective actions.

7.3.3 NATURE OF THE CONTROL SYSTEM

- **All pervasive:** controlling is present in every department and at all three levels of management. It is part of almost all types of organisations and each industry. Controlling is the dominant function of every manager. It is a concurrent process.
- **Circular flow:** It will be difficult to revise the plans if there is no control system to inform us of the variance from the desirable state. Controlling links management functions back to planning through feedback to provide a circular flow of functions. It set the future discourse of actions.
- **Continuous process:** It is ongoing and present in different forms. Managers regularly update or revise the standards and plan accordingly. The organisation implements control on a daily, monthly, quarterly or yearly basis.
- **Learning activity**: It provides a learning curve for the organisation. The manager learns from past mistakes and ensures those mistakes do not reoccur in future. With the help of feedback control,

an organisation comes to know about its strength, weakness, opportunities and threats. It helps to know which strategies work best for us.

- **Demonstrate optimism:** It identifies the problems, resolves them, clears the hindrances in the way, and ensures performance and the achievement of goals.
- **Future-orientated:** control is forward-looking; it anticipates controlling even before the activity starts as preventive maintenance measures. It prevents damage to life, infrastructure or an organisation's reputation.
- **Past oriented:** It is also backwards looking in nature; controlling is based on past performances and planning for the future.
- **Dual process: affirmative and negative:** On the one hand, control ensures optimum utilisation of resources. On the other, it adds underlying resources and cuts down the misuse of resources.

IN-TEXT QUESTIONS add instructions

Fill in the blanks

1. ______anticipates the problems beforehand and implements control before the activity starts.

State True or False:

2. When the range of variation falls into the unacceptable range, a manager should take corrective actions. True / False
3. Controlling is all-pervasive. True/False

Choose the correct answer:

4. When actual performance meets the established standard, and the minimal variations fall under acceptable variation, the manager:

a) Corrective Performance b) maintain the status quo
c) Revised standards d) consult with experts

7.4 IMPORTANCE OF CONTROLLING

7.4.1 ESSENTIALS OF CONTROLLING

- **Suitability:** Every organisation is different so does the controlling system. The control system must suit the purpose of an organisation. Assume an IT firm has implemented a high-tech controlling system because the risk of cyberattacks over networks is high to block all the services. It does not work the same for food and beverage companies. The control is very different for different departments in the same organisation. The finance department has a different control method from production and operation. It must be suitable for the organisation.
- **Flexibility:** The control system should not be rigid but flexible and adaptable to change. In the era of high volatility, globalisation, and technological advancement, it is necessary to be quick and flexible to survive the environment. It should be open to creativity and innovations.
- **Simple flow:** It should be easy to understand for everyone. There should be clear objectives, simple measurement techniques, performance reporting, gaps identification and transparent controlling actions. The role and responsibility should be clear with the proper system of feedback.
- **Learning management:** There should be a proper system for learning from past mistakes, storing the information in the archive, and disseminating the information to each department when and where required.
- **Accurate and reliable:** The control system should be accurate, speedy and reliable. Regular checks of the control system reduce the chances of being faulty. The entire control system relies on accurate and reliable information.
- **Time-bound:** Continuous monitoring should always be on time and in place. Even before the activity starts, during, and after the activity is completed in the form of feedback. Moreover, provide timely information to the management.
- **Critical checkpoints:** Establish critical checkpoints. It is not economically viable to keep an eye on the entire system. Identify some essential critical success points which bring the highest variation in the performance and are critical for success or failure.

- **Easy and equal Accessible but ensures privacy:** It should be equally accessible to all, especially managers, to provide easy access to critical information. The power to change any information should rest with top managers to prevent it from being misused.

7.4.2 THE NEED FOR AN EFFECTIVE CONTROL SYSTEM

The effectiveness of a control system is determined by how well it helps the manager to restrain deviations and attain the goals. We have heard dozens of examples of product recall because of product quality and safety concerns; a company's brand image is at stake. Those examples can indeed explain why having a robust control system is mandatory**.**

- **Transparency:** It can expose the flaws in the system and provide a chance to fix the issues and meet performance standards. Whenever the actual performance falls short of standards, it scans the entire system to discover all the issues.
- **Effective planning:** The revision in planning is possible with control. Plans show the path, but that does not make that path correct, or it does not ensure the achievement of goals, but controlling does. The control system provides adequate feedback to refocus.
- **Optimum utilisation of resources:** It controls and cuts the overuse of scarce resources like finance, labour, and machinery. It also relocates the resources to their best use and utilises its best opportunity cost.
- **Reduce disruption:** The control system checks the machinery, infrastructure, products and services, reduces deviations and prevents damage. It undertakes all the preventive maintenance measures and takes care of everything. It ensures quality and safety.
- **Target achievement:** It ensures the timely achievement of the target. The control system monitors and measures the actual performance, compare it with standards and takes appropriate corrective action to meet the goals. It ensures the meeting of all departments' goals simultaneously; it provides integration and coordination in the organisation.
- **Identify the deviations:** It identifies the variances in the performances. The first step is to find out about errors, and only we can find a solution. Such as, it informs the manager that something is going wrong, the product is not up to standards, or employees are performing low. The planning has faults and many more.

- **Corrects the errors:** Not just identifying, it also helps to correct the error, resolve it, and fix the fine-tune system.

- **Managerial decision making:** controlling enable the manager to make correct decisions**.** It provides authentic, accurate and reliable information promptly. It is a control that decides most of the manager's decisions; whether he would do nothing, correct the actual performance, or revise the standards depends on the control system's feedback.

- **Enhance the effectiveness of processes:** It corrects the shortcomings; it increases the overall effectiveness of almost all the processes through constant feedback and improvement.

- **Better coordination, Discipline and order:** Control provides better coordination and a smooth rhythm to the workflow. It implements order and discipline in the organisation by setting the rules and keeping everybody and everything in check.

- **Employees motivation and morale:** Control system provides feedback to improve performance. Every employee wants to know how well he/she performs and how to improve further. When employees know they doing good, they become motivated and satisfied. It ensures equity and a fair system of performance evaluation that is there due to the control system.

- **Protection of workplace and system:** The control system protects the workplace from violence and conflicts and ensures a smooth flow of work. It also protects the infrastructure, data, networks and servers by undertaking regular maintenance, updating antiviruses, installing a highly locking system, and continuously upgrading the keys.

ACTIVITY

Assume you are the chief organiser of an educational event. The event did not get successful as planned. Fewer participants turned up, over cost and conflicts were some of the outcomes. You need to find the causes of the variance between the desired state and what is achieved. Write down three reasons why control is essential with the help of your own experience.

7.5 BEHAVIOURAL IMPLICATIONS OF CONTROL

In a social context, control is a term that binds employees to particular rules and regulations. Control is to impose discipline and order in the organization and impose disciplinary action on deviated behaviour. Control is also used to increase performance and maintain quality. There is an urge to keep a particular social structure in an organization intact through control. The main focus of control is to produce predictable results; the control and coordination formalize and standardize the behaviours and force people to specialized jobs with no discretion. Control flows from power position and authority. Control is directly proportional to power.

The behavioural implication of control depends on the employee's perception of its nature and intensity of control. Those who are being controlled do not like it—pressures of timely and high- performance breakdown the essence of the control system in the first place. The aim is to control human behaviour into some accepted norms, and when it is extreme, it leads to resentment among those being controlled. Complexities with controlling are that management has to make a balance. There is no doubt that excessive control is harmful to the organization. Mary Parker Follet, one of the neo-classical management thinkers emphasized self-control. She said control should be intrinsic and cannot be imposed by an outside authority.

There are some behavioural implications of control:

- **Resistance to change and control:** When there is a high degree of control, people show resistance to change. They feel uncomfortable around changes, are likely to maintain the status quo, and are unwilling to cooperate. They fear changes and that they have to adjust to the new changes.
- **Degraded human relations:** More than controlling leads to poor working relations between subordinates and supervisors. There would be conflicts of interest and disharmony. Freedom is the love of humankind, and almost all civilisations have struggled for it through the ages. The voice of dissent is vital to flourishing.
- **Suppressing initiation and creativity:** Humans cannot be controlled like machines and robots. We have our creativity and uniqueness. We have a deviation in our work. Treating humans like robots is harmful. It is indeed an underutilisation of human potential.

- **A regime of fear:** deviant behaviour or non-compliance with the stricter control system call for various sanctions, which leads to fear of being fired. This regime might lead to corruption, dissent, conflicts, litigation and waste of resources. The Reign of control carries the elements of power, politics, and status.
- **Powerful informal groups:** Over-control victims lead to the emergence of powerful informal groups that create conflicts of interest and hamper work. The informal group uniformly decides the work standards and performs accordingly on a mass scale.
- **Minimum performance:** due to strict control and fear of being sanctioned, employees perform the minimum required and do not let themselves exceed standards. They deliberately drag the standards down.
- **Employee retention:** employees do not feel belongingness to the organisation because of unnecessary control. They feel the issue of trust from the management side to levy high control on them. They do not stay for long.
- **Boss-subordinates Conflicts:** If the supervisor control too much, employee feel aggressive and frustrated, and there will be an issue to trust and respect between them. Inputs from the subordinated side are generally ignored. The supervisor sometimes denies that there can be a possibility of the system's faults instead of an employee.
- **Decrease motivation and morale:** employees lose their morale without flexibility and creativity. They feel demotivated when not being heard or understood.

ACTIVITY

Make an inquiry with your classmates or with office colleagues concerning their experience of being controlled, and jot down some more points.

Control is not effective by its amount but by how it has been managed—some possible courses of action for the progressive control system in an organizational social context are the following:

- **Fair control system:** the control system should have equal treatment. The intent and logic of control should convey to employees. The control limit should be justified. It should not be arbitrary.
- **Employees' participation:** Quality Circles and Total Quality Management are good techniques to involve the employees in the control function. Employees will feel valued. As a manager, pass on the responsibility of being productive and performing to employees through participation and self-commitment. Create a culture of work cooperation.
- **Clear communication:** communicate the aim, objectives, standards, and expectations very clearly in written form, remind them, and ask them what they understand, what their perspective is, and how they feel about the same. Communication should be both ways.
- **Freedom to speak of errors:** there should be freedom and openness so that employees can talk about some errors, inefficiency, and wrongdoing to supervisors, HOD or top management. There should be some proper channels to identify potential complaints.
- **Positive criticism:** tolerable and diverse culture allows the voice of dissent to make us aware of the existence of some other dimensions, arguments and reasons. Positive criticism will let us see our defects and give us a chance to improve or prove ours.
- **Timely upgrading of flexible control system:** The control system should be flexible to mould easily to support the changes happening in the surroundings. Updating the control with time is necessary.
- **A culture of Self-control:** control comes from within. It is a highly efficient form of control that allows employees to regulate their performance and quality.

IN-TEXT QUESTIONS add instructions

Fill in the blanks

1. Control ensures better coordination,_______and______.

State true or false

2. Resistance to change and control is the behavioural implication of control. True/False
3. Excessive control leads to the optimum utilisation of human resources. True/False

Choose the correct answer

4. Which one is not the requirement of an effective Control system:

a) maintain employee morale b) Transparency
c) Management by objective d) protection of workplace and system

7.6 TECHNIQUES OF CONTROL

There are some control techniques that are frequently used by managers:

1. **Direct observation and surveillance:** These are done by the manager himself. It is also called management by walking. A manager directly interacts with employees on a real-time basis to know what and how things are going. This technique is best suited for small-scale enterprises.
2. **Financial statements:** These include the balance sheet, cash flow analysis of an organisation, cost incurred, total revenue generated, and profit earned, which helps to measure the organisation's performance.

3. **Ratio analysis:** It includes the debt-to-equity ratio, liquidity in the organisation, profitability, risk ratios and others. It measures a company's performance and compares it with other companies.
4. **Budgetary control:** it is a blueprint which helps in planning and controlling. It ensures the allocation of scarce resources like finances.
5. **Statistical reports:** These consist of representation and analysis of the data. These reports convert data into useful information regarding averages, percentages, correlations and others.
6. **Return on investment:** organisation is always interested in generating higher returns over investment.
7. **Management by objective:** The manager and subordinates set individual goals together. Periodic evaluation takes place to assess the performance against the set objectives.
8. **Management Audit:** It analyses and evaluates all the objectives, functions and processes of an organisation to determine its achievements, accomplishments, effectiveness and efficiency an organisation. It evaluates the control system to see how fair and effective it works. Identify the errors and suggest possible methods to correct them. It is a 360-degree evaluation and the most reliable tool. It is independent and conducted by external auditors to keep the authenticity of the results.
9. **Management information system:** It is helpful to collect, store, analyse, disseminate and use all necessary information about all the functions, processes and operations of an organisation. It is a powerful tool for controlling. It is so pervasive that it helps in controlling daily operations.
10. **The Program Evaluation Review Technique (PERT):** PERT is helpful for planning and controlling a project where the expected completion time of a project is not known. PERT includes estimating the expected total time required to complete the project and analysing the probability of delivering the project on time. The probabilistic technique uses 3 times estimates of the optimistic, pessimistic and, most likely, time for a single activity. Identify the number of jobs that have to be completed. Asses every job in the project, their proper sequence, the total time required to do a job and the cash outlay required. We arrange a different sequence to complete the job effectively and efficiently with minimum resources. It is beneficial for massive one-time projects like construction and building.
11. **The Critical Path Method (CPM):** In CPM, the expected completion time of each actvity is known. First, identify the critical jobs that have to accomplish to complete the project and asses

the time required to do them through scheduling flexibilities. Identify the most extended sequence in terms of the amount of time required to complete the jobs to deliver the total project on time. If there is a delay on the critical path, it delays the delivery of an entire project. This method uses to decrease the cost due to inefficient scheduling.

12. **Individual self-control:** the employee is accountable to himself to ensure the completion of work with the minimum defect**.**

13. **Gant chart:** Henry Gant developed the very first Gant chart. It is a graphic visual representation in the form of a bar graph about the tasks, their sequencing, scheduling, and deadline for completion. Here, the time is on the x-axis, and activities are on the y-axis. It helps to prepare a plan for a project. Identify the different tasks and resources, arrange them in sequence, perform efficient scheduling, and set deadlines and standards. Track each task, monitor the progress, analyse the actual performance, and compare it. It ensures the optimum utilisation of resources. Any deviation can easily be tracked and corrected.

14. **Break-even analysis:** It is a situation when a firm has neither profit nor loss. The revenue equal's cost. It is a survival control method. It helps to understand the different sources of revenue and type of costs that organisations incur, which nullifies the revenue. However, to survive, a firm has to have a profit. It identifies areas where we can cut costs with effective use of resources. It is an efficient tool for controlling.

ACTIVITY

Assume you organised a cultural event. Write down the number of techniques you will use to measure the control performance of the event

7.7 COORDINATION AND COOPERATION

An organization's functions, processes and systems are in symbiotic relationships. They all depend on each other to work towards a common goal with the help of coordination and cooperation. Coordination arranges the activities and ensures unity and harmony among all the functions toward the organization's objectives; it removes conflicts and confusion in the tasks and roles. If there is no coordination, things get random. The process of synchronizing efforts of different departments, people, functions, processes, and activities together to accomplish goals is called cooperation. Everyone is interdependent and hence supports each other to achieve the desired outcome. It is the only function that holds an organization together as one. MP Follet (1868-1933) gave four main principles of coordination and cooperation: "Coordination by direct contact, In the early stage, as a continuous process and as reciprocal relation of all the factors in the situation".

IN-TEXT QUESTIONS add instructions

Fill in the blanks

1. When all the efforts of different departments, people, functions, processes and activities synchronise together to create_____.

State True or false

2. The budget gives a benchmark against which the performance is measured: True/False

Choose the correct answer among the following options:

3. It is a graphic visual representation in the form of a bar graph about the tasks, their sequencing, scheduling, and deadline for completion
   a) Gant chart   b) PERT
   c) CPM   d) Budget control

4. Which one of them is not a technique for control:

   a) Breakeven Anaylsis   b) Direct observation & surveillance
   c) Management Audit   d) SWOT analysis

Coordination & cooperation are pervasive and global concepts. They benefit a large organization with different departments, product lines, geographic presences, and specialized departments. These departments have their own goals and targets, which sometimes clash with each other and promote disharmony and conflicts. Coordination and cooperation prevent them in the first place and try to replace them with unity and a smooth workflow. They reconcile the objectives and goals of different groups into the organization’s goals. It inter-relates the work and people. Setting up cordial relations between internal and external stakeholders of the organization clears out misunderstandings and prevents conflicts in the workplace. Coordination and cooperation save energy and other scarce resources as it prevents the duplication of work and ensures the quick completion of tasks. The communication system implements coordination and cooperation in the organization.

There can be two types of coordination, vertical coordination and horizontal coordination. Vertical coordination includes vertical communication channels, hierarchical tasks, and formalization. It is concerned with power dynamics, decentralization, delegation, and boss-subordinate relationships. Horizontal coordination helps to correlate the different departments working at the same level or with similar jobs. It bridges the gap between ships with the same destinations but different route plans, and horizontal coordination aligns them and their efforts.

7.8 CONTEMPORARY ISSUES

7.8.1 TOTAL QUALITY MANAGEMENT

Quality has always been an essential factor that ensures the organization's survival in the long term, making it a strong and global player. TQM is a technique that ensures total quality in all spheres of business by continuous improvement and reducing defects to satisfy the customers. Quality generally denotes excellence or something supreme in nature. It reflects perfection, reliability, durability, trust, authenticity, and customer satisfaction. It can be seen from the customer's perspective and production perspective both. An organization keeps both angles in mind and puts effort into quality to maintain the image in the eyes of the customers. However, maintaining quality was a brainteaser with traditional management techniques in the era of volatile markets, high competition, globalization, and technologies. Earlier organizations keep "quality control" or "quality" departments with the main focus on ensuring quality. They are limited to product manufacturing and service only and focus on just reducing defects. The organization is interdependent and interrelated; hence TQM emerged as an appropriate solution.

Total Quality Management is a widely accepted approach for attaining and sustaining quality that is the "degree of excellence" or "fit for use" and focuses on the overall development of an organization. It was given by E. Demmings and JM Juran in the 1950s; it was first implemented in Japan. It focuses on achieving excellence and setting the highest benchmark in the industry. It helps to achieve and tightly hold the highest market share. TQM sustains excellence in all its products, services, functions, processes, and systems and manages human resources to satisfy customers. The organization's main aim is to produce "quality" and maintain quality standards sustainably in all its procedures to fulfil the unfulfilled desires of customers. The continuous effort to maintain quality is TQM. The key emphasis is to sensitize everyone towards quality. It ensures the optimum and efficient utilization of scarce resources and makes an organization a responsible being. TQM is a mix of various approaches to attain quality standards. It suits all types of organizations.

TQM consist of six essential elements:

- **Top-to-bottom support:** The top Management must be the initiators of TQM and quality improvement programs, make it a culture, set up the quality council, and communicate clear aims, and objectives to all levels.
- **Focus on customers:** Try to know more about the customers, what they value the most, how they perceive the company's product, understand their expectations, desires and circumstances and try to satisfy the customers. Customers should always be the priority for an organisation
- **Involvement of the entire workforce:** involve employee participation, train them to produce quality, and train them in TQM techniques and statistical controls. Motivate them to be creative and innovative to find ways to reach quality in their work.
- **Continuous improvement:** start from small steps like on-time delivery and minimum defects, customer services, make short-term, midterm and long-term goals, monitor their level of achievement, and try to make it part of the culture. Small but consistent efforts are essential.
- **All stakeholders as partners:** encourage business partners to adopt TQM in their functions; the quality of the raw material must be outstanding. Try to make true partners.
- **Establish performance standards:** appraise performance standards set by employees for them and encourage others to do more, and set a new record.

CASE STUDY

Motorola is well known for its successful total quality management program, the origination of Six sigma (Techniques of TQM), innovative solutions, and promote creativity among employees. It is an American multinational telecommunication company founded in 1928. It manufactures wireless telephone handsets and designs and sells wireless network infrastructure equipment.

Motorola 1981 launched an ambitious program to improve the quality of its product and services. The company specified its quality goal as "Zero defects in everything we do". The managers started keeping a printed card in their pockets with "total customer satisfaction". They regularly visited the customers and conducted surveys, complaints, field audits and other feedback mechanisms to know customers' feedback towards their products and services to guide the measures of quality improvements and developments. Motorola invented six sigma, one of the techniques of TQM, in 1986 by using statistical analysis to improve the quality by reducing the defects in manufactured products and became the role model for others in quality.

Six Sigma (6Ï*f*) ensures the process does not produce more than 3.4 defects per million opportunities (DPMO) – which translates to 99.9997% efficiency. It reduces the chances of defects in the products. It is widely used in manufacturing, sales, product design, customer services and many more. Motorola also implemented total cycle time reduction. Motorola empowered employees through employee participation, promote leadership and innovation, freedom to take risks, and encouraged employees to be creative and proactive. The practice of always being ready to serve the customers and satisfying their needs with the best quality.

1. **Study the other techniques of TQM**
2. **Why employee participation at all levels is essential for Successful TQM?**

QUALITY CIRCLES

Quality circles are small groups of employees working in the same department, performing the same work. They meet voluntarily in a systematic manner to discuss and analyze the relevant information, problems, and issues they face at work and try to solve them with possible remedial actions. Let us consider James as the senior manager of the marketing team of an education company. He has been noticing a decline in course enrolment during the past few months. He is keen to know the reasons for the same and possible course of action to improve the quality. He creates 2-3 teams of 5-6 employees who have the same work in the marketing department to identify the problems and solutions for the same. These are called quality circles. Quality Circles is an immensely All-in-one formula where the organization ensures employee participation, a mutually agreed solution to the problem and assured quality

E. Demmings gave this concept in the same period of TQM. It is Teams work-based concept. Quality circles are groupings whose primary concern is attaining quality and controlling deviations. It consists of delegating the responsibility of quality and performance to workers at large. The members of the group are the immediate employees of the work. It is a kind of formal group; a supervisor chairs the meeting provides training, and persuades employees to open up. He becomes a link between workers and the top management. They frequently meet at a specified time and discuss their everyday problems. The issues might be independent or familiar, but how they handle them varies from person to person. Nobody could understand the ground realities of work better than those who are doing that work.

These meetings help to share knowledge, wisdom, experience and learning with each other; they brainstorm and find the remedial actions together, which comfy everyone as they are the ones who have come up with that solution, the acceptance level increases, and so the performance and quality. The Groups discuss various issues not just limited to processes but related to cost minimization, innovation, creativity, quality, safety, work-life balance, customer satisfaction, working conditions and health issues.

Disagreements are bound to happen when there is a group, which is its beauty. The member tries to come to a consensus for a decision through deep discussion. Quality Circles includes employee participation and ensures inclusivity and diversity at the same time. The main goal is to make coordination and cooperation a part of the culture. It increases the motivation and engagement of the employees when they feel that management listens to their suggestions. They feel valued. Employees feel belongingness to the organisation. It ultimately leads to the growth and development of groups and individual employees. For its success, top and middle management support are reasonably necessary.

CASE STUDY

Bharat Electronics Limited (BHEL) was the very first Indian organisation that started Quality circles in India in 1980. BHEL is engaged in engineering and manufacturing processes on a large scale in India and is quite successful. The management and employees learn, observe and understand the Philosophy of Quality circles and implement it with all their heart and soul. Initially, there were 5 circles started at Hyderabad Unit. The employees voluntarily participate and choose their leader of the circle. The training was conducted for statistical tools and the procedures of quality circles. after the eighteenth month, the count of Circles rose to 51 at the Hyderabad unit of BHEL alone. Right after that, the Quality Circle Forum of India (QCFI) was founded in 1982. One of the Quality Circles formed in BHEL was a Nine members group, with Mr N. Narayan Rao as the leader. The Circles have duties like dispensing correct medicines per prescription to 30,000 to 35,000 patients per month, explaining dosage to the patients and Entering receipts and issues of medicines in a tally sheet. The objectives of the circle were to improve the quality of services, working systems, and work environment. To reduce stress and strains on pharmacists, Cost reduction, Work simplification and making work a pleasure. They brainstormed and performed Pareto analysis and cause & effect diagrams to identify the nature of problems. The main problems identified were the high waiting time by patients and too many brands of the same drugs working more. The four areas identified were working system, operational cost, facilities and workforce. Quality circle decided to concentrate on problems of the working system and operational cost first. The Problem chosen was that the waiting time of patients for medicines is more, i.e., 2.5 to 3 minutes per. Brainstorm for solutions and reach a conclusion through consensus. The possible solutions were opening more windows for medicine dispersal. Segregate patients in different queues, pre-packaged drugs, and many others. They have successfully reduced the waiting time from 3 min to 0.75 min per patient with quick services. boosted the morale of pharmacists and reduced strain.

1. Is there any limitation on Quality Circles with regard to problems relating to modernisation or automation?
2. Is there any optimum number of meetings which should be held to arrive at a solution to a problem taken up by
   Quality Circles?

7.8.2 GLOBALISATION

Now, look at these statements. The financial crisis of 2008 in the USA caused a ripple effect of the economic crisis in various developed and developing nations. The outlets of Domino's Pizza, the jeans of Monte Carlo, Nike shoes and the iPhone by Apple have a global presence.

The manufacturing units of some of the US-based brands are located in China. There is a trend of westernization of cultures. English is one of the primary languages in schools in India and elsewhere worldwide. All these statements indicate a phenomenon called globalization.

It is not a new term; ancient civilizations have indulged in international trade for centuries. The industrial revolution, with the inventions of fast transportation and communication technologies, gives wings to the phenomenon. India went for globalization and opened the gate for these big brands in 1991, causing political-economic and social changes to allow foreign organizations to invest in India. In the last 60-70 years, globalization has had an exceptionally geometric trajectory of growth because of the internet and digital infrastructure. There are two driving forces for world trade:

1. **Regional trading alliances** (RTA): a group of countries that come together to sign a pact of free trade or free movement of goods to get mutual economic benefits. There are plenty of such alliances, such as European unions (EU), African Union (AU), North American Free Trade Agreement (NAFTA), SAARC Preferential Trading Arrangement (SAPTA), Regional Comprehensive Economic Partnership (RCEP), ASEAN and others. Bilateral trade agreements are also prevalent.
2. **Global Trade mechanism**: look out for smooth trade, effectively and efficiently, around the globe. World trade organisation (WTO), the International monetary fund (IMF), the World Bank Group, and the Organization for Economic Cooperation and Development (OECD) are the crucial mechanisms that keep international trade continuous.

Global Organizations use various approaches such as import, export, global outsourcing, licensing, franchising and strategic alliance to lower costs, high quality, and diversity and attain a competitive advantage in international markets

To survive in global markets, a manager must understand the host country's political, economic, social and cultural environment. The manager should have a global mindset to manage the diversity of the global workforce with high sensitivity and understanding and align their efforts with organizational goals.

CASE STUDY

McDonald’s is an American fast-food company that came into existence in 1940 to serve burgers and fast-food Items. Mcdonald’s now has a presence in almost 130 countries and serves millions of customers each day. Most of the Mcdonald’s outlets in the world are owned and operated by independent business owners in the form of franchises. A large part of the revenue is generated from rent and royalties from these franchises. McDonald’s started its first operations in India in 1996 in New Delhi. It revolutionises the fast-food restaurant culture in India and takes its place in the daily life of middle-class Indian customers. It also faces competition from KFC, Burger king, Domino’s and Pizza Hut, so it ensures the best quality food products. McDonald's guiding force philosophy is QSCV (Quality, Service, Cleanliness and Value) to serve the customers in India. While entering Indian markets, MacDonald's faced various social, religious, economic and cultural problems. The main problem was that the signature products of Mcdonald’s containing pork or beef would not have worked in India, where half of the population is pure vegetarian. MacDonald’ decided to went local and introduce a separate line of veg products. India is the first country where Mcdonald’s served non-beef and non-pork food. Mcdonald’s re-engineers its Menu to suit Indian taste and culture in its products to become successful in India. Mcdonald’s segregated the Veg and Non-veg food Items right from food processing plants to the point of serving the customers. It designs Veg Tikkis, french fries and veg sausages for Indian customers and also names the products in a local way, like McAloo, Maharaja Burger, Paneer Burger and others. To be recognised as a global brand, an organisation has to learn to respect different cultures and diversity and go local first. It set the price of keeping the affordability of a large segment of Indian customers. It is grand success in India. McDonald's has become emblematic of globalization. Now thnk of folliwng questions

1. What kind of difficulties an organisation might face while entering into diverse country?

2. Find out the companies which failed entered a foreing market and failed. List down the what are factors important for successful globalising of prducts.

7.8.3 INNOVATIVE ORGANISATIONS

You must have heard about the tag lines of Philips "innovation and you" or “think outside the bun” by taco bell, a fast-food restaurant; “invents” by HP, “thinks different” by Apple, “Reinvent” by Lakme and many others. The urge to provide customers with low-priced, high-quality products tailored to their specifications or needs to attract and satisfy customers keeps the companies on their toes. The customer also becomes choosy and conscious of specifics about what they want. Creativity and innovation are essential for an organization to grow. Today's business environment is characterized by the rapid growth of technologies, uncertainties, high competition, interdependencies, and deregulations. A successful organization needs to hold high flexibility, creativity, and the ability to innovate as a competitive advantage to produce world-class quality products and services. It requires continuous improvement. There will always be a new normal. They are incorporating the new normal and focusing on innovation to be consistent in the business. Now, look at the features of innovative organizations.

An organization can become innovative by change in the following four areas:

1. **Organisational Focus: Increasing Customer Satisfaction:** provide clear directions to all the lines of employees about their ultimate goal, that is, customer satisfaction. They should have a clear understanding of what the organisation stands for. It also help/s to reduce inter-functional barriers and minimises confusion. It allows managers to make operational decisions, set objectives, plan, coordinate and control functions.
2. **Organisational structure:** innovative organisations have three related structure patterns.

- The first change is implementing an organic control structure, a less hierarchical network pattern of communications, and creating more flexible, vertical, horizontal, and diagonal communication channels for the easy flow of information. Encourage more openness, ideas exchange and participative orientation instead of strict command and control.
- The second change is to use permanent and temporary teams of specialised individuals from different functions. A multidisciplinary team helps to update the knowledge of recent developments in each department and learn from each other.
- The third change is decentralisation, delegating the power to the lower levels and increasing their involvement in work.

3. **Leadership:** The leader is the initiator and the key to successful change of innovation. First, a leader should motivate and encourage employees to experiment with new approaches to work. He must be supportive of an atmosphere of taking risks without the fear of failure.

4. **Information system:** the organisation must have a robust information management system that ensures timely, accurate and speedy information to all employees. All employees should also share their knowledge with others.

7.8.4 SOCIAL RESPONSIBILITY AND ETHICS MANAGEMENT

Generally, a business manufactures products and services and serves people in exchange for some money with the sole purpose of profit-making. During the manufacturing process, the business uses society's natural resources; hence they have a more significant obligation toward society. Socially responsible businesses contribute toward society's welfare and think beyond self-profit. An organization must balance the profit-making and public good simultaneously. Managers often face a dilemma in decision-making for being socially responsible in the cases of quality, safety, resources optimization, human resource management, environmental sensitivity, philanthropic actions, and pricing of the products. Being socially responsible will ensure long-term survival and long-term profit. It contributes to the inclusive development of society and a sustainable environment. Some organizations also use this technique to build trust and a strong brand image among consumers.

Social Entrepreneur: The social entrepreneur is an individual or organization seeking opportunities to improve society using practical, innovative, and sustainable approaches

India is the first country in the world to make Corporate Social Responsibility (CSR) a mandatory clause under the companies act 2013 for some categories of companies to boost social welfare activities and make companies socially responsible.

Then there is the question of being ethical. All types of organizations face ethical issues and ethical dilemmas in business operations. Is it ethical to purchase the subscribers on the social media page? Is it ethical to use an organization's property for personal use? Is it ethical to bribe an intermediary to get possession? Is it ethical to fake the numbers or misrepresent the company's assets?

Davis & Frederick defined ethics as principles, values, and beliefs that define right and wrong decisions and behavior. To encourage ethical behavior among employees, a manager can hire people with high moral principles and establish a code of conduct emphasizing ethical values and actions. Provide timely ethical training. Rewards the ethical behavior to encourage others to pursue ethical behavior, ethical leadership, Independent social audits, and protective mechanism for whistle-blowers.

IN-TEXT QUESTIONS add instruction

State the True or False

1. Quality circles are small groups of employees working in the same department, performing different kinds of work. True / False

Fill in the blanks

2. ______are values that define right and wrong in decisions.
3. The_______is the initiator and the key to successful change of innovation.

Choose the Correct option

4. Which one of them is the element of TQM:

   a) Employee's participation b) continuous improvement
   c) supplier's quality d) All of the above

7.9 SUMMARY

Things can go out of hand in the business environment if not controlled. Controlling as a management function is about monitoring and measuring the performance, comparing it with standards and taking corrective actions to keep the project on track. It gives feedback to improve the process and connect again with planning. Feedforward, concurrent and feedback control are three main types of control. The controlling provides accurate and reliable information to the decision makers on time. It ensured timely target achievement, transparency, and optimum utilization of resources. It increases the employee's morale if applied with balance. Excessive control in organization results in resentment and aggression by employees, the rise of powerful informal groups and a high attrition rate. The manager uses various controlling techniques, such as direct observation, financial reports, ratio analysis, statistical reports, budget, PERT & CPM, Gant chart, Management audit, breakeven analysis and others. There are some contemporary issues concerning control, such as Total quality management, quality circles concerning continuous improvement and overall quality attainment. Global and innovative organizations are the ones that can survive the competition as change is constant. Being socially responsible and ethical is one of the targets of an organization.

7.10 GLOSSARY

- **Control:** The process of monitoring and measuring the performance, comparing it with standards and taking corrective actions to keep the project on track. It gives feedback to improve the process and connect again with planning.
- **Coordination:** Coordination efficiently arranges the activities and ensures unity and harmony among all the functions toward the organisation's objectives
- **Cooperation:** The process of synchronising efforts of different departments, people, functions, processes and activities together to accomplish goals is called cooperation
- **Ethics** are principles, values, and beliefs that define right and wrong decisions and behaviour.
- **Quality:** It reflects perfection, reliability, durability, trust, the authenticity of the products, and customer satisfaction. It can be seen from the customer's perspective and production perspective both. In other words, it is a "degree of excellence" or "fit for use".
- **Quality Circles:** Quality circles are small teams of employees in the same department performing the same work. They meet voluntarily on in a systematic manner to discuss and analyse the relevant information, problems, and issues they are facing and try to solve them with possible remedial actions.
- **Social responsibility:** Social responsibility is contributing to society's welfare. Thinking beyond self profit-making

- **Total Quality Management:** TQM is a technique that ensures total quality in all spheres of business by continuous improvement and reducing defects to satisfy customers.

7.11 ANSWERS TO IN-TEXT QUESTIONS

Feedforwards control	Cooperation
True	True
True	Gant Chart
Maintain the status quo	SWOT analysis
Discipline and Order	False
True	Ethics
False	Leader
Management by objective	All of the above

7.12 SELF-ASSESSMENT

1. What is the role of control in the management
2. What is the process of control, and how does it affect the managerial decision making
3. Describe the different types of control and how they are connected.
4. What concerns does excessive control raise in the organisation?
5. Discuss the different types of tools used to monitor and measure organisational performance
6. How an organisation can become an innovative organization

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Semester-I

FUNDAMENTALS OF ORGANIZATIONAL BEHAVIOUR

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Lesson 1

Introduction to Organizational Behaviour

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STRUCTURE

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1.1 Learning Objectives

At the end of this lesson, the student should be able to:

- Define organizational behaviour.
- Explain the need for and importance of a manager in an organization.
- Develop an understanding of the functions of a manager and managerial roles in an organization.
- Explain the three level of analysis of the organization's behaviour.
- Understand various challenges and opportunities managers face in applying organisational behaviour concepts.

1.2 Introduction

Organizational behaviour (OB) is a field of study investigating the cognitive, affirmative and behavioural aspects of human resources within the organization as individuals and groups. It deals with what people do within the organization, how they do it and their attitudes towards it. OB is applied in business to address the issues at the workplace, such as absenteeism, turnover, productivity, motivation, leadership teamwork and job satisfaction. Managers use the knowledge of OB to deal with various daily challenges and opportunities in the most efficient and effective manner.

"*Organizational behaviour is a field of study that investigates the impact that individuals, groups, and structure have on behaviours within the organizations to apply such knowledge towards improving an organization's effectiveness*."- Stephen P Robbins.

"Organisation behaviour is a branch of the social science that seeks to build theories that can be applied to predicting, understanding and controlling behaviour in work organisations." - Ramon J Aldag and Arthur P Brief.

The management has to deal with common organisational problems such as:

- Why do some people do well in organisational settings while others have difficulty?
- What people-related challenges have you noticed in the workplace?
- Do you know what a typical organization looks like?
- Why should you care about understanding other people?
- Does job satisfaction make a difference?
- Are you ready to assume more responsibility at work?

Before exploring the various components of organizational behaviour or the three levels of analysis in organizational behaviour (namely, Individual, Group, and Organizational level), it is crucial to understand what we mean by these three levels of analysis. How has the domain of Organization behaviour formed? Furthermore, who are managers, and what functions and roles do they perform in an organization.? Finally, it is also essential to understand managers' present-day challenges and opportunities in organizational behaviour.

1.3 What is an Organization?

An organisation is a social entity structured and managed to pursue collective goals. Manufacturing and service firms, including colleges, hospitals, temples, military units, warehouses, retail stores, police departments, volunteer organizations, Not for profit organisations, start-ups etc., are all organizations. Some of the common characteristics of organization given by Porter, Lawler and Hackman include:

- Organisations are composed of individual and groups.
- They exist to try to achieve certain goals.
- They involve specialization and require rational co-ordination and control.
- They have some degree of permanence.

The organisation can be seen as having an operational core composed of workers producing the goods or services (focused on the technical task) and a management hierarchy concerned with formulating objectives, developing strategies, implementing plans and providing co-ordination. In between will be various support workers such as human resource management, quality control and maintenance.

1.4 Manager and interpersonal skills

The manager is the one who works with and through other people by coordinating their work activities in order to accomplish organizational goals. The managers of the organization shape the organizational culture in every organization. They are responsible for setting and achieving the organizational goal by taking all the stakeholders into consideration. Their main task within an organisation is to get work done through others instead of completing it by the manager. Thus, it become very important for managers to understand the attitude and behaviour of human within the organisation. The managers can be classified as Top-level managers, middle-level managers and lower-level managers.

Lower-level managers: Managers at the lowest level of the organization who manage the work of nonmanagerial employees directly or indirectly involved with the production or creation of the organization's products
Middle-level managers: Managers between the first-line level and the top level of the organization who manage the work of first-line managers
Top-level managers:: Managers at or near the top level of the organization who are responsible for making organization-wide decisions and establishing the plans and goals that affect the entire organization.

The managers have to generally play 3 important roles of interpersonal, informational and decisional. The effectiveness of an organization and its management is dependent on the manager's skills. Managers shapes how people spend their time in an organization and whether they experience joy or despair, perform well or badly or are health or sick. It is no secret that employees leave their organization because of bad manager but, the highly interpersonal skilled managers can attract and retain high-performing employees. In late 2020, a movement was observed globally where employees were resigning on mass scale. During this period the term "Great Resignation" become very popular. The common skills incudes skills such as technical skills, leadership skills, influencing abilities, communication skills, critical skills, negotiation skills, time management, forecasting skills etc.

1.5 What do managers do?

Management is what managers do. Management is coordinating work activities so that they are completed efficiently and effectively with and through other people. Henry Fayol and Henry Mintzberg gave a detailed description of various functions and roles performed by a manager. Functions of management are part of the classical approach provided by Henry Fayol (French

Industrialist). Later in the 1960s, Henry Mintzberg divided the diverse responsibilities of a manager into ten roles performed by the manager.

1.5.1. Management Functions

Henri Fayol identified five management functions: planning, organizing, commanding, coordinating, and controlling. The manager performs various tasks of similar nature within each function. The detailed description of all five Functions of Management are as follows-

Planning: The primary purpose of any organization is to achieve specific goals. The manager needs to define these goals in line with the primary purpose and vision of the organization. It is a complete process where the manager explores various alternatives, builds a strategy for the whole organization, and sets employee objectives. Later these goals become a yardstick against which outcomes are measured. Fayol summed up this role under a broad category known as "*Planning*".

Organizing: The manager is also responsible for building the structures in the organization. The organizing function includes identifying various organisational tasks, grouping, and classifying similar-nature tasks and designing reporting relationships.

Commanding: The manager is responsible for communicating planned strategies, goals, or targets. In line with organizational goals and practices, a manager should direct and lead subordinates. It associated with communicating clear instructions to employees in line with the company's mission and vision. In addition, a manager should be able to inspire and motivate employees to achieve the company's goals.

Coordination*:* Coordination is one of the crucial functions of management. Setting goals, creating structures, and giving instructions to employees will fail if all activities are not appropriately coordinated. It is equally important to harmonize all activities in an organization. Managers should ensure that various activities complement each other. Effective coordination will also reduce conflicts and stimulate employees' motivation.

Controlling*:* The manager sets standards/objectives at the planning stage. However, the planning stage will remain incomplete unless the manager compares the standards with actual performance. Therefore, a manager should periodically compare the targets with the actual performance and take corrective actions in case of any gap.

The five functions identified by Henry Fayol provide an overview of the main functions of management; it may not cover all the complexities that a manager is expected to deal with in their day to day functioning.

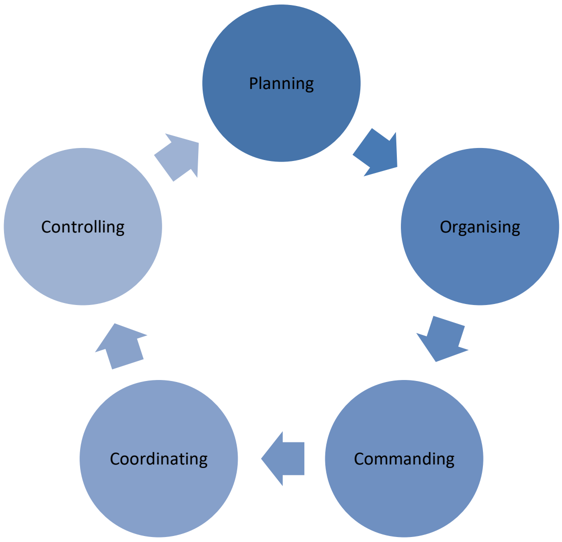

Figure 1.3. Five Management Functions by Henry Fayol

1.5.2. Managerial Roles

The role of managers in an organization is multifold. Henry Mintzberg defined Managerial Roles in 1960. Based on observation, Mintzberg segregated all the roles of a manager into three broad categories, namely, Interpersonal, Informational, and Decisional. He stated that these roles are highly interrelated and reflect a set of behaviours followed by managers in an organization. The detailed description of all three categories of Managerial Roles is as follows-

Interpersonal role of a Manager**:** Interpersonal role of a manager includes three subsets within it. First is "*Figurehead*", a symbolic role where the manager works on routine level work of social and legal nature. This role inspires others in the organization. Secondly, the manager acts as a "*leader*" responsible for hiring, motivating, and directing employees. The third managerial role within interpersonal is called "*Liaison"; under* this role; he builds his network. He can gather the required information through networking with people internal or external to the organization. Such contacts also provide a manager with favours.

Informational role of the manager**:** The informational role of a manager is associated with a process where the manager gathers required information, transfers it into the organization, and transmits it to the outside organization. This role includes three subsets. The first subset is known as "*Monitor*"; under this role; the manager collects information through various sources and analyses the internal and external environment. Later the manager transmits relevant information to other members of the organization; this role also defines the second subset known as "*Disseminator"*. Finally, under the third subset, the manager as a "Spokesperson", transmits the information outside the organization.

Role	Description	Examples of Identifiable Activities
Interpersonal		
Figurehead	Symbolic head; obliged to perform a number of routine duties of a legal or social nature	Greeting visitors; signing legal documents
Leader	Responsible for the motivation of subordinates; responsible for staffing, training, and associated duties	Performing virtually all activities that involve subordinates
Liaison	Maintains self-developed network of outside contacts and informers who provide favours and information	Acknowledging mail; doing external board work; performing other activities that involve outsiders
Informational		
Monitor	Seeks and receives a wide variety of internal and external information to develop a thorough understanding of organization and environment	Reading periodicals and reports; maintaining personal contacts
Disseminator	Transmits information received from outsiders or from subordinates to members of the organization	Holding informational meetings; making phone calls to relay information
Spokesperson	Transmits information to outsiders on organization's plans, policies, actions, results, etc.	Holding board meetings; giving information to the media
Decisional		
Entrepreneur	Searches organization and its environment for opportunities and initiates "improvement projects" to bring about changes	Organizing strategy and review sessions to develop new programs
Disturbance handler	Responsible for corrective action when organization faces important, unexpected disturbances	Organizing strategy and review sessions that involve disturbances and crises
Resource allocator	Responsible for the allocation of organizational resources of all kinds—making or approving all significant organizational decisions	Scheduling; requesting authorization; performing any activity that involves budgeting and the programming of subordinates' work
Negotiator	Responsible for representing the organization at major negotiations	Participating in union contract negotiations

Figure 1.4 Mintzberg Managerial Roles (Source: H. Mintzberg, The Nature of Managerial Work (New York: Harper and Row, 1973), pp. 93–94. Copyright © 1973 by Henry Mintzberg. Reprinted by permission of Harper & Row, Publishers, Inc.)

***Decisional Role of a Manager*:** The manager is not only a symbolic head who manages information or directs employees but also a decision-maker. As an "*Entrepreneur*" manager searches for new opportunities and brings new assignments/ projects to the organization, a manager also initiates change. The manager is responsible for "*handling disturbance*" in the organization. For example, suppose there is some roadblock in the organization's functioning; the manager is responsible for handling it. The manager also acts as a " *Negotiator*", where he represents the organization in all the major negotiations. Lastly, as a "resource allocator," he is responsible for procuring and allocating *resources*.

Functions Vs. Roles

The question arises as to which approach to use to describe what managers do. Roles or functions? Both roles and functions have its own advantages. The functions approach represents the most useful way of conceptualizing the manager's job. Managers carry out so many vast activities and utilize such different techniques that functions are needed to provide clarity and a means for categorizing ways to achieve organizational goals. Many of Mintzberg's roles align well with one or more of the functions. For example, resource allocation is part of planning, as is the entrepreneurial role, and all three of the interpersonal roles are part of the leading function. Although most of the other roles fit into one or more of the four functions, not all of them do. The discrepancy occurs because all managers do some work that is not purely managerial.

IN-TEXT QUESTIONS

1. Efficiency means achieving goals with ______________.
2. Functions of management are part of the classical approach, given by_______
3. _________means completion of given task within planned time frame.
4. According to Mintzberg, manager transmits the information outside the organisation, and this role is termed as _______
5. ________is a symbolic role, under this role manager inspires the employees.
6. The _______stage will remain incomplete unless manager will compare the standard formed at ____stage with actual performance.

1.6. Managerial Skills

It is important to understand the various types of skill which is required to become a good manager with an organization. Robert L. Katz has identified various skills necessary for a successful manager. According to him, a manager needs the following three skills to accomplish their goals-

1.6.1 Technical Skills*:* Technical skills refer to the "*Employees' ability to apply specialized knowledge or expertise while performing the given task*"; in other words, technical skills mean knowledge and the ability to accomplish the given task.

For example, for a manager at ABC Ltd (an audit firm), technical skills could include knowledge about the fundamentals of accounting, Indian Accounting Standard rules, and procedures for conducting an audit. Education/ and qualification are essential for technical skills (like a chartered accountant degree), along with knowledge gained through schooling/ college and/or on the job experience.

1.6.2 Human skills: The primary responsibility of managers is to communicate with employees and coordinate the work between employees. A manager should be able to motivate and lead employees to accomplish the organisation's purpose. In addition, a manager should be able to resolve conflicts in the organization.

For example, An audit manager with a chartered accountant degree might possess sound technical knowledge about the audit process. Still, he won't be able to manage a team or accomplish goals unless he has good human skills (like- the ability to communicate, listen, and motivate; the ability to create good coordination between team and client to achieve the set targets; etc.)

1.6.3. Conceptual skills: The organisational environment today is highly Volatile, Uncertain, Complex and Ambiguous (VUCA) . In such an environment, making a decision based on only past knowledge is not possible . Therefore, to work in a present-day environment, a manager should have the mental ability to deal with complex problems. The ability to analyze a complex problem requires "*Conceptual skills*". Furthermore, for decision-making in the VUCA environment, a manager should have good conceptual skills.

For example, To handle diverse client-specific queries or any challenge posed by the external environment (like the pandemic), a manager needs to analyze the problem, generate various alternatives and choose the best alternative .

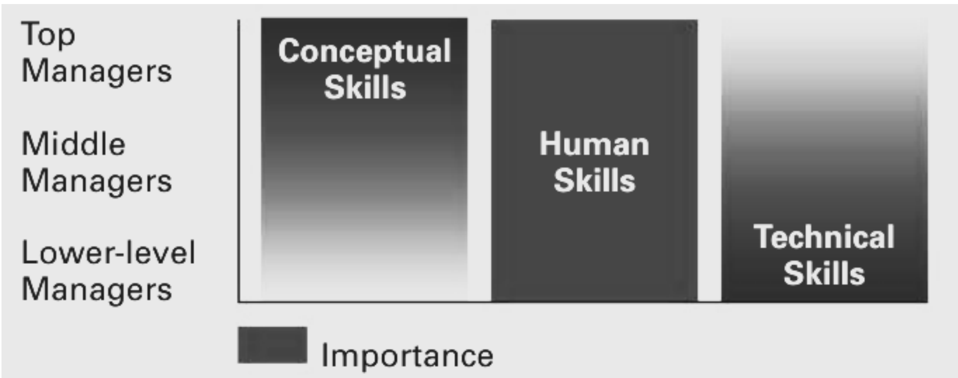

Figure 1.5 Skills Needed at different Management Levels

1.7 Managerial Activities: Effective versus successful Manager

Fred Luthans and his associate found that all managers could be engaged in four activities, namely-

- ***Traditional Management***: This includes planning, organizing, making decisions, etc.
- ***Communication*** includes communicating information, handling paperwork, and exchanging information.

- ***Human resource management***: This includes managing people using human skills (Like motivation, training, handling conflicts, etc.).
- ***Networking***: Building a social network, and interacting with outsiders.

Figure 1.5 Allocation of Activities by Time

Source: Based on F. Luthans, R. M. Hodgetts, and S. A. Rosenkrantz, Real Managers (Cambridge, MA: Ballinger, 1988).

Luthans and his associates conducted an empirical study based on a sample of 450 employees. Their study found that a successful manager spends 48% of their time networking and hardly 13% of their time in traditional management. In contrast, an effective manager spends 44% of their time communicating and barely 11% of their time is spent on networking. An average manager spends 19%-32% of their time in all activities. In a nutshell, networking is an important activity that makes a manager successful.

1.8 Organizational Behavior

The definition of OB suggests that it is a *"field of study*, " meaning it is a distinct area with a common body of knowledge. Further, the field of study investigates individuals or groups to apply this knowledge to increase organizational effectiveness. The study focuses on the behaviour of employees at the group, individual or organizational levels that impact the performance of an organization. The study also focuses on various interpersonal skills that could help to deal with employees effectively. Following are some critical areas in OB-

- Motivation
- Leadership
- Stress management
- Group Dynamics

- Conflict Management
- Personality
- Change proces
- Interpersonal communication

1.9 Major disciplines that contribute to the domain of organizational behaviour

OB is an applied behavioural science. It integrates knowledge from various disciplines like psychology, social psychology, anthropology, sociology, etc.

Psychology: Psychology provides knowledge about factors that determine human behaviour. It includes various sub-disciplines like clinical psychology, industrial psychology, etc. Psychology has contributed to understanding the individual behaviour of employees in an organization. Some key areas in the domain of OB that are influenced by the knowledge of psychology are motivation, perception, personality, work stress, employee happiness, attitude, etc.

Sociology: Psychology deals with an individual's behaviour whereas sociology deals with the behaviour of a group. The domain of Sociology includes status, society, social groups, prestige, social behaviour, etc. Some key areas in the domain of OB that are influenced by the knowledge of sociology are formal and informal organization, group dynamics, etc.

Social Psychology: The bent of psychology and Sociology is termed Social Psychology. In simple words, it means the influence of group members on individual members of the group. Some key areas in the domain of OB that are influenced by the knowledge of social psychology are group decision-making, change in attitude, behaviour, communication, etc.

Anthropology: Anthropology deals with the study of human culture. It includes knowledge of various cultures and the impact of multiple cultures on human. With globalization, workforce diversity is inevitable, and employees from different cultures come together to accomplish organizational goals. Therefore, it is essential to understand the influence of culture on human behaviour. Some key areas in the domain of OB that are influenced by the knowledge of anthropology are cross-culture influences, values, etc.

1.10 Level of analysis in organizational behavior

There are three levels of analysis in organizational behaviour. Employee behaviour can be analyzed at three levels (individual, group, and organizational). The individual-level analysis is a micro-level analysis, whereas the organizational-level analysis is a macro-level analysis. This difference in the analysis is required because it has been observed that the behaviour of employees is different when they work in groups compared to when they work individually.

1.10.1 Individual level analysis-

This is the first level of OB analysis. Unlike static resources, humans as a resource differ from one another. The concept of psychology plays important role in the individuals level analysis. The behavior of each individual is different from others due to differences in social, cultural and other environmental variables. Organizations are made up of people, and every employee in an organization is central to the study of OB. Individual-level analysis or micro-level analysis helps in understanding individual differences. Integrating these individual factors provides insights to a manager and facilitates an understanding of human behaviour. Some topics that fall under this category could be an input (like- personality, values, attitude, etc.) or a process (like perception, learning, motivation of individual employees, etc.)

1.10.2. Group level analysis:

The organization consist of more than two individuals and all the individuals are expected to work in a group. Working in teams is essential for surviving in a competitive environment. Individual employees perform differently when they work in groups. The group-level analysis, also known as meso-level analysis, helps understand group dynamics. Areas of interest in this category include group cohesiveness, teamwork, power, politics, group dynamics, etc.

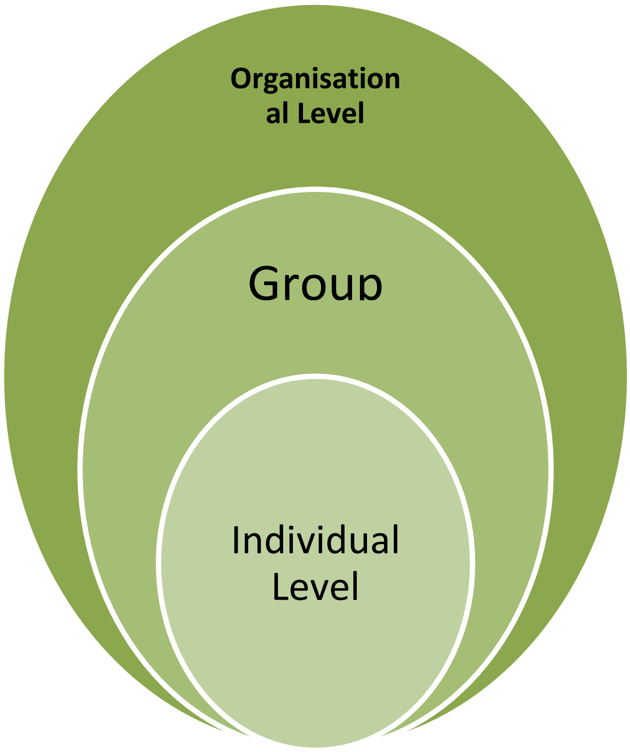

Figure 1.7 Level of analysis in Organizational behavior

1.10.3. Organization-level analysis: It is also known as macro-level analysis. Several groups/teams operate within an organizational structure. They together form the culture. Sociology, anthropology, and political science are the major disciplines contributing to this level. The organizational level analysis consists of a study of culture, climate, cross-culture analysis, etc., For example, it has been observed that employees often resist change, and change is an inevitable process. OB helps deal with resistance to change and facilitates a smooth change process.

IN-TEXT QUESTIONS

7. Level of organisation could be broadly classified into _______categories.

8. Individual level analysis is also known as micro level analysis. True / False

9. Following title could not related to individual level analysis-

a) Personality b) Attitude
c) Values d) Culture

10. __________ is also known as meso level analysis.

11. Organization represents a set of arrangement by group of people to accomplish some underline _________.

1.11 Challenges and Opportunities in Organizational Behavior

Organizational behaviour has grown in importance as the work environment has become more challenging, and the understanding of organisational behavior is being looked upon to provide solution to the challenges. The diversity in the workplace has increased, and now organizations need more flexible employees. With technological advancement and globalization, new employment opportunities have emerged, and managing the workforce has become more challenging. The emerging gig economy and the use of artificial intelligence in all spheres of business are presenting new challenges for managers. Following are emerging challenges where understanding of OB could provide a solution and an opportunity for a manager to use concepts of OB-

Responding to Globalization: Globalization refers to the integration of various economies. Today businesses are no longer restricted to a particular region. Today companies sell products in multiple countries; for example, Samsung is a South Korean company it sells its product worldwide; Brazilian company Burger King and others sells their products worldwide. Companies hire employees from other countries due to the cost of labour; like Apple is the US company, but most Apple employees are not from the US. Even the production process is undertaken in a foreign land by some companies like Honda cars are built in Ohio. The world has become a "Global village". Therefore, a manager needs to focus on global issues. An expatriate manager must understand the cultural differences among employees and that the legal system varies from country to country. Something that fits the culture or legal system of the homeland might not work in other countries cultures or the legal system.

Managing Workforce Diversity: Workforce diversity means differences and similarities between employees in terms of gender, ethnicity, race, sexual orientation, age, value, etc. Presently organizations are operating globally, which means they have to deal with people of diversity. The heterogeneous workforce is essential because it helps the organization understand the customer needs, it helps in bringing new innovative ideas to the organization, and increases the morale of other employees. But the diversified workforce is also a challenge for management. It is difficult to resolve conflicts as people tends to stick to their viewpoints which often centres around their values, belief, religion, or cast.

Improving customer service: Employees in front roles (directly dealing with customers) play an essential role in ensuring customer satisfaction. In addition, customer satisfaction plays a vital role in a competitive environment. Therefore, there is a need for a "customer-responsive" culture in an organization. Organizational behaviour could help managers bring such a culture into the organization by working on employees' attitudes and behaviour.

Working in Networked Organization: Network organizations allow employees to work together even when they are far away from each other in terms of distance. Worldwide lockdown around 2020 due to the pandemic (Covid-19), forced most organizations to move to the virtual platform. Even today in 2022, many businesses are still working through virtual platforms or have permanently adopted a hybrid mode. Managing such an organization needs a different set of skills, presently collaborating and coordinating with employees through online mode is an emerging challenge for managers.

Helping employees in Work-life balance: Employees today find it challenging to create a balance between their work and life. Long working hours are one of the main reasons for work-life conflict. Today, employees from all over the world are virtually connecting through online platforms. It may be a day-time for one employee and a night for another employee. So, the world never sleeps. Work is endless, and there is no specific working time. Such conditions of present-day work lead to work-life conflict. Work-life conflict could increase burnout and stress among employees and, as a result, could drop the employee's productivity.

Creating a positive work environment: The new wave of positivity within the organization led to the growth of a new concept of positive organizational behaviour

(POB), a study that focuses on the strength of employees. The earlier focus of managers was to work on the weakness of the employees or correct what is wrong, but the field of POB suggests that the focus needs to be deviation from what is wrong to what is right. Therefore, a manager today needs to learn how to get the best from the strengths of the employees.

Improving ethical behaviour: It is not that employees always want to do something considered wrong on moral grounds for their benefit or that they are not aware of what is right or ethical. It is just that people at work face Moral Distress, i.e., they mostly know what is right, but due to the limitations and fear of adverse outcomes, they fail to do the right thing. There is no clear line between what is right and wrong. Still, a manager needs to create an "ethically- health climate", which could minimize the vagueness between right and wrong behaviors. Further, It is important to promote integrity in the organization at all levels.

Economic Pressure: Managing employees in bad times, like during Covid-19, is more challenging than managing employees in good times. The spread of the novel Covid-19 in the year 2020 forced us to ensure social distancing and put a limit on travelling, which badly impacted businesses at all levels. Besides impacting health conditions, the pandemic has pushed organizations to go for cost-cutting. Therefore, COVID -19 pandemic can be regarded as a negative factor that has suddenly changed the business environment and presented unprecedented challenges to most businesses and their management. Under good economic conditions, managers work on employee motivation through rewards, but under bad economic conditions, managers need to deal with the growing stress conditions in the workplace.

The above challenges could also provide various opportunities to present-day managers. For instance, workforce diversity brings new ideas to the organization but could also lead to increased conflicts. Therefore, a manager must learn how to convert these challenges into opportunities.

IN-TEXT QUESTIONS

12. To coordinate with employee's manager needs _______ skills.

13. Role of manager is changing and becoming more challenging due to the technological advancements. (True/False)

14. ______suggests that the focus needs to be a deviation from what is wrong to what is right.

15. A manager needs _______ to analyse complex nature problem.

1.12 Managerial Implication

The following are the implications for the managers-

1. Human behaviour is complex, and it is challenging to generalize human behaviour. Though some provide insights for understanding and generalizing human behaviour, most of them are erroneous.
2. Managers often try to use intuition/idea/ or feeling while explaining cause-and-effect relationships. But sometimes feelings lead to incorrect decisions. Therefore, it is important to use metrics and rely on facts.
3. Managers should learn interpersonal skills. In a managerial role, soft skills like empathy, communication, leadership skills, etc., are way more important than technical skills.
4. Work environment is changing continuously. Hence a manager needs to upgrade their technical and conceptual skills. In addition, managers must also update themselves with the new OB trends like Big Data.
5. Concepts of OB could provide various insights that could help a manager resolve conflicts, improve work-life balance, reduce stress, etc.

1.13 SUMMARY

The lesson aims to highlight the meaning of organizational behaviour, the need for interpersonal skills, and the manager's various functions and roles. The present-day managerial roles have changed with technological advancement, globalization, organizational structures, and changing employees' lifestyles at all levels. A manager needs to learn how to convert these challenges into opportunities. Additionally, with increasing complexity in an organization, the skills required by a manager could also vary. The skills required to be a manager could also be bifurcated into three categories (namely, technical skills, human skills, and conceptual skills). The domain of organizational behaviour integrates the knowledge drawn from various disciplines like psychology, social psychology, anthropology, sociology, etc. It helps in understanding people's behaviour at an individual, group, and organisational level. It applies knowledge that enhances organizational effectiveness.

1.14 Answers To In-Text Questions

1. Minimum Resources 2. Henry Fayol 3. Effectiveness 4. Spokesperson (or Informational role of manager 5. Figurehead 6. Planning Stage 7. Three 8. True	9. Culture 10. Group-level analysis 11. Purpose/ goal (Both are correct) 12. Human skills 13. True 14. Positive Organisation Behaviour 15. Conceptual Skills

1.16 Self-Assessment Questions

1. Assume you become a bank manager of a bank. As per Mintzberg's theory, what roles do you think you will be required to play as a manager? *(BMS; Open book exam)*
2. An effective manager may not be an efficient manager. Comment. Also, explain the various skills required by a manager to be a successful manager.
3. Explain the difference between various levels of management, along with a suitable example.
4. Define Organisation Behaviour. Why is understanding organisational behaviour so important for every organisation ?
5. Write a short note on the functions of a manager. State how functions of management are different from managerial roles.
6. Explain various challenges faced by a present-day manager. Elaborate on how the role of a manager is changing with time.

7. "Management is a universal concept". Do you agree? Comment.

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LESSON 2

PERSONALITY AND LEARNING

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STRUCTURE

2.1 LEARNING OBJECTIVES

After this lesson, you will be able to:

1) **Understand** the concept of personality and the various factors that determine personality.
2) **Identify** various types and theories of personality.
3) **Comprehend** how personality develops from its infancy to maturity.
4) **Examine** how personality traits influence organizational behavior.
5) **Understand** the concept of learning.
6) **Explain** various theories of learning.

2.2 INTRODUCTION

One of the crucial psychological components that affects an individual's behavior is *personality*. Personality is the role that an individual performs in public. The personality of an individual is distinct, personal and a major determinant of his/her behavior. Another important aspect is *learning*. Learning is a fundamental psychological process that influences human behavior. The learning process impacts all human behaviors, either directly or indirectly. Learning may be defined as the acquisition of new behavior in an interactional context. Hence, it is important to understand the concept of personality and learning in shaping individuals' behavior.

This lesson is broadly divided into two parts – personality and learning. The lesson on personality briefly discusses the concept and various factors that determine personality. Then, various types and theories of personality are identified and explained. The lesson also explores the development of personality and examines how personality traits influence organizational behavior. The lesson also offers ways of measuring personality. The next part of the lesson discusses the concept of learning. Consequently, the lesson delineates various learning theories that are important in organizational behavior.

This lesson will help the learners to understand various traits and theories of personality as well as theories of learning and also understand their significant impact on organizational behavior. This will assist them in shaping their behavior in real-life situations.

2.3 PERSONALITY

2.3.1 Concept of Personality

The English term "personality" has been originated from the Latin word "persona," which means "to *speak through*." Originally, the Latin term refers to the masks used by the actors. Personality may be defined as the sum total of an individual's reactions and interactions with others. As a result, personality is the role that an individual performs in public. Personality does not just refer to a person's charm, appearance, smiling face, and attitude toward life. However, it is a dynamic notion that represents the evolution and development of an individual's entire psychological system. Traditionally, the idea of personality pertains to how individuals affect others through their outer appearances and conduct. Therefore, personality is a reasonably consistent set of characteristics that impact an individual's behavior. Personality was interpreted differently by different psychologists. Let us explore some definitions of personality that will assist us in understanding personality in a much better sense.

According to Hilgard et al., personality is defined as "*the characteristic patterns of behavior and modes of thinking that determine a person's adjustment to the environment".*

In the words of Gordon Allport, personality is defined as "*the dynamic organization within the individual of those psychological systems that determine his unique adjustment to his environment".*

Fred Luthans has defined personality as *"how a person affects others and how he understands and views himself as well as pattern of inner and outer measurable traits and the person-situation interaction."*

As per Floyd L. Ruch, "*Personality includes external appearance and behavior, inner awareness of self as a permanent organizing force and the particular pattern or organization of measurable traits, both inner and outer*".

Thus, it is understood from the above definitions that the meaning of personality is considerably more than just the part that an individual performs in public. Integrating all of these definitions, one may say that personality is the sum of various characteristics that are evident in an individual and define his behavior pattern.

2.3.2 Determinants of Personality

In this section, we shall try to understand what determines the personality of an individual. Is an individual's personality predetermined from birth itself or is it the consequence of how they interact with their environment? However, frankly speaking, there is no clear-cut answer to this question. It is said that an individual is born with certain mental and physical characteristics, but the personality is shaped by the environment in which the person has been raised. Numerous factors determine personality which is broadly characterized by four factors namely biological factors, family and social factors, situational factors and environmental factors (Fig 2.1). Let us discuss them one by one.

Biological Factors

Biological factors are those factors that are related to the human body. It includes three factors – Heredity, Physical attributes, and Human Brain. (a) ***Heredity*** refers to the characteristics of an individual's personality that are passed down from parents to their children that are decided at the time of conception. Physical stature, hair color, facial attractiveness, eye color, temperament, sex, reflexes and energy level are examples of heredity characteristics that are often inherited totally or partially from the parents; (b) ***Physical attributes*** such as height, color, facial attractiveness, physical strength, etc., influences personality, and (c) ***Brain's*** composition and structure also have a significant impact on one's personality.

Environmental Factors

Environmental factors are those factors that exist within and around an individual. Culture creates rules, attitudes and values that are imposed by various social groups. Individuals are obliged to adapt to the culture that society has built. Every culture has its sub-cultures that further specify success criteria, moral standards, appropriate style of dress, and cleaning standards. These cultural subgroups have a large influence on an individual's personality development. For example, a girl born and raised in a rich family in an urban region will act differently than a girl born and raised in a poor family in a slum area. Thus, culture has a stronger impact on an individual's personality.

Family and Social Factors

Family and social factors have a vital role in developing an individual's personality. Personality is influenced by three key factors – Socialization, Identification, and Birth Order. (a) ***Socialization*** refers to the process by which a newborn acquires a wide variety of behavior from the extremely vast range of behavioral potentialities that are available to him at birth. Those patterns of behavior are considered acceptable and normal by his family and social groups. (b) ***identification*** process happens when a person attempts to identify himself with someone in the family who he considers ideal. Normally, a child emulates his father or mother, and (c) Another important factor determining an individual's personality is ***birth order***. For instance, firstborn children are more likely to be reliant, logical, ambitious, cooperative, diligent and less aggressive, as well as more prone to anxiety and guilt.

Situational Factors

Situational factors have a significant impact on personality. In general, an individual's personality is constant and stable, yet it fluctuates depending on the situation. Life is typically described as a series of experiences. Every person goes through many situations in one's life that have a significant impact on the personality development. It sometimes boosts an individual's behavior and sometimes exercises restrictions. For example, a coward and a physically frail person might occasionally act bravely to save the life of his close one.

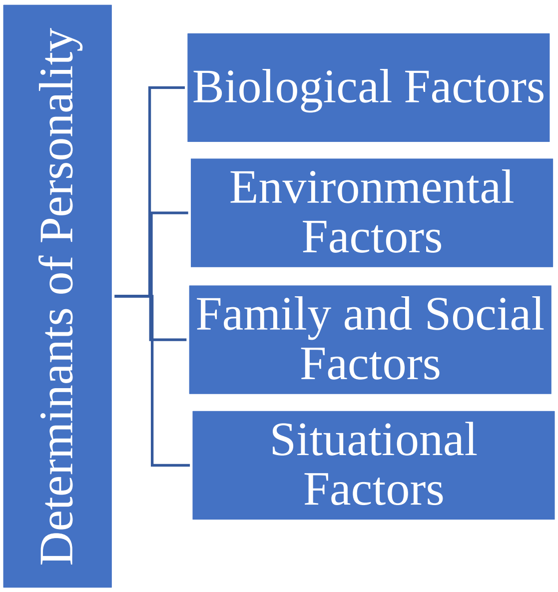

Fig 2.1: Determinants of Personality

2.3.3 Development of Personality

Two most prominent psychologists described the development of personality namely Sigmund Freud and Erikson. Let us discuss them one by one.

Sigmund Freud's Stages of Personality Development

Sigmund Freud proposed that there are five universal stages of personality development namely oral, anal, phallic, latency and genital. These stages are explained below (Fig 2.2):

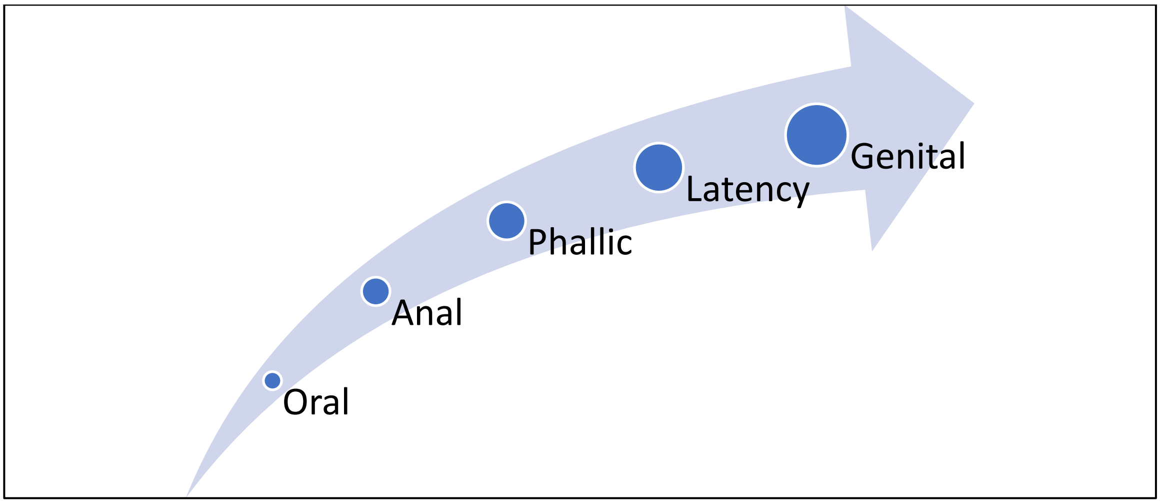

Fig 2.2: Sigmund Freud's Stages of Personality Development

- **The Oral Stage (first year):** During this stage, the child's mouth is the most sensitive area of the body and the primary source of pleasure and joy. For instance, an infant's thumb sucking or biting when teeth erupt.
- **The Anal Stage (one to three years):** In this stage, the energy transfers from the mouth to the anal area. Toilet training provided by the parents to the child will have an impact on the child's adulthood.
- **The Phallic Stage (three to six years):** In this stage, the focus on sexual enjoyment moves to the sex organs. During this time, children found themselves inspecting and fondling their genital organs.
- **The Latency Stage (until puberty):** At this stage, the child lacks interest in sexual things. It is a stage of social development during which the child gains information and abilities for interacting with the outside world.
- **The Genital Stage (Puberty to Adulthood):** In this stage, there is again the desire for sexual enjoyment as well as an enhanced awareness of a desire for the opposite sex.

Erikson's Stages of Personality Development

Erikson criticized Freud's emphasis on biological and social factors in the development of personality. He believed that social concerns should be given more consideration. Erikson established eight stages of life that reflect a person's continuous development. He described each stage by a specific conflict that must be successfully resolved before moving on to the next. These eight stages (Fig 2.3) are explained below:

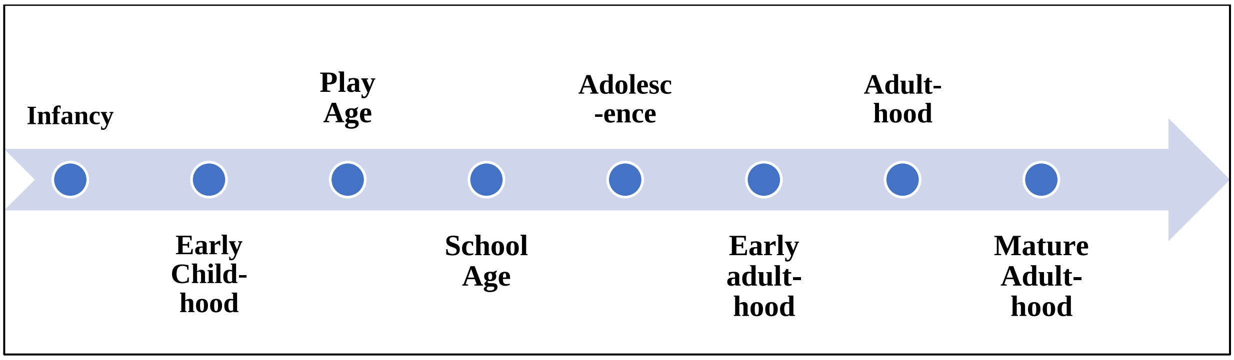

Fig 2.3: Erikson's Stages of Personality Development

- **Infancy (first year):** In this stage, a child resolves the fundamental problem of ***trust vs. mistrust***. An infant who receives love and care develops a sense of trust for other people whereas mistrust develops from a lack of love and care. This period has a significant impact on a child's future events.
- **Early Childhood (second and third year):** At this stage, a ***sense of autonomy*** will emerge if the child is permitted to govern those parts of life that the child is capable of

controlling. If the child often faces rejection from adults, a ***sense of self-doubt and humiliation*** is likely to emerge.

- **Play Age (fourth and fifth year):** At this stage, a child will acquire a ***feeling of initiative*** if he is encouraged to try and attain appropriate goals. If the child is controlled and made to feel incompetent, he will develop remorse and a lack of ***self-confidence***.
- **School Age (between sixth and twelfth year):** At this stage, a child learns numerous new skills and develops social talents. A child will acquire a ***sense of enterprise*** if he/she is able to acquire appropriate skills and abilities whereas, in the opposite scenario, a child will acquire a ***sense of inferiority***.
- **Adolescence (till nineteenth):** The adolescent is simultaneously attempting to ***identify*** himself or herself as socially distinct from the parents.
- **Early adulthood (twenties):** The young adult in his or her twenties faces the ***conflict of intimacy*** against isolation. The feeling of identity acquired throughout the adolescent years permits the young adult to build meaningful relationships.
- **Adulthood:** During this stage, adults must choose between ***generativity and self-absorption***. The generative individual perceives the world as much larger than themselves and for them, workplace productivity and societal growth become vital, whereas, self-absorbed individual never learns to see beyond themselves and focus on maintaining and advancing their careers.
- **Mature Adulthood:** In this stage, an individual is developed as a very mature individual (***sense of wisdom or despair***). He has gathered enough knowledge and perspective for leading future generations.

2.3.4 Types of Personality

There are numerous personalities that differ in traits. Guilford (1959) defined trait as "*any distinguishable, relatively enduring way in which one individual differs from another*". Personality qualities help people understand their personality types. The following personality types have been discussed below:

Type A and Type B Personalities

Individuals are termed as Type A personalities who are impatient, highly competitive and aggressive whereas Type B personality individuals are easy going, non-competitive and laid-back. Type A individuals are likely to be very productive as they work hard, however, they are more irritable, not good team players, impatient and have poor judgement, whereas Type B individuals perform better on complex tasks involving accuracy and judgement rather than hard work and speed.

The Big Five Personality Model

The Big Five Personality Model identifies five essential personality dimensions namely conscientiousness, emotional stability, extraversion, agreeableness, and openness to experience. These factors are discussed below:

- **Conscientiousness:** A person who is more trustworthy, reliable, systematic, achievement-oriented and organized.
- **Emotional Stability:** A person who is usually calm, secure and self-assured.
- **Agreeableness:** A person who is compassionate and cooperative.
- **Extraversion:** A person who is more talkative, friendly, social and self-assured.
- **Openness to Experience:** A person who is incredibly creative and is constantly open to new ideas.

Introversion and Extroversion

These terms are usually associated with the sociability and interpersonal orientation of an individual. While extroverts are more gregarious, introverts are more self-assured and driven by their own distinct thoughts. Extroverts are reality-oriented, sociable individuals and are performers. Introverts, on the other hand, are less risk-taking and more directive. They need strong encouragement and clear instructions. While extroverts think in terms of interactive and objective interactions, introverts think in terms of their own philosophy and belief.

The Myers-Briggs Type Indicator (MBTI)

The MBTI is a personality assessment instrument that is widely used across the world. This instrument consists of 100 statements on human personality and asks individuals how they generally feel in specific scenarios. Based on the responses provided by the individuals, they are categorized as:

- **Thinking vs. Feeling (T or F):** Thinking individuals are more logical and sensible in general whereas, feeling types of individuals often base their decisions on their own morals and feelings.
- **Extraverted vs. Introverted (E or I):** Extraverted individuals are outgoing, friendly, and self-assured, whereas introverted people are calm and reserved.
- **Judging vs. Perceiving (J or P):** Judging personalities appreciate order and organization in their surroundings and seek control, whereas perceiving personalities are more adaptable and impulsive.
- **Sensing vs. Intuitive (S or I):** Sensing individuals are highly practical and tend to stick to routines and orders. In contrast, intuitive individuals are not practical and typically rely on unconscious processes.

The individuals are categorized into 16 different personality types based on the higher and lower scores in each of these characteristics. For instance, Introverted/ Intuitive/ Thinking/ Judging (IITJ) persons are self-sufficient, driven, excellent creative thinkers, and have a strong desire to pursue their own ideas whereas, Extraverted/Sensing/Thinking/Judging (ESTJ) people are effective organizers and decision makers because they are logical, reasonable, and analytical. As a result, it can be stated that MBTI is a highly effective instrument that is frequently used for employee selection, enhancing self-awareness, and offering career direction.

IN-TEXT QUESTIONS

1. Height, color, facial attractiveness, physical strength, etc., are examples of which factor of personality?
   a) Biological b) Environmental
   c) Situational d) Social
2. When a person attempts to identify himself with someone in the family who he considers ideal it is known as:
   a) Birth order b) Physical Attributes
   c) Identification d) Socialization
3. Which dimension of the Big Five Personality Model defines a person who is usually calm, secure and self-assured?
   a) Conscientiousness b) Extraversion
   c) Emotional Stability d) Agreeableness
4. ________individuals are highly practical and tend to stick to routines and orders.
   a) Extraverted b) Sensing
   c) Thinking d) Feeling
5. ____________ are more self-assured and driven by their own distinct thoughts.
   a) Extraverts b) Introverts
   c) Judging d) Perceiving

2.3.5 Theories of Personality

There are so many definitions of personality and theories of personality. But there is no consensus among the theorists regarding personality theories. The most prominent personality theories among others are trait, self-concept, psychoanalytic and socio-psychological theories. Let us discuss them one by one.

Trait Theory

According to trait theory, an individual is made up of a set of traits. These traits are identifiable and often long-lasting qualities of an individual that set him apart from others. Furthermore, the traits remain constant over time There are two main trait theories namely:

- **Allport Trait Theory:** This theory was proposed by Gordon Allport. According to him, an individual's personality may be examined by distinguishing between common traits and personal dispositions. The common traits are used to compare people based on six values i.e. religious, economic, social, political, theoretical and aesthetic. Apart from common traits, there are personal dispositions that are distinct such as selflessness, friendliness, loyalty, kindness, agreeableness, etc.
- **Cattell's Trait Theory:** Raymond Cattell developed this trait theory. According to him, a vast number of factors should be investigated to have a good understanding of an individual's personality. He identified 16 key personality factors (Table 2.1).

Table 2.1: Cattell's 16 Key Personality Traits

Traits	
Abstractedness	Imaginative Vs. Practical
Apprehension	Worried Vs. Confident
Dominance	Forceful Vs. Submissive
Emotional Stability	Calm Vs. anxious
Liveliness	Spontaneous Vs. Restrained
Openness to Change	Flexible Vs. Stubborn
Perfectionism	Controlled Vs. Undisciplined
Privateness	Discreet Vs. Open
Reasoning	Abstract Vs. Concrete
Rule-Consciousness	Conforming Vs. Non-Conforming
Self-Reliance	Self-sufficient Vs. Dependent
Sensitivity	Tender Vs. Tough
Social Boldness	Uninhibited Vs. Shy
Tension	Impatient Vs. Relaxed
Vigilance	Suspicious Vs. Trusting
Warmth	Outgoing Vs. Reserved

Self-Concept Theory

Carl Rogers has made substantial contributions to the self-concept theory. The self-concept theory is described as a theory that talks about "***I** or **Me***". This theory focuses on an individual's set of perceptions about himself, as well as the perceptions of his interactions with others and other areas of life. There are four factors included in self-concept theory: (a) **self-image** (refers to as "*what an individual perceives about himself"*), (b) **ideal-self** (refers to the "*way an individual would like to be*"), (c) **looking glass-self** (refers to "*an individual's impression of how others see his attributes or feel about him*"), and (d) **real-self** (refers to "*what others show you in terms of your self-image*").

Psychoanalytic Theory

The psychoanalytic theory is yet another personality theory that is based on the notion that an individual is more driven by unseen forces that are influenced by conscious and logical thinking. There are three elements included in psychoanalytic theory- Id, super-ego and ego. (a) ***Id*** is the unconscious component of the mind that acts instantly and without giving any consideration to what is right and wrong, (b) ***Super-Ego*** is associated with the social or moral norms that an individual instills as he gets older, and (c) **Ego** is the rational and conscious aspect of the mind that is linked to the reality principle.

Socio-Psychological Theory

According to the socio-psychological theory, the person and society are closely linked. This indicates that an individual seeks to satisfy the demands of society and society assists him in accomplishing his goals. An individual's personality is formed as a result of this interaction. Hence, the socio-psychological theory is a mix of social (family, religion, society, money) and psychological (ideas, feelings, beliefs) factors that are regarded to have a significant impact in determining an individual's personality.

2.3.6 Personality Assessment

There are numerous ways through which one can assess the personality of individuals. Depending on the goal of the personality assessment, the usage of assessment methods for understanding personality may change from time to time and from circumstance to circumstance. The three most significant ways that are extensively employed are assessment center, personality inventories and projective tests. A brief discussion of each is as follows:

Assessment Centre

An assessment center is a tool that is used to examine personality. The primary goal of this approach was to evaluate applicants in a social setting. Situational tests, management difficulties, business plan presentations, in-basket exercises, scenario-based decision-making exercises and other simulated activities are used to evaluate personality. Individuals are required to take part in these activities. Multiple trained assessors, who might be from inside or outside the business, monitor the applicants' behavior and grade them based on specified aspects considered significant in their job. A job analysis is used to discover the critical aspects of a job. Each assessor creates an evaluation report for each applicant in the assessment exercises. Finally, all of the reports are combined to create the employee's profile. This approach is beneficial for both the organization as well as employees. Organizations gather enough information about their employees to determine their strengths and weaknesses which assists them in planning the selection, training, career paths and promotions of their employees. On the other hand, employees gather favorable impressions about their jobs, chances of promotions and long-term loyalty to the organization. Many Indian companies, including Hindustan Lever, Modi Xerox, Crompton Greaves, Eicher, etc., have embraced this approach of assessment. This approach, however, is not without limitations. One is that many stimulating approaches could not accurately represent the circumstance, and as a result, the applicant might not act genuinely. Second, even if the employee will be evaluated by many assessors, the halo effect in terms of personal abilities may affect the assessment.

Personality Inventories (Objective Tests)

Personality inventories (often known as objective tests) are the most widely used method of measuring personality. They are standardized and can be administered to a large group of people at the same time. They are a questionnaire-based way of assessing personality that asks an individual to express reactions or feelings in certain scenarios. Individuals are asked to indicate their level of agreement or disagreement with each statement. Sometimes even a simple yes or no answer pattern is required. However, these replies are considered to have drawbacks such as faking a positive reaction. This highlights the importance of taking corrective actions to avoid and manage these drawbacks in order to generate a more and more trustworthy personal inventory. One method is to ask both positive and negative statements about the same aspects of personality, as well as to reverse the degree of agreement or disagreement values. The most popular personality inventories is the 'Locus of Control' developed by J. B. Rotter. As per Rotter, locus of control is a method of personality assessment that examines an individual's internal and external orientation, as well as his or her attitude toward control. On the basis of this, individuals are usually categorized into two extremes i.e. internal and external locus of control. People with an "*internal locus of control*" are those who think they have total control over their destiny and luck, whereas, people with an “*external locus of control*” are those who feel that what occurs to them is completely at the mercy of forces outside their control. The locus of control influences the individual’s behavior and performance.

Projective Tests

Projective tests, as opposed to the inventory method of personality measurement, are primarily used to determine the more subtle characteristics of personality. As a result, these tests are predicated on the underlying fundamental beliefs that an individual’s personality may be judged by assessing some of his or her dormant feelings, ambitions, aspirations, and hopes. Numerous projective tests for assessing personality have been developed over time. Projective tests include the Inkblot Test, Sentence Completion Test, Thematic Appreciation Test (TAT), Picture Frustration Test and World Association Test. Among them, the most extensively used projective test to measure

personality is the Inkblot test, popularly known as the Rorschach Test, devised by the Swiss psychiatrist named Herman Rorschach. In the Inkblot test, Rorschach employed ten ambiguous and unstructured images termed inkblots, with one-half identical to the other. The individuals are then shown these inkblots/images and asked to describe what they perceive in the inkblots/images. The interpretations of these inkblots/images represent their sentiments or feelings, which serve as the foundation for their personality assessment. Whereas, Morgan and Murrary devised the Thematic Appreciation Test (TAT) projective test, which is also used to measure an individual's personality. It is made up of twenty images that depict various societal situations. Unlike the Rorschach test, these images depict a more precise picture of a situation. Individuals are then asked to compose a story about what may be happening in such a social context.

2.3.7 Personality Traits Influencing Organizational Behavior

By now, you have learned numerous personality types and theories that help to determine one's personality. The personality traits of employees are used to analyze their behavior and to build appropriate tactics to cope with their behavior. Some of the most important personality attributes that impact organizational behavior are:

Locus of control

The belief about the results of their actions is termed the locus of control. Some people feel that their talents and abilities have an impact on the result of an activity. Others think that external factors such as fate or chance impact their outcome. Individuals who feel they have control over what happens to them are termed *internals*, whereas those who believe it is governed by other forces such as luck or chance are called *externals*.

Internals are typically more satisfied with their jobs and are more active in seeking out information to make decisions than externals. Externals are more likely to be absent from their work, less satisfied and less committed to their jobs than internals.

Machiavellianism

The term Machiavellianism is named after the works of Nicolo Machiavelli. Machiavellianism refers to an individual's tendency to manipulate others in order to gain and achieve power. Such people are more inclined to be active in organizational politics. Those individuals who exhibit this attribute with greater intensity are known as high Machs.

High Machs are more realistic, emotionally stable, and willing to use any means to attain their goals. They manipulate more and generally win more. They are more likely to succeed in an environment with few rules and restrictions and are more self-assured and have higher self-esteem. They perform well in jobs that are more rewarding or that demands bargaining skills.

Self-Esteem

A sense of liking or disliking oneself is referred to as self-esteem. A person with a strong drive for achievement is said to have high self-esteem. He feels he has the necessary skills to succeed in his work.

People who have high self-esteem are risk-takers. They like dangerous and difficult tasks. They have an internal locus of control. They value pride, flair, recognition, achievement, and independence and are fulfilled with higher-order requirements over simple monetary motivation. People with low self-esteem, on the other hand, are impacted by external factors. They value and appreciate other individuals' perspectives more. They do not wish to be in an uncomfortable situation. As a result, they strive to please.

Self-Monitoring

Self-monitoring is the capacity to adjust to the demands of the situation. Individuals with a high self-monitoring score closely examine the behavior of others to change their own behavior. They value professional mobility. They are more effective at performing opposing roles. These individuals can wear a mask that is more appropriate to the situation. As a result, highly self-monitoring persons exhibit a high degree of behavioral inconsistency.

Therefore, the self-monitoring attribute assists managers in understanding their subordinates' personalities and behaviors to guide, motivate, communicate and control them on the job.

Risk Taking

People's attitudes toward taking risks vary. The willingness to accept risks impacts decision-making. Risk-takers are more inclined to make quick decisions. Taking risks is also linked to job demands.

High risk-taking is more prevalent in some castes, nationalities, religions and gender groups. Risk-taking behavior in organizations is connected to employees' capacity to take up difficult jobs and possess a high level of achievement motivation.

IN-TEXT QUESTIONS

6. Which theory is based on the notion of "I or Me" perception?
   a) Psychoanalytic Theory b) Self-Concept Theory
   c) Socio-Psychological Theory d) Trait Theory
7. Which element of mind in Psychoanalytic theory is conscious of the realities of the external world?
   a) Id b) Ego
   c) Super Ego d) None of the above
8. Individuals who feel that they have control over what happens to them are termed as:
   a) Internal Locus of Control b) Machiavellianism
   c) External Locus of Control d) Self-Esteem
9. ___________refers to an individual's tendency to manipulate others in order to gain and achieve power.
   a) Machiavellianism b) Locus of Control
   c) Self-Esteem d) Self-Monitoring
10. Picture frustration tests is an example of___________.
    a) Projective Tests b) Personality Inventories
    c) Assessment Centre d) Regressive Tests

2.4 LEARNING

2.4.1 Concept of Learning

Learning is the transformation of one's behavior as a result of education, training, practice and experience. It is accompanied by the accumulation of relatively permanent knowledge, skills, and experience. The following definitions will help you better understand the notion of learning:

E. R. Hilgard defined learning as "*a relatively permanent change in behavior that occurs as a result of prior experience*."

According to W. McGehee, "*learning has taken place if an individual behaves, reacts responds as a result of an experience in a manner different from the way he formerly behaved*".

Learning entails change, which can be positive or negative from the perspective of organizations. Changes cannot always be attributed to learning. Learning is the process through which an individual's behavior changes in a relatively permanent way. Learning cannot be associated with any temporary change. Individuals' behavior should reflect their learning.

Learning does not occur when a person's beliefs, opinions, or perceptions change without corresponding changes in their behavior.

2.4.2 Concept of Learning

To explain the phenomena of learning, several theories and models of learning have been developed. There are four theories that describe how individuals acquire new behavioral patterns. These theories can be categorized as:

- Classical Conditioning
- Operant Conditioning
- Cognitive Learning
- Social Behavior

The following theories and their implications for enhancing an individual's learning and behavior are discussed below:

Classical Conditioning

Classical conditioning is defined as the connection of one event with another desired occurrence resulting in a desired behavior or learning. It is a type of conditioning wherein an individual responds to some stimulus that would normally induce such a response. Famous Russian psychologist Ivan Pavlov conducted the experiment on classical conditioning that has received the greatest attention. Pavlov aimed to create a stimulus-response relationship in a study with dogs. Pavlov was awarded the Nobel Prize for his work in this area. Pavlov attempted to link dog salivation with the ringing of a bell in his experiment on dogs. Using a surgical technique, the quantity of saliva secreted by the dog was assessed. Initially, Pavlov showed the dog a piece of meat as part of the experiment and he observed a great deal of salivation. He termed the food an *unconditional stimulus* and the salivation an *unconditional response*. So, when the dog saw the meat, it salivated.

During the second stage, Pavlov withheld the meat and instead rang a bell (neutral stimulus) in front of a dog. The dog did not salivate. In other words, there was no response. In the following stage of the experiment, he began ringing the bell when the meat was provided to the dog. In doing so, he connected meat with the ringing of the bell. Thus, a link between two stimuli i.e. meat and the bell was created. He repeated this method for some time. After some time, he discovered that even without the presence of meat, the ringing of the bell stimulated the saliva of the dog. As a result, the bell became a conditioned stimulus, leading to a learned or conditioned response. Thorndike termed this as the "*law of exercise*" which states that behavior can be learned through a repetitive relationship between a stimulus and a response. Therefore, under classical conditioning, learning is a conditioned response that involves creating a relationship between a conditioned stimulus and an unconditioned stimulus.

Operant Conditioning

According to the theory of operant conditioning, behavior is a result of its consequences. B. F. Skinner, who practiced operant conditioning theory, claimed that individuals emit rewarded behaviors and do not emit non-rewarded or punished behaviors. The term 'operant' describes the link between behavior and consequences as a learning process that develops over time in which a person alters his behavior based on his favorable or unfavorable outcomes.

Operant conditioning is defined as voluntary or learned behavior that is determined, sustained, and directed by its consequences. The behavior is more likely to be repeated when the results are positive and less likely to be repeated when the results are negative. As a result, the link between behavior and its consequences is essential to operant conditioning. It is a powerful tool for managing people in organizations. Management can successfully employ the process of operant conditioning to control and influence the employee’s behavior by manipulating the reward system. If a manager seeks to impact behavior, he must also be able to influence the consequences. Therefore, it can be concluded that the rate of responses increases when the behavioral responses are rewarded whereas the rate of responses decreases when the behavioral responses are aversive.

Cognitive Learning

The theory of cognitive learning relates to an individual's knowledge, ideas and understandings concerning himself and his surroundings. This theory holds that individuals acquire the meaning of numerous objects and events, as well as learned behaviors based on the meaning attributed to the stimulus. A cognitive structure is established in an individual's memory that maintains and organizes knowledge about numerous events that occurred throughout the learning process. Whenever the individual encounters a circumstance or an event, he evaluates it against his memory to identify the best course of action. As a result, the individual's action is determined by the cognitive structure recalled from memory.

Edward Tolman is considered the father of the cognitive theory of learning. Tolman created this idea through carefully controlled experiments. He carried out a scientific experiment on rats. He demonstrated how rats learned to navigate a complicated maze in order to get to their target of getting food. Rats formed expectations at every decision point in the maze. As a result, individuals learned to anticipate that particular cognitive clues associated with the choosing point would eventually lead to the food. Finally, learning occurred when the association between cues and expectancy was reinforced since cues led to predicted objectives.

Cognitive theory is not the same as classical conditioning (Stimulus → Response learning) and operant conditioning (Response → Stimulus learning) as they argue that learning is a function of the stimulus-response connection while ignoring the involvement of the individual in the learning process. As per Tolman, cognitive learning could be termed as Stimulus → Stimulus learning i.e. one stimulus leads to another. The cognitive theory acknowledges an individual's responsibility in receiving, memorizing, recalling, interpreting, and reacting to stimuli. Nowadays, the cognitive approach to learning is quite important, and in organizational behavior, it is mostly applied to the theories of motivation. Attributions, goal setting, locus of control and expectations are all cognitive concepts and signify the purpose of organizational behavior.

Social Behavior

Bandura's Modelling Theory is the most well-known social learning theory. The social learning theory emphasizes the necessity of observing and modelling other individuals' attitudes, behaviors, and emotional reactions. According to the theory, most of what we learn comes from observing and mimicking our role models, such as parents, teachers, classmates, or celebrities. Social behavior is learning attained through the reciprocal connections between people, behavior and their surroundings. The theory believes that learning is a mix of both environmental determinism (i.e. classical and operant conditioning views) and individualism determinism (i.e. cognitive theory). The impact of the role model serves as the focal point of learning in observational learning. According to this theory, four processes define a role model's impact on an individual:

- **Attention Process:** The attention process outlines how people learn from role models when they pay close attention to their key behaviors. As a result, individuals are influenced by models who are more appealing and seem similar to them.
- **Retention Process:** The retention process states that learning from the model is dependent on how effectively the individual maintains the model's actions and behaviors even when the model is no longer available to the individual.
- **Motor Production Procedure:** This procedure entails recalling the model's behavior and performing one's own actions by aligning them with those of the role model.
- **Reinforcement Process:** The reinforcement process explains why people would repeat the same behavior if it is rewarding. Reinforced behaviors gain more attention and are carried out more frequently.

IN-TEXT QUESTIONS

11. _______is the transformation of one's behaviour as a result of education, training, practice and experience.
    a) Personality b) Perception
    c) Learning d) Motivation
12. Which theory of learning claimed that individuals emit rewarded behaviors and do not emit non-rewarded or punished behaviors?
    a) Classical b) Operant
    c) Cognitive d) Social Behavior
13. The ______ process outlines how people learn from role models when they pay close attention to their key behaviors.
    a) Retention b) Motor Production
    c) Attention d) Reinforcement
14. Who is considered the father of the cognitive theory of learning?
    a) Edward Tolman b) B. F. Skinner
    c) Ivan Pavlov d) Bandura
15. Which process of social behavior theory explains that people would repeat the same behavior if it is rewarding?
    a) Attention b) Retention
    c) Reinforcement d) Motor Production

2.5 SUMMARY

- Personality is the role that an individual performs in public.
- Numerous factors determine personality which is broadly characterized into four factors namely biological factors, family and social factors, situational factors and environmental factors.
- Two most prominent psychologists described the development of personality namely Sigmund Freud and Erikson. Freud proposed that there are five universal stages of personality development namely oral, anal, phallic, latency and genital whereas Erikson proposed eight stages of life that reflect a person's continuous development namely infancy, early childhood, play age, school age, adolescence, early adulthood, adulthood and mature adulthood.
- Personality qualities help people understand their personality types. The following personality types have been classified as Type A and Type B Personalities, The Big Five Personality Model, Introversion and Extroversion and The Myers-Briggs Type Indicator (MBTI).

- Trait theory, self-concept theory, psychoanalytic theory and socio-psychological theory are the four main theories of personality.
- According to trait theory, an individual is made up of a set of defined predisposition characteristics known as traits.
- The self-concept theory focuses on an individual's set of perceptions about himself, as well as the perceptions of his interactions with others and other areas of life.
- The psychoanalytic theory is a personality theory that builds on the notion that an individual is more driven by unseen forces that are influenced by conscious and logical thinking.
- Socio-psychological theory indicates that an individual seeks to satisfy the demands of society and society assists him in accomplishing his goals.
- The three ways of assessing personality are personality inventories (objective tests), projective tests and assessment centers.
- The personality traits of employees are used to analyze their behavior and to build appropriate tactics to cope with their behavior. The following are some of the attributes that impact organizational behavior: locus of control, machiavellianism, self-esteem, risk-taking and self-monitoring.
- Learning is the transformation of one's behavior as a result of education, training, practice and experience.
- There are four theories that describe how individuals acquire new behavioral patterns namely classical conditioning, operant conditioning, cognitive processes and social behavior.

2.6 GLOSSARY

Agreeableness: A person's capacity to collaborate with others.

Cognitive: How a person perceives and acts in the world.

Conscientiousness: A measure of an individual's reliability.

Emotional Stability: A person's capacity to cope with stress.

Extraversion: An individual's level of ease in interpersonal connections.

Extrovert: Individuals who are reality-oriented, sociable individuals and performers.

Heredity: Characteristics of a person's personality that are passed down from parents to their children.

Ideal-Self: “Way an individual would like to be”.

Introvert: Individuals who are self-assured and driven by their own distinct thoughts.

Learning: Transformation of one's behavior as a result of education, training, practice and experience

Locus of Control: Belief about the results of an action.

Looking-Glass-Self: "An individual's impression of how others see his attributes or feel about him".

Machiavellianism: An individual's tendency to manipulate others to gain and achieve power.

Openness to Experience: A person's creativity and interests.

Personality: Role that an individual performs in public.

Real-Self: "What others show you in terms of your self-image".

Risk Taking: Willingness to accept risks.

Self-Esteem: A sense of liking or disliking oneself.

Self-Image: "What an individual perceives about himself".

Self-Monitoring: Capacity to adjust to the demands of the situation.

Socialization: Process by which a newborn acquires a wide variety of behavior from the extremely vast range of behavioral potentialities that are available to him at birth.

2.7 ANSWERS TO IN-TEXT QUESTIONS

1. Biological	9. Machiavellianism
2. Identification	10. Projective Tests
3. Emotional Stability	11. Learning
4. Sensing	12. Operant
5. Introverts	13. Attention
6. Self-Concept Theory	14. Edward Tolman
7. Ego	15. Reinforcement
8. Internal Locus of Control	

2.8 SELF-ASSESSMENT QUESTIONS

1. What is personality? What are the various factors that determine personality?
2. Briefly explain various theories of personality.
3. Write a short note on:
   a) Trait Theory
   b) Locus of Control
   c) Type A and Type B Personalities
   d) Erickson's Stages of Personality Development
4. Discuss how personality can be assessed.
5. Explain the concept of learning. Discuss the various theories of learning.

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LESSON 3

PERCEPTION

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STRUCTURE

3.1 LEARNING OBJECTIVES

The core objective of this lesson is to understand the perception and attribution theory and their implications. On completion of this lesson, a student will be able to understand the following:

- The perception processes
- Influence of culture on perception of an individual
- Attribution theory and its elements
- Common perceptual biases affecting perception

3.2 INTRODUCTION

"There are things known and there are things unknown, and in between are the doors of perception." —Aldous Huxley

We are constantly surrounded with uncountable cues from our environment, and we cannot pay attention to them all. It may be pleasantly cool or hot where you are right now. You are working on your laptop or preparing for an exam or listening to music or hearing the humming sound of the air conditioner. The chair or bed you are sitting (or lying) on right now may be comfortable with appropriate reading lights. You would likely pay some attention to your surroundings and might ignore others. The **stimuli** around us are interpreted based on our perception. This is particularly true in **social circumstances**. Large part of a leader's job entails sifting through information to determine what is pertinent and what is not, and then acting based on those decisions. In this chapter, our endeavour is to explore the way we produce perceptions in our mind about people, organizations, and the world beyond.

3.3 PERCEPTION

Perception is the **mental process** that we use to understand our surroundings (or environment), whereas social perception is *"the act of gathering, selecting, and interpreting information regarding how we view ourselves and others"*. In contrast to the relatively objective and testable nature of perceiving the physical environment, information about people is frequently subjective and open to interpretation. This makes social perception a subjective rather than objective process.

When we interact with others, **"there are many cues and signals that want our attention"**. We see the way people dress; their facial and other physical attributes; how do they talk & what accent do they use; non-verbal (which can't be spoken) behaviours; their eye contact with others; how often they smile; and the message they communicate. We cannot heed attention to everything at once, so we select and decide what is important for us as an individual.

A key part of a manager's job is to assess *"social situations, selecting what is significant and what is not, evaluating people, and acting based on this evaluation. The process of perception is fundamental to managing people."*

3.3.1 Perception Process

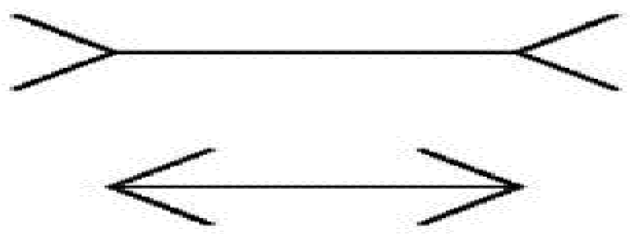
The stages in the perception process are **selecting, interpreting, and using stimuli** and cues. This process is subject to a chance of error which can lead to incorrect interpretation and meaning drawn. For example, take some time studying the pictures (Figures 3.1 and 3.2).

The illustrations in figure 3.1 is the standard test of physical perception. **Did you also make the same mistakes as most people?** Even though we can evaluate the images objectively, and we are also aware of the fact that we are making errors in our perception, we are still not able to perceive the images correctly. In Figure 3.2, the company's logos have hidden significance; but once you perceive, you won't miss them again.

"What we see is subject to perception and therefore to error."

Another illustration that highlights the strength of perception is presented in figure 3.3. The figure reflects **"closure".** It refers to how we complete the missing piece of information to comprehend a stimulus. We objectively are sure that in figure the lines are incomplete, but we complete them to interpret them as a rectangle and triangle. Hence, closure is an important part of the perception processes. Most of the time, we do not know all the facts, which is why we rely on assumptions to fill in incomplete information. **Closure allows** us to complete that incomplete picture and analyse a faded situation by completing it based on our experiences.

Figures 3.1, 3.2, and 3.3 define physical perception. However, similar processes influence social perception. We do not see everything, but we connect the dots based on our assumptions.



Ignoring the arrows, which line is longer?

Fig 3.1. Common Perception Illusion

Source: Suggested Readings

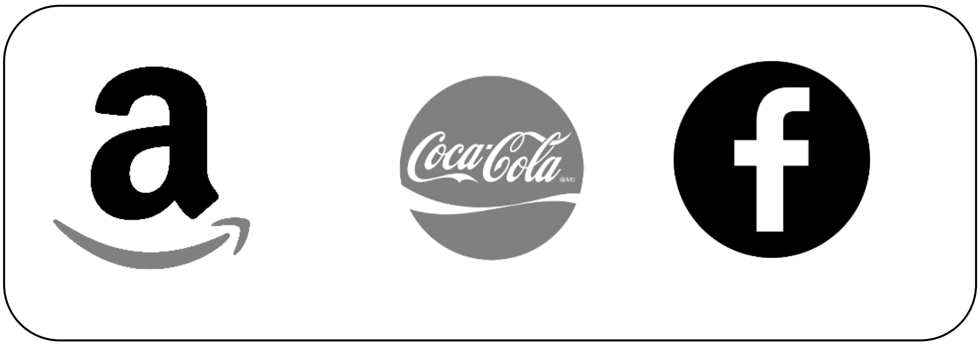


Fig 3.2. What do you see in these famous logos?

Source: Suggested Readings

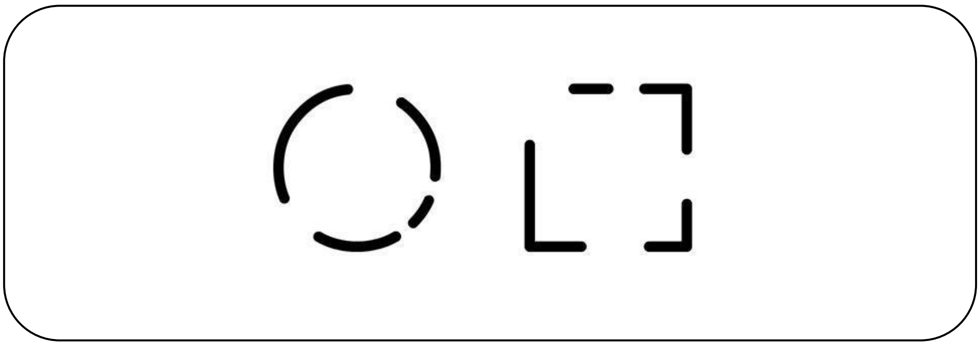


Fig. 3.3. Closure

Source: Suggested Readings

Consider how closure might affect a manager's opinion of an employee. A manager who is responsible for 25 employees has little interaction with each one. However, during the previous six months, one client has voiced a complaint on a certain employee, and the manager has personally overheard a heated exchange between that employee and a manger from a different department. **These two incidents of behaviour are merely a small sample of what the employee may have done overall, but they provide the manager with the clearest information and stand out for him to make judgement about the employees' behaviour**. The manager may use closure to complete the picture and determine that the employee has a short attention span based on these two incidents and the little time available to obtain more information.

IN-TEXT QUESTIONS

1. Perception is a _________ process
   a. Scientific c. Mental
   b. Both A and C d. None
2. Selecting, interpreting, and using stimuli are the underlying elements of
   a. Perception process c. Organizational culture
   b. Change d. Creativity

WHAT WOULD YOU DO?

You're thinking about working for a corporation that operates widely in Cyber City in Gurgaon in Haryana, India. Knowing that being English fluency will give you an advantage. You are now taking an English-language course that will hone your basic communication skills language itself. Since you anticipate being reasonably proficient by the time you really receive the job, you are thinking whether to include this as one of your skills or not. WHAT WOULD YOU DO?

3.3.2 Culture and Perception

Culture encompasses **behaviour, customs, beliefs**, and values associated with a certain group. Culture, then, impacts how we perceive the world and analyse what happens with us. Work-related behaviour such as how you greet people, to how you dress at work, how you present yourself, how you handle disagreements, and how you give feedback to your employees—are impacted by culture.

Only in a specific cultural context does behaviour have a meaning. When you're not in a familiar cultural setting, people perceive your actions and words differently and unexpectedly. For instance, a manager's admission that he does not know the solution to a question is seen by an Indian or Chinese employee as a sign that the boss has never encountered the scenario before. He simply isn't aware of the solution. A Japanese or Australian employee, meanwhile, is more likely to view the manager's acknowledged ignorance as ineptitude. Due to the differences in the cultures of India and Australia, the interpretations are different. For instance, in India, people with power are treated with high respect in high-power distance cultures. This shows similar role of power and its elements in the two countries.

Simple **behaviours that are perceived and interpreted** in a particular way in one culture are interpreted differently in another culture. Because we see and interpret the world through the lenses of our own cultures, it should come as no surprise that cross-cultural communication is subject to misunderstandings.

3.3.3 The Three Stages of Perception

The three stages of perception process are presented in Figure 3.4.

As seen in Figure 3.4, social perception is a multistage process. We analyse each of the three stages and consider the variables that impact each in the sections that follow.

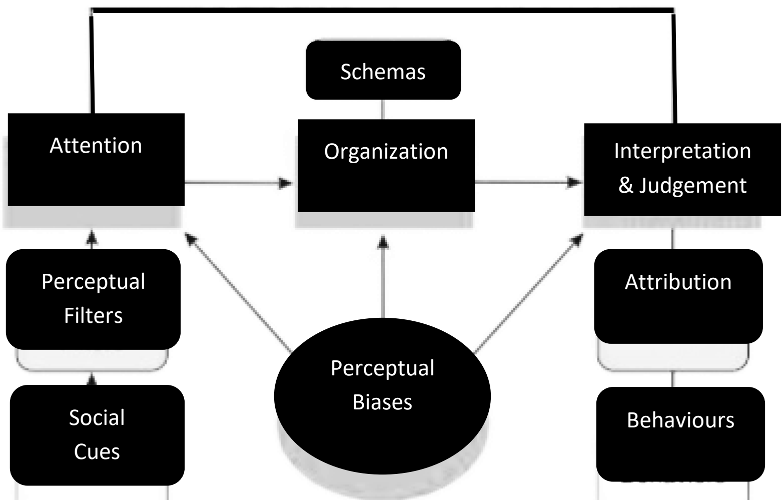


Fig. 3.4. The Three Stages of Perception

Source: (Robbins & Judge, 2013)

1. Attention Stage

The first stage of the perception process involves paying attention to the environment. Being aware of environmental cues is a necessary step in the social perception process. We choose stimuli, cues, and signals to pay attention to. **What have we observed? What catches our eye?** For instance, you could see your professor's keys jiggling in his pocket while he takes a little break from class to peruse his notes. You could then notice his unusually ill-fitting baggy pants because of that noise. Or perhaps your new boss's southern accent is really distracting when you're at work. Or perhaps an older boss is the one to first notice the numerous piercings and barely concealed tattoos on her new hire. In each of these scenarios, something unusual catches people's attention and may cause them to become distracted from their activity. We either consciously or unconsciously choose what we will pay attention to during the attention stage of perception. The perceptual filter is a method of letting certain information through while blocking the rest. The fundamental component of the perceptual filter is selective attention, or the fact that we pay attention to some social and physical stimuli but not others. What gets through our perceptual filter during the attention stage depends on a variety of things.

Salience is another aspect, in addition to culture. Cues that stand out in some manners are known as salient cues. We employ salient components and signals have a bigger role in our perception process than others do. The jingling keys, loose clothing, Southern dialect, tattoos, and body piercings all stood out in the samples. Intensity of the stimulus increases the probability of it getting noticed. You're more inclined to pay attention to someone's loud speech, eye-catching clothing, or overpowering perfume/fragrance they have applied. For instance, individuals who dress in vibrant colours are more likely to be recalled after a meeting—though not necessarily favourably.

2. Organization Stage

Organization is the second stage of the perception process. This step involves organising the data/stimuli that have passed the stage of attention. **The information is arranged into sets that are meaningful, helpful, and organised**. Connections are established between the many components, new sets construct and categorised, newly discovered information arranged into categories that already exist and are known to us and finally items are grouped into bundles we can recall.

Schemas

Schemas are mental or cognitive models or patterns used to comprehend and explain certain circumstances and occurrences. They serve as frameworks that let us fill in the blanks in social situations. For instance, individuals utilise schemas to assist fill partial visuals during the closure process. Even though we may be cognizant of some of our schemas, they typically function on a subconscious level.

Schemas at Work

Here is an example of how the schema process works. **Everybody has preconceived notions about how a new job's first day would go.** You will visit the organization and meet your new supervisor and co-workers. You would also be given a tour of the department or company and details on the position and responsibilities. You anticipate a day with little work but a tonne of knowledge. You may learn what is "normal" and what is not by using the schema for "the first day at a new job." You can tell whether anything unexpected occurs using this schema. Being handed a stack of work without any introduction or not meeting with your boss—who sat in her office all day and never greeted you—would imply something unacceptable or unusual since they go against the norms established by your first-day schema.

Schemas are helpful because they speed up the processing of information. They support our ability to recall specifics and fill in perceptual gaps. Schemas help us organise knowledge extremely well, which improves our ability to recall details about individuals and events. On the downside, schemas might result in errors since we use closure to fill in information we don't know and make hasty judgments.

Table 3.1

Merits and Demerits of Schema

S.No.	Merits	De-merits
1.	Help us in recalling	Hard to change
2.	Furnishes information	Ignores information that does not fit
3.	Organize information	May lead to over-interpretation

Culture and Schemas

Different firms with diverse corporate **cultures also produce various expectations and norms for behaviour**. For instance, laughing, being silly and light-hearted, and being very casual are all parts of Southwest Airlines' culture. Regular customers on Southwest are accustomed to the flight attendants singing safety instructions, cracking jokes, and pulling practical jokes on them—behaviours that represent the company's ideals. The claimed culture includes having fun, enjoying oneself, and not taking yourself too seriously. A job interview at Southwest includes asking candidates to share jokes, which is not typical in most other airlines throughout the world.

We must be conscious of the possibility that our schemas will colour how we perceive others while dealing with them. Some information is rapidly sorted and stored because it fits into pre-existing schemas. A specific schema might not apply to additional information. This could result in the development of a new schema or what does not belong to be forgotten since it goes against what we already believe and there may be **no pre-existing category to assist us categorise it.** For instance, many women have had the experience of making comments and recommendations in meetings and having their male co-workers either forget such comments or attribute them to male co-workers. Many women are still hindered from achieving their full potential by the traditional paradigm of women as being less competent, limited in their ability to deal with people, and maybe not totally at home in the job.

3. Interpretation and Judgement Stage

The **ordered information** is explained and translated in the third stage of social perception to determine its significance (see Figure 3.5). Through interpretation, we construct an opinion or judgement about the person or event and determine the reason for the actions. This procedure is essential in businesses where a manager's duties include assessing their team members, clients, vendors, and other company partners. This stage leads to **attribution theory** (also known as the attribution process)

IN-TEXT QUESTIONS

4. What is the last stage of the perception process?
   a. Judgement c. Interpretation
   b. Judgement and Interpretation d. Organization
5. Which element speed up the process of processing information?
   a. Change c. Salience
   b. Schema d. Intensity
6. Choose odd one out.
   a. Distinctiveness c. Consistency
   b. Consensus d. Determination

3.4 THE ATTRIBUTION PROCESS (ATTRIBUTION THEORY)

The attribution process **refers to the act of assuming a reason for a behaviour and putting that cause forth**. Deciding as to whether an action's cause is internal or external is one of the initial steps in the attribution process (see Figure 3.5). When you assign an internal attribution, you say that something "within" the individual is to blame for the behaviour. These are elements that are stable and lasting (such as personality, morals, or innate talent) or less stable (such as effort or motivation). Internal attributions are sometimes known as personal attributions since they focus on the individual.

External attributions are also known as situational attributions since they attribute behaviour to the context in which it occurred. These contextual elements include the physical environment, the challenge of the work, the corporate culture, the presence and actions of other people, or luck. We create **external attributions** when we believe that variables "outside" the individual are the source of behaviour, for instance, "Mary is late for work because she is lazy," or "Sergio scored well on the test because he studied hard."

Internal attributions are based on effort and aptitude, but external attributions are mostly based on task difficulty and chance. Like all of us, managers are prone to overusing internal and underusing external attributions. For example, managers evaluating employees are more likely to assume that lack of ability or effort and motivation are the cause of poor performance. Those are less likely to blame situational variables, such inadequate training, inadequate assistance from co-workers, inadequate tools, or even their poor leadership for employees' lack of performance.

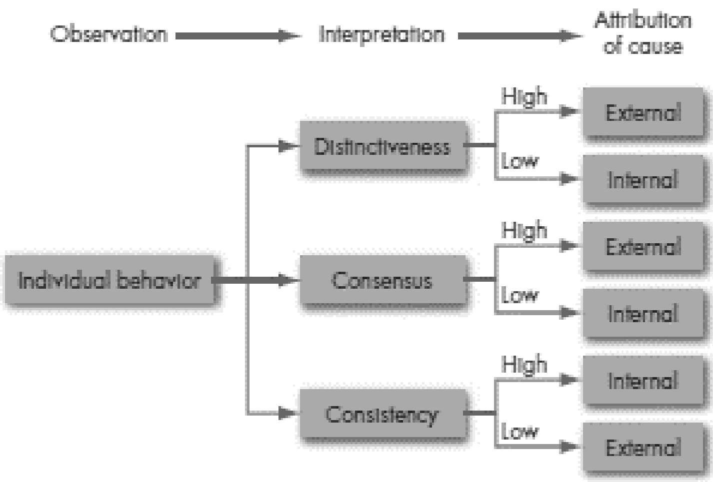


Fig. 3.5. The Interpretation and Judgement Stage: Attribution

Source: (Robbins & Judge, 2013)

3.4.1 Interpretation and Attribution

We employ **distinctiveness, consensus, and consistency** as three sorts of information when assigning either internal or external attributions.

1. Distinctiveness is the first element in the attribution process. We first consider if the behaviour is particular to a given job or circumstance. Does the person always act in this manner? If the answer is yes, we are probably going to blame the individual for the conduct. If not, we can look at contextual factors.

2. Consensus is the second element in attribution decisions. Is this a common behaviour or is this individual acting in a peculiar way? Is the employee in question the only one in the team that the poor performance worked on having problems with the new procedure? We are inclined to attribute something externally if other people act similarly, indicating that there is consensus.

3. The third is ***consistency***. We can attribute anything to the internal or exterior world, depending on what is consistent. Without consistency, we struggle to form any sort of judgement; great consistency is required to assign blame. A management would find it difficult to attribute an employee whose performance varies greatly from month to month and from job to task.

1.4.2 Attribution of the Cause

Researchers have discovered that despite having access to more knowledge about us than about others, we frequently use the same methods to determine the source of our problems. We consider our actions and behaviours and infer our goals and attitudes from them to determine why we act the way we do. This idea is referred to as self-perception theory. According to **self-perception theory**, when asked to explain the reasons for their own behaviour, people have a propensity to look both inside and outside of themselves,

Think about how we justify our behaviour when we receive an award for our efforts. How would a professional basketball player who receives a sizable bonus for playing well, for instance, defend his play? Would he claim to truly adore the game or would he blame his success on the large bonus? How would the employee who frequently offers her assistance to other employees without receiving financial compensation justify her actions?

It's interesting to note that **we are more inclined to attribute our conduct to external rewards** when we obtain significant monetary or public praise for our efforts. The propensity to attribute our actions to external factors own actions after receiving an outside reward is referred to as over-justification.

The consequences of **over-justification** for managers are numerous. It implies that providing people with sizable external rewards for completing activities they find enjoyable may lower their internal drive to complete the activity. People are more likely to make an external attribution—that is, to attribute responsibility for their behaviour to something other than their internal motivation—if the reward is significant and substantial enough. As a result, unless individuals continue to receive the high incentives, their internal drive to succeed may decrease and they may be less likely to do so effectively. This phenomenon could offer one reason for why some professional athletes perform poorly while receiving big compensation. To preserve employees' internal motivation and interests, managers should, wherever feasible, stress internal elements and make them apparent. High levels of public acclaim and reward can have an immediate impact, but they could have the opposite effect over time.

IN-TEXT QUESTIONS

6. The act of assuming a reason for a behavior and putting that cause forth is known as:
   a. Attribution Process c. Creativity
   b. Perception d. Change
7. Personal attributions are related to?
   a. External attributions c. Internal attribution
   b. Societal attributions d. Physical attributions
8. Situational attributions are
   a. External attributions c. Internal attribution
   b. Societal attributions d. Physical attributions
9. We consider our actions and behaviors and infer our goals and attitudes from them to determine why we act the way we do. This idea is referred to as
   a. Self-evaluation c. Self-cognition
   b. Self-perception d. Self-social
10. Attributing our own actions to external factors after receiving an outside reward is:
    a. Under-justification c. Consensus
    b. Over-simplification d. Over-justification
11. The last factor of the attribution process is:
    a. Distinctiveness c. Consistency
    b. Consensus d. None of the above
12. *We are inclined to attribute something externally if other people act similarly, indicating that there is agreement*. This is related to:
    a. Distinctiveness c. Consistency
    b. Consensus d. All of the above

3.5 PERCEPTUAL BIASES

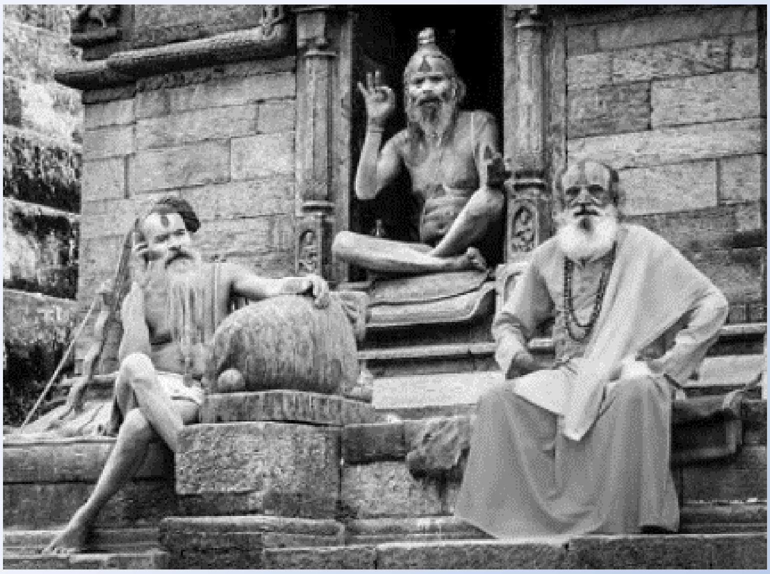
Table 3.2

Merits and Demerits of Schema

S.No.	Perceptual Biases	Description
1.	Fundamental Attribution Error	The tendency to undervalue situational factors and overvalue personal factors while making attributions about others' actions
2.	Actor-Observer Differences	The tendency to depend more on external attributions while explaining our own actions
3.	Stereotypes	"A generalization about an individual based on the group to which the person belongs"
4.	Halo or Horn Effect	Use of a single attribute to form a positive or negative impression that dominates other information
5.	Similar-to-Me Effect	Developing a liking for a person that we perceive is like us and not liking (or disliking) those who are different
6.	Primacy and Recency	"A tendency to overemphasize either early information—in the case of primacy, or most recent information—in the case of recency"
7.	Self-Serving Biases	The tendency to accept credit for success and reject blame for failure

We already discussed the propensity to exaggerate personal characteristics and undervalue environmental elements when attributing others' behaviour. The Fundamental Attribution Error is the name given to this propensity. For instance, if your boss is unresponsive, you are more likely to attribute the behaviour to his poor interpersonal skills or his tendency to be cold and distant than to the demands he is under or his level of workload. Like this, you are more inclined to blame a co-worker's obstructive conduct on her personality than the lack of time to understand each other. These attributions lead us not to give others the benefit of doubt. than the lack of time to understand each other.

CASE STUDY
INDIA



India is a large, dynamic nation that is the subject of numerous misconceptions.

Few of these stereotypes are based in fact, despite the possibility that some of them may have a grain of truth. Additionally, stereotypes can reveal something about the person or individuals who believe them. We must all examine and deal with the preconceived notions we hold about people. It will be easier for you to truly comprehend the diversity of a culture and civilization, in this case India, if these false beliefs and misinformation are put to rest.

Questions:

1. What do you think about India?

2. List down 5 major stereotypes about India?

The **Fundamental Attribution Error** may have detrimental effects. Because of this tendency, we frequently incorrectly internalise victims and hold them responsible for their misfortune. For instance, the fact that Trayvon Martin[1] was wearing a hoodie in the United States and became the focal point, overshadowing many of the important concerns in the well-publicised case of the Florida teenager who was shot by a self-appointed neighbourhood watchman. We frequently concentrate on internal aspects while judging others.

When we search for reasons behind our own conduct, however, the Fundamental Attribution Error operates in the other direction. We depend more on outside attributions to justify our own behaviour. **The actor-observer difference** is the name given to this process. While we frequently do the fundamental attribution mistake and tend to make internal attributions about other people's conduct, we also commit external attributions about our own behaviour. This distinction is due to the diverse viewpoints that result from having access to various sorts of information. We are aware of our own past and how we behave in various contexts, contrary to how others may see us. We therefore have opinions on how distinctive and consistent our own behaviour is that are likely to be different from those of observers. Environmental influences are more salient to the actor than to the observer due to the differing viewpoints, hence an actor is more likely to attribute external causes.

A **stereotype** is a "generalization about an individual based on the group to which the person belongs. Such groups may include race, gender, sexual orientation, functional area, and so forth. Stereotypes are so powerful that they can prevent us from recognizing individual differences and performance".

The **halo effect (or horn effect)** happens when a general opinion or assessment of one aspect of a person or circumstance produces either a halo, a favourable impression, or horns, an unfavourable impression, which then serves as the focal point around which all additional information is chosen, arranged, and interpreted. For instance, research conducted in the United Kingdom found that a person's initial name might significantly affect how they are seen. Another illustration is when someone introduces himself as a "Google" or "Apple" employee. We are likely to create an opinion of the individual right away because of the reputation of these firms.

[1] https://www.huffpost.com/entry/geraldo-rivera-trayvon-martin-hoodie_n_1375080

A famous example on stereotype

Fig. 3.6. Sheryl Sandberg

Source: Google

Sheryl Sandberg, *Facebook COO*, believes that ***"women are held back by others' stereotypes and by how they perceive their own roles in organizations and in their family. In your own words, explain how this is an example of channelling."***

The **"similar-to-me"** effect is a potent component that can produce a halo or horns. The similar-to-me effect happens when we get fond of someone, we think is like us and detest someone we think is different from us. In a cross-cultural setting when the other person is certain to be different and as a result, possibly unlikable, it can be quite dangerous.

Do you think first impressions are crucial? You are right if you say that! The primacy effect refers to the significance of first impressions. It refers to the propensity to exaggerate new information. People tend to recall early knowledge, and it tends to influence how they perceive things later. The recency effect, which is the opposite of the primacy effect, causes us to focus on the most current information at the expense of prior data. When there is a lag in time between the earlier and later information, the recency effect happens most frequently.

The **self-serving bias** is the propensity to accept praise for our accomplishments but reject responsibility for our mistakes. On the one hand, we tend to place external blame rather than internal attribution concerning our own lack of effort or competence when we perform poorly on a test, botch a presentation, lose a customer, or fall short of our goals. We place the blame on the unjust lecturer, the unfocused audience, the picky customer, or the unrealistic business objectives.

The interaction between managers and their staff is intriguing due to the culmination of all the biases. **Primacy-recency,** halos-horns, and stereotypes might skew the data that managers acquire. Additionally, managers frequently attribute bad performance to workers' incapacity and lack of effort, but workers attribute it to managers' lack of managerial abilities. However, both parties tend to overlook the contributions of the other side because they are so certain of their own skill and dedication to success. We can be quick and effective in our social perception thanks to perceptual biases, but they can also lead to mistakes.

IN-TEXT QUESTIONS

13. The propensity to accept praise for our accomplishments but reject responsibility for our mistakes is which type of bias?

    a. Horn c. Self-serving

    c. Recency d. Fundamental Attribution Error

14. A generalization about an individual based on the group to which the person belongs is

    a. Primacy c. Similar-to-me

    b. Stereotype d. Actor-Observer

15. When there is a lag in time between the earlier and later information, which effect happens most frequently ?

    a. Recency c. Primacy

    b. Both Primacy and Recency d. Fundamental Attribution Error

3.6 SUMMARY

In this lesson, you have learned:

1. The perception process is **imperfect and biased** by nature.
2. **Cross-cultural** interactions are particularly vulnerable to perception mistakes because culture adds complexity and frequently presents an unknown scenario.
3. Everyone has **preconceived notions** about a particular group. So, consider taking some time to examine your stereotypes.
4. Relying on memory might lead us to make some **biased decisions in an organizational set-up.** Therefore, keep notes on occurrences and crucial problems to avoid biases and inaccuracies from impairing your judgement and leading to errors.

5. In management decision-making and many other administrative contexts, **perceptual biases** are important to understand to avoid errors in judgement.

3.7 GLOSSARY

Egalitarianism is a belief in human equality especially with respect to social, political, and economic affairs.

Perception filter is the process of letting some information in while keeping out the rest.

Selective attention is the "process of paying attention to some, but not all, physical and social cues".

Salient cues are those cues that are somehow so striking that they stand out.

Stereotypes vs Prejudice - Stereotypes are unfounded assumptions about a social group that lack any basis in fact. Stereotypes are assumptions made about a social group that can be either good or negative, conscious, or unconscious. Prejudice is a strong unreasonable feeling of not liking or trusting somebody/something, especially when it is based on his/her/its race, religion, or gender.

3.8 ANSWERS TO IN-TEXT QUESTIONS

1. C	**9.** B
2. A	**10.** B
3. C	**11.** C
4. B	**12.** B
5. D	**13.** C
6. A	**14.** B
7. C	**15.** A
8. A	

3.9 SELF ASSESSMENT QUESTIONS

Discussion Question:

1. What are perceptions? Describe all seven biases in detail.
2. Describe the differences between primacy and recency with your real-life examples?
3. In the Trayvon Martin case, which perceptual bias became more relevant (and irrelevant) at the same time?

Case Study:

Karan was filled with satisfaction as he left his office after being given consideration as a prospective Website Manager for the topmost search engine company in India, **Qamunu**. But as he was making his way back home, these emotions of contentment were making him feel anxious and nervous.

Qamunu is the first search engine in the India to design, implement, and run national search. Search engines like Yahoo! and Google are still the stalwarts of the world. Qamunu targeted the areas that lacked access to any local search engines or online directories at the time. Nitish Verma, co-founder, and current CEO of Qamunu, saw an opportunity and created **indiasearch.com**, the company's first search engine, which exclusively returned information with an Indian focus. It achieved great success. Since the Asia is a wider region, hence Qamunu has an advantage of opening Asian country specific search engines. It is a 100% surety that Qamunu would build several country-specific search engines within a short period of time for every nation in the Asian region. Nearly 17 regional and worldwide websites, search engines, and portals are now being managed by Qamunu.

When Karan joined Qamunu in 2003 as a research analyst, his career officially began. Three years later, he received a promotion as a content manager at indiasearch.com, where he revitalized the brand, boosted website traffic by an average of 17% annually, and doubled ad income. Karan was a top contender for the post when Qamunu wanted to hire a new Website manager for chinasearch.com, which would be Qamunu's largest search engine. Although the new position would be a significant professional boost, Karan started to worry about his capacity to oversee the entire website because a website manager's work comprises considerably more than that of a content manager. Karan is quite content with his lifestyle in India, whereas chinasearch.com will be headquartered in China. Qamunu CEO is anticipating Karan to make the decision the next day, so it appears that Karan has a lot of thinking to do.

Questions:

1. Determine the decision-making factors that Karan used to decide whether to accept or reject the recommended promotion using the rational choice theory model of decision-making.

2. What do you believe Karan should decide based on the factors mentioned in question 1?

3. Assume that Karan will accept the offer as the result of a logical decision-making process. Karan, though, rejects the promotion. How would you justify making such a choice?

3.10 REFERENCES

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3.11 SUGGESTED READINGS

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Lesson 4

Motivation

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STRUCTURE

4.1. Learning Objectives

4.2. Introduction

4.3. Process of Motivation

4.4. Approaches to Motivation

4.4.1. Cognitive Models

4.4.2. Non-Cognitive or Reinforcement Model

4.5. Maslow's Need Hierarchy Theory

4.5.1 Appraisal of Maslow's Need Hierarchy Theory

4.6. McClelland's Theory of Needs

4.6.1. Implication Of McClelland's Theory of Needs

4.7. Alderfer's ERG Theory

4.8. Herzberg Two Factor Theory

4.8.1. Contribution and Limitation of Herzberg Two Factor Theory

4.9 Theory X and Theory Y

4.10. Vroom's Expectancy Theory

4.1. LEARNING OBJECTIVES

At the end of this lesson, the student should be able to-

- Define Motivation
- Explain the need for and process of motivation in an organisation.
- Develop an understanding of the importance of motivation in an organisation.
- Explain various theories of motivation.
- Differentiate between content and process theories of motivation.

4.2. Introduction

The phenomenon of motivation is complex, with multiple definitions. The common frame of reference contains one of the following words in the definition: drives, goals, incentives, desires, wants, and needs. The motivation process accounts for an individual's intensity, direction, and persistence of effort toward achieving a goal. The concept of motivation is situational, and its level varies between different individuals and at different times. If you understand what motivates people, you have the most powerful tool for dealing with them at your command. Motivating employees is one of the most crucial roles of management. It includes the skills of communicating, leading by example, challenging, encouraging, obtaining feedback, involving, informing, briefing, and rewarding. Motivation is a catalyst since it impacts the intensity of willingness and the level of work a person puts forth to attain organisational goals.

4.3. Process of Motivation

The motivational process begins with identifying an employee's needs and drives. Needs are the deficiencies a person experiences at a particular point in time that makes specific outcomes appear attractive. These deficiencies cause psychological (e.g., need for recognition) or physiological (e.g. need for water, shelter, or food) imbalances within the individuals. The deprived person, in turn, examines the environment (surroundings) to find the sources to gratify these imbalances. An unsatisfied need often acts as an energiser as they create tension within the individuals. Therefore, employees explore ways to satisfy them.

Next comes the effort given by employees within a context of opportunity (resources at disposal) to bridge the gap. Actions should be goal-oriented, as motivation is primarily goal-directed. Goal-directed efforts lead to performance towards which skill and technology (i.e., ability) undoubtedly contribute significantly. In the next phase, if performance is suitably rewarded, it results in need satisfaction. Finally, once the employees have received rewards, they reassess their needs.

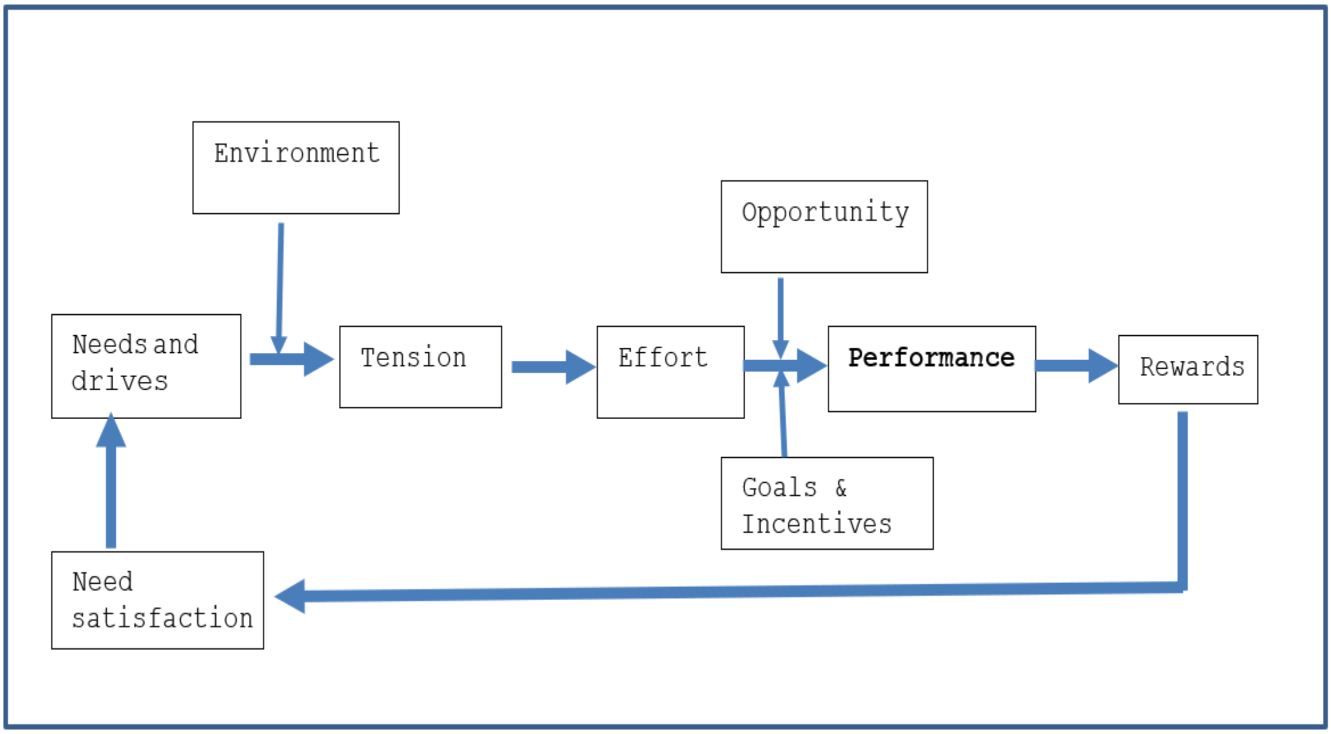

Figure 1 Process of Motivation

4.4. Approaches to Motivation

Several theories attempt to explain how motivation works. The theories could be broadly categorised into Cognitive and non-cognitive models.

4.4.1. Cognitive Models: The cognitive model of motivation consists of theories that focus on the human mind's internal state. The focus is on mental processes that emerge from human needs, desires, expectations, and drives. Theories under the cognitive model could be further subdivided into Content and Process theories.

1. **Content (or need) theories** of motivation focus on factors internal to the individual that energise and direct behaviour. These theories suggest that people have certain needs and/or desires which are internalised. In general, such theories regard motivation as the product of internal drives that compel an individual to act or move (hence, "motivate") toward satisfying individual needs.

2. **Process Theories:** Process theories are concerned with determining how individual behaviour is directed and maintained in the specifically self-directed human cognitive processes. Process theories of motivation are based on early cognitive ideas which posit that behaviour results from conscious decision-making processes.

4.4.2. Non-Cognitive or Reinforcement Model: Unlike the cognitive model, which focuses on the internal state, the non-cognitive model focuses on external forces. If an action is rewarded, the employee is motivated to repeat the action. Similarly, if action is punished, employees will be motivated not to repeat it. A manager could use various external forces, like rewarding, punishing, ignoring, etc., to motivate employees to behave in a particular manner. Both cognitive and non-cognitive models are complementary to each other. It is not mutually exclusive. It means both models work together to motivate employees.

4.5. Maslow's Need Hierarchy Theory

It is one of the popular motivation theories given by A.H. Maslow. Maslow suggested that employees' needs are arranged in a particular hierarchy (as shown in figure 2). As lower-order needs are satisfied, the hierarchy's next need becomes dominant. From the standpoint of the theory, we could say that no need is ever gratified. A substantially satisfied need no longer motivates. Maslow separated the needs into higher and lower-order needs. Physiological and safety needs are lower-order needs, while higher needs are social esteem and self-actualisation. The differentiation is that the higher-order needs are satisfied only within a person, and the lower-order needs are satisfied by material things. Following is a brief on various categories of need as mentioned by Maslow-

- Physiological Needs: Physiological needs are basic needs that are important for human survival, like water, food and shelter. Unless these basic needs are fulfilled, other needs won't be able to motivate employees.
- Safety and security Needs: Once physiological needs are met, one's attention turns to safety and security needs. Such needs might be fulfilled by living in a safe area, medical insurance, job security and financial reserves.
- Social Needs: Employees are social beings. The need for social circle and belongingness remains important. Social needs are the first higher-level wants that become essential after a person has satisfied their lower-level physiological and safety requirements.
- Ego or Esteem Needs: Esteem needs may be classified as internal or external. Internal esteem needs are related to self-esteem, such as self-respect, independence, and achievement. External esteem needs are such as social status and recognition. Some esteem needs are self-respect, attention, recognition, and reputation.
- Self-Actualisation: It is the quest of reaching one's full potential as an individual. Unlike lower-level needs, this need is never fully satisfied as one matures. There are always new opportunities to continue to grow. Self-actualised people tend to have needs such as truth, justice, wisdom, and meaning. Self-actualised persons have frequent occurrences of peak experiences, which are energised moments of profound happiness and harmony.

Note: However, not all people are driven by the same needs - at any time, different people may be made by entirely different factors. To motivate employees, managers must recognise the needs level at which the employee is operating and use those needs to motivate employees.

4.5.1 Appraisal of Maslows' Need Hierarchy Theory

The theory suggests that needs follow a definite sequence. However, due to cultural differences, this may not hold. Some cultures appear to place social needs before others (for example, Spain and Belgium workers felt this way). Similarly, some assumptions might not work in all cases; for example, employees won't move to the next level need unless a lower need is fulfilled. Also, satisfied needs won't motivate employees further. Finally, there is little evidence to suggest that people are motivated to satisfy only one need level at a time, except when there is a conflict between needs. A "multiplicity of motives often guides employees". Even though Maslow's hierarchy lacks scientific support, it is pretty well-known and is the first theory of motivation to which many people are exposed.

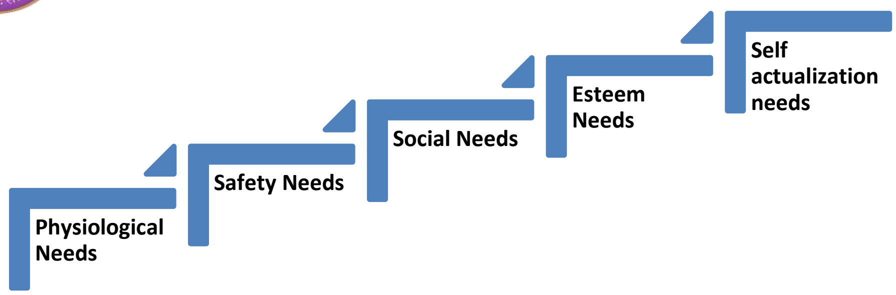

Figure 2 Maslow Needs Hierarchy Theory

4.6 McClelland's Theory of Needs

Three need model is formulated by `David McClelland'. David McClelland proposed that an individual's specific needs are acquired over time, shaping one's life experiences. The needs can be classified under three categories: Achievement, Affiliation, and Power. Also termed as the need for affiliation (n Aff), the need for power (n Pow), and the need for achievement (n Ach).

Need for achievement (n Ach) refers to the drive to excel, grow, strive, and succeed to a set of standards. People who need achievement differentiate themselves from others by their desire to do things better. They try to seek situations where they can achieve rapid feedback on their performance. Such individuals set moderately challenging goals. They are not gamblers, but they take up situations where the probability of winning is 50 -50. Such individuals also prefer to work hard and take personal responsibility for failures.

Need for power (n Pow): The need to make others behave in a particular manner in which they wouldn't have acted otherwise. The need for power is the desire to have an impact on others or to be able to influence or control others. Individuals with high 'Power Need' enjoy being in charge and prefer to be placed in competitive and status-oriented positions. McClelland categorised power into two categories, namely, institutionalised and personalised power. Here institutionalised power refers to the power used for social benefit, and personalised power refers to the power exercised for individual gain.

Need for affiliation (n Aff): The desire for friendly and close interpersonal relationships. It refers to the need for affiliation, i.e. the desire to be liked and accepted by others. Individuals with this need strive to maintain friendships and prefer cooperative situations.

4.6.1. Implication of the McClelland's theory of needs

David McClelland's Human Motivation Theory gives a manager a way of identifying people's motivating drivers. It can help get praise and feedback effectively, assign suitable tasks, and keep oneself highly motivated.

Certain problems have also been identified in theory: The degree to which we have each of the three needs is difficult to measure, and therefore the theory is difficult to put into practice. It is more common to find situations where managers aware of these motivational drivers label employees based on observations made over time. Therefore, the concepts are helpful but not often used objectively.

4.7. Alderfer's ERG Theory

The ERG theory is an extension of Maslow's hierarchy of needs. The theory was developed to reduce the overlap between the five needs described by Maslow. Maslow's need theory was condensed into three types of needs, namely, existence, relatedness, and growth by Alderfer. It also assumes that no rigid structure of needs hierarchy is followed.

- **Existence Needs:** The existence needs comprise all those needs that relate to the physiological and safety aspects of human beings and are a prerequisite for survival. Thus, Maslow's physiological and safety needs are grouped into one category because of their same nature and similar impact on an individual's behaviour.
- **Relatedness Needs:** The relatedness needs refer to the social needs, that an individual seeks to establish relationships with those he cares for. The relatedness needs refer to our desire to maintain essential relationships interpersonally. These align with Maslow's social needs and the external component of Maslow's esteem needs
- **Growth Needs:** Growth needs refers to the intrinsic desire for personal development and the characteristics included under self-actualisation. The ERG theory demonstrates that more than one need may be operative simultaneously, and if the gratification of a higher-level need is stifled, the desire to satisfy a lower-level need increases. Thus, growth needs are those needs that influence an individual to explore the maximum potential in the existing environment.

Figure 6 Alderfer's ERG Theory

4.8. Herzberg Two factor Theory

Frederick Herzberg proposed the two-factor theory of motivation. An empirical study was conducted using a sample of 200 engineers and accountants, and based on the study's findings, the various needs were categorised into two factors, namely, hygiene factors and motivators.

-Hygiene factors, which were previously thought to be the motivators, do not result in motivation but are necessary to bring the level of motivation to a start level or platform so that the motivation of personnel from that platform becomes easier. It was reported in the study that the presence of hygiene factors would not cause satisfaction, but their absence would cause dissatisfaction. Hygiene factors must be present in the Job before motivators can be used to stimulate that person. One cannot use motivators until all the hygiene factors are met. Herzberg's needs are specifically job-related and reflect some of the distinct things people want from their work as opposed to Maslow's Hierarchy of Needs which reflects all the needs in a person's life. The following table shows the difference between hygiene factors and motivators

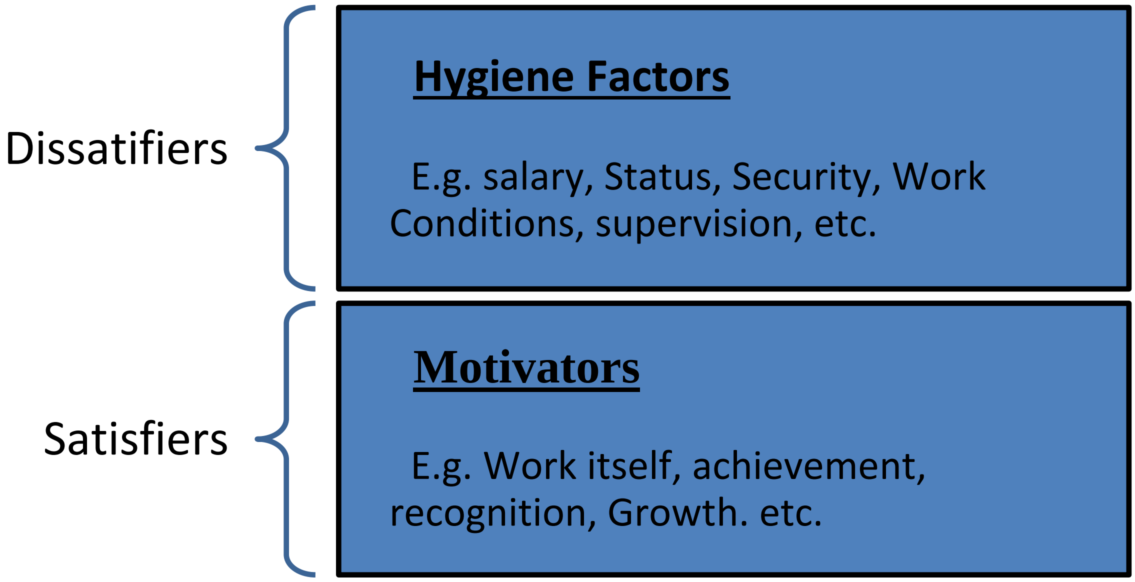

Figure 5 Examples of hygiene and motivation factors

Hygiene factors	Motivators
Absence results in dissatisfaction; presence results in no dissatisfaction	Absence results in no satisfaction; presence results in satisfaction
Examples- company policy, administration, supervision, working conditions, equitable salary	Examples- Achievement, recognition, work itself, responsibility, and growth

Herzberg also reported that both factors are uni-dimensional, i.e., the effect could only be seen in one direction. In other words, hygiene factors are maintenance factors or dissatisfiers, meaning if they are present, they act as a maintenance factor, and if they are not, they act as a dissatisfier. Either way, they won't motivate employees. Similarly, motivators are satisfiers, which means they tend to motivate the employees if they are present.

4.8.1. Contribution and limitation of Herzberg's Two-Factor theory-

Herzberg's two-factor theory has two essential Contributions.

First, improving work conditions and basic pay won't motivate employees to give higher performance. On the contrary, it would only reduce dissatisfaction among employees. It gave managers a different perspective, who believed this could motivate employees.

Secondly, Herzberg stressed that "work itself" is a motivator. It also gives a better understanding of the term "Job enrichment".

Additionally, Herzberg mentioned that today's motivator is tomorrow's hygiene factor. Because eventually, human needs shift to other needs.

Herzberg's Two Factor Theory continues to be essential for management in motivating their employees. His idea that satisfaction and dissatisfaction do not form a continuum, that one decreases with another increase, still holds. In fact, companies today are increasingly looking for ways to enrich their team's work. They are building enrichment into the appraisal and review process and investing in training and development opportunities. Job engagement has also become a key focus. Following are some limitation-

1. **Limited sample of Professions-** the study's finding was based on the limited sample of professionals, who might value challenging tasks, but it is difficult to generalise the findings or say that financial benefits or payments are not a motivator.
2. Too much emphasis is given to the enrichment of jobs. For example-Employees do get satisfaction through status and pay; but such components have not been given much focus.
3**. Situational factors** have been ignored. For example, pay may motivate a worker, but the same is not true for an employee.

IN-TEXT QUESTIONS

1. Fill in the blanks-

a) The motivational process begins with identifying an employee's ____ and _____.

b) These theories of motivation could be broadly categorized into ______ and ______ models.

c) Cognitive model of motivation consist of theories that focus on ______.

d) Theories of motivation under cognitive model could be further sub-divided into_________ and ________.

2. MCQs

I. Physiological and safety needs are the _______ of motivation given by A.H. Maslow.

a) lower order needs
b) Higher-order needs
c) Important needs
d) Required needs

II. Higher order needs are ______ and ______

a) social esteem
b) self-actualisation
c) Safety needs
d) Both (a) and (b)

III. ________proposed the two-factor theory of motivation.

a) Frederick Herzerg
b) A.H. Maslow.
c) Alderfer
d) Locke

IV. Absence of Hygiene factors results in dissatisfaction, presence results in ________

a) no dissatisfaction
b) Satisfaction
c) Achievement
d) Dissatisfaction

4.9. Theory X and Theory Y

Douglas McGregor formulates theory X and Y. After studying managers' dealing with employees, McGregor identified two different viewpoints based on the assumptions a manager follows while managing employees.

Theory X

Assumptions

- Employees in general does not like work and if possible, tries to avoid it.
- Unless manager closely supervise employees, it is difficult to ensure task completion. Therefore, manager must push employees to work either through reward or punishment.
- Employees lacks aspiration and dislikes responsibility. They give more weightage to job security.
- Manager needs to direct them at every step.

Under the first viewpoint, the manager believes that employees dislike working and therefore it is important to direct them as managers. This viewpoint is based on the "*Carrot and Stick Approach*". According to the "Carrot and Stick" approach, a manager could motivate such employees through rewards or could make them work through punishments. In other words, Theory X assumes that lower-order needs (as Maslow suggested) dominate the employees. It represents a pessimistic viewpoint.

Theory Y

Assumptions

- Unlike Theory X, employee like their work.
- Employees possess self-direction and self-control. They are dedicated to achieve the goals set by organisation.
- Employees are loyal and committed towards organisations.
- Employees are ready to take responsibility, and they possess capabilities to solve problems and complete the task on their own.

Unlike theory X, Under Theory Y is an optimistic viewpoint. Here, managers assume that employees are self-motivated and like to do the work. If we look at Maslow's need hierarchy, then according to theory Y employees are motivated by higher-order needs, like esteem and self-actualization needs motivates employees.

4.10. Vroom's Expectancy Theory

Expectancy theory is part of process theories. Unlike previous theories, where the focus was on what motivates employees? Expectancy theories attempt to answer how motivation takes place in employees' minds. Expectancy, Instrumentality and Valence interact psychologically to create a motivational force such that the employee acts in ways that bring pleasure and avoid pain. In other words, individuals' perception of the outcomes of their actions and the value they add to the outcomes will determine their motivation to do a particular action. The Vrooms' theory of motivation consists of three components: Expectancy, Instrumentality, and Valence.

Expectancy (Effort -performance probability) -Employees have different expectations and levels of confidence about what they can do. Expectancy refers to an employee's perception of his/her capabilities to perform the given task. It could range from 0 to 1. ***Example***: If an employee believes that s/he lacks the required knowledge and the chances to complete the given task are zero, zero will be scored in expectancy. Similarly, if s/he believes that s/he will be able to complete the task based on confidence level, higher score on expectancy would be obtained.

Instrumentality refers to employees' perception about receiving desired rewards if they perform the given task. In other words, employees' beliefs about doing specific actions will lead to promised rewards (strength of relationship). It could range from 0 to 1. ***Example:*** Let us assume an employee X needs a promotion. Suppose Employee X believes that his/her efforts will give him the promotion. Then, s/he will score high on Instrumentality. Similarly, if s/he believes the efforts have nothing to do with promotion, s/he will score zero in Instrumentality.

Valence– This represents employees' preference for the reward. In other words, it refers to how highly the employees value the rewards. It could range from -1 to 1. If an employee is indifferent about the reward, his valence will be zero.

All three components could be arranged in the form of an equation:

Motivation= Expectancy x Instrumentality x Valence

All components should score above zero. If either of them becomes zero, motivation among employees will become zero. Conversely, motivation will be high if all three components will score high.

4.11. EQUITY THEORY

J.S. Adams formulated the Equity Theory of motivation. The equity theory helps us understand the importance of equal treatment of all employees in an organisation. The theory explains the process through two components, namely inputs and outcomes. People use subjective judgement to balance the outcomes and inputs for comparing other employees with themselves. If people feel they are not equally rewarded, they either reduce the quantity or quality of work. However, if people perceive that they are rewarded higher, then they are motivated to work harder.

This theory believes that a manager's fair treatment and balanced decisions are crucial in an organisation and states that an employee compares his/her job's input and outcomes with others, whether within or outside the organisation and then responds to eliminate these inequalities.

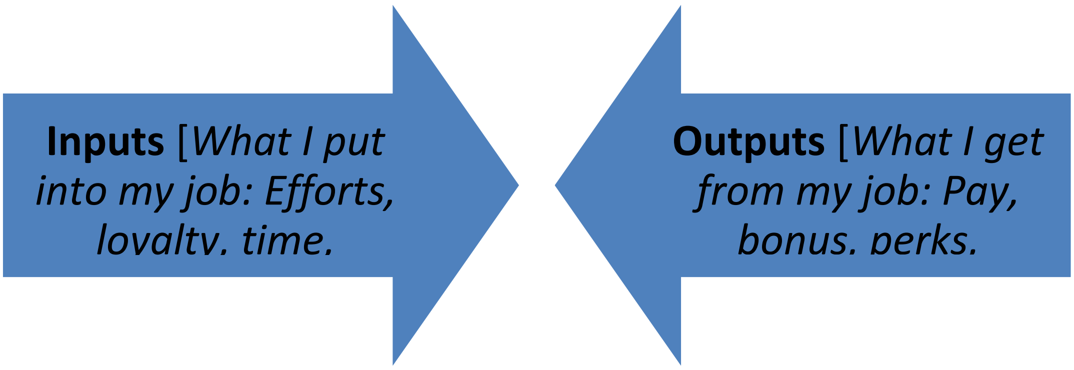

Figure 10 Equity Theory

Here 'Input' refers to everything that an employee gives to the organisation (example-skills, knowledge, efforts, time, idea, etc.); and 'Outcomes' refers to various rewards that he receives from an organisation (for example- pay, recognition, promotion, benefits, friendly relationships, etc.). The employee tends to compare the inputs he gives to an organisation with the outcomes he receives. Additionally, s/he tends to compare his input- outcomes ratio with others.

According to Equity theory, employees take measures to re-establish fair treatment in case of inequity. Following are some examples through which employees could re-establish equity -

- Changing their inputs by giving less effort.
- Changing outcomes by asking for higher returns
- Plans to leave the organisation

- Changing the employee with whom they compare themselves.

IN-TEXT QUESTIONS

3. MCQs

I. Theory X and Y are formulated by `______

a) David McClelland; b) Frederick Herzerg; c) A.H. Maslow; d) Douglas McGregor

II. Under this, manager believes that employees usually dislike working and therefore as a manager it is important to direct them

a) Theory X; b) Theory Y; c) Theory Z; d) Three need theory

III. Expectancy theory is part of _______

a) Process theories
b) Content Theories
c) Non cognitive Theories
d) Reinforcement Theory

IV. ________ refers to how highly do the employees value the rewards.

a) Valence
b) Instrumentality
c) Expectancy
d) None of the above

V. "If people feel that they are not equally rewarded they either reduce the quantity or quality of work to some other organization.", the statement holds true as per-

a) J.S. Adams Equity theory
b) Equity theory by Edwin Locke
c) Alderfer's Equity theory
d) McClelland's Equity theory

4.12. Types of Motivation: Cognitive Evaluation Theory

Motivation activates human behaviour and gives it direction. Cognitive evaluation theory suggests that there are two types of motivation; intrinsic and extrinsic. Intrinsic (internal) motivation is an internal state or condition that drives behaviour, such as a hobby. On the other hand, extrinsic (external) motivation refers to direction from outside the person, including the promise of rewards, the threat of punishments, intimidation, and coercion. Both intrinsic and extrinsic motivations are essentially related to goals.

4.12.1. Intrinsic Motivation

Any of the following may determine intrinsic motivation:

1. **Physiological States/Needs**: Employees may seek sensory stimulation to decrease hunger, thirst, or physical discomfort.
2. **Emotional Needs**: An employee may seek to calm over-aroused emotions, increase good feelings, decrease negative emotions, maintain optimism and enthusiasm, develop a sense of productivity, or increase self-esteem.
3. **Cognitive Needs**: Employees may seek to increase knowledge and understanding, maintain attention to interesting and personally meaningful events and activities, solve problems, or resolve uncertainty or confusion.
4. **Social Needs**: Employee(s) may seek to be like a role model, to be part of a group, to help others, or to be accepted by peers and have friends.
5. **Volitional/Self-Determination Need**s: Finally, an employee may seek to achieve goals that he has set for herself, take control of her affairs, reduce others' control over her (become self-determined), or pursue her dreams.

In summary, intrinsically motivated employees act as they do because of their own needs, goals drive them, and wants versus external inducements, they like the outcomes, and the outcomes make them feel good — give them a sense of satisfaction. The motivation agent is inside the person; they have an internal locus of control. It is worth noting that the idea of reward for achievement is absent from this model of intrinsic motivation since rewards are an extrinsic factor.

4.12.2. Extrinsic Motivation

Management systems in many rehabilitation centres, schools, and homes are based on the assumption that people are extrinsically motivated and will not engage in positive behaviour without external inducements. The underlying belief is that most human resources engage in activities because they are directed to do so, because they are required to do so, or because they are provided with either promise of rewards or threats of punishment to sustain their participation. Thus rewards (e.g., monetary or non-monetary) play an essential role. All factors mentioned above (under reinforcement theory) represent external factors that motivate or demotivate employees.

4.13. Summary

- Motivation is the process in which basic need leads to creating drives aimed at a goal. Highly driven people put in much effort at their jobs, whereas those who lack motivation do not.
- The cognitive model of motivation consists of theories that focus on the human mind's internal state. Theories under the cognitive model could be further subdivided into Content and Process theories.
- Content (or need) theories of motivation focus on factors internal to the individual that energise and direct behaviour. In contrast, Process theories are concerned with determining how individual behaviour is directed and maintained in the specifically self-directed human cognitive processes.
- Content theory includes Maslow's Need Hierarchy Theory; Herzberg's Motivational Hygiene Theory; Alderfer's ERG Theory; and McClelland's Needs theory; while Vroom's Expectancy Theory, Adam's Equity theory; and Goal Setting Theory fall under Process Theories.
- B.F. Skinner formulated reinforcement theory. This theory proposes that behaviour is a function of its consequences. In other words, unlike cognitive theories of motivation, other than the inner state, motivation can be enhanced through external factors.
- Cognitive evaluation theory suggests that there are two types of motivation; intrinsic and extrinsic.

4.14 ANSWERS TO IN-TEXT QUESTIONS

1. a) needs and drives; b) Cognitive and non-cognitive models; c) internal state of human mind; d) content and process theories.
2. I) Lower order needs; II) Both (a) and (b); III) Fredrick Herzberg; IV) No dissatisfaction; V) Herzbergs' Two factor Theory
3. I) Douglas McGregor; II) Theory X; III) Process theories ; IV) Valance; V) J.S. Adams Equity theory

4.15 Self Assessment Questions

1. Define motivation & Explain the process of motivation.
2. Explain Cognitive evaluation theory. State the effect of intrinsic and extrinsic rewards on the behavior of the employees.
3. Explain Maslow's need theory and its implications for management.
4. Do you believe that motivational theories are affected by the Culture? Justify your answer with suitable examples.
5. "Millionaires keep working even in the later years of their lives" What motivates them to work.

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LESSON 5

INTERPERSONAL RELATIONSHIP

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STRUCTURE

5.1 LEARNING OBJECTIVES

After studying this lesson you will be able to:

- Understand and manage Interpersonal behaviour.
- Understand how people relate to one another.

- Apply knowledge of ego states to improve communication and human relations
- Design ways of improving interpersonal relationships through self-awareness and mutual understanding.
- Understand perception of self and others through Life Positions.
- Understand the role and importance of strokes.

5.2 INTRODUCTION- Interpersonal Relations

Organizations cannot survive without regular and positive interaction between people, whether within the organization or between employees and external stakeholders. These interactions give rise to interpersonal relations between people where each influences and gets influenced in turn by another. This is termed as Interpersonal Relations. Every manager is responsible for managing interpersonal relations in his department in such a way that every employee cooperates willingly in accomplishing the organizational goals. In the absence of good interpersonal relations, there will be an atmosphere of misunderstanding and conflicts in the organization.

Behavioural scientists have recommended the use of various tools for understanding and managing interpersonal behaviour in the organization for the betterment of the organization as well as its people. Some such tools are Transactional analysis, Johari Window, the study of life positions, ego-states, stroke analysis and game analysis.

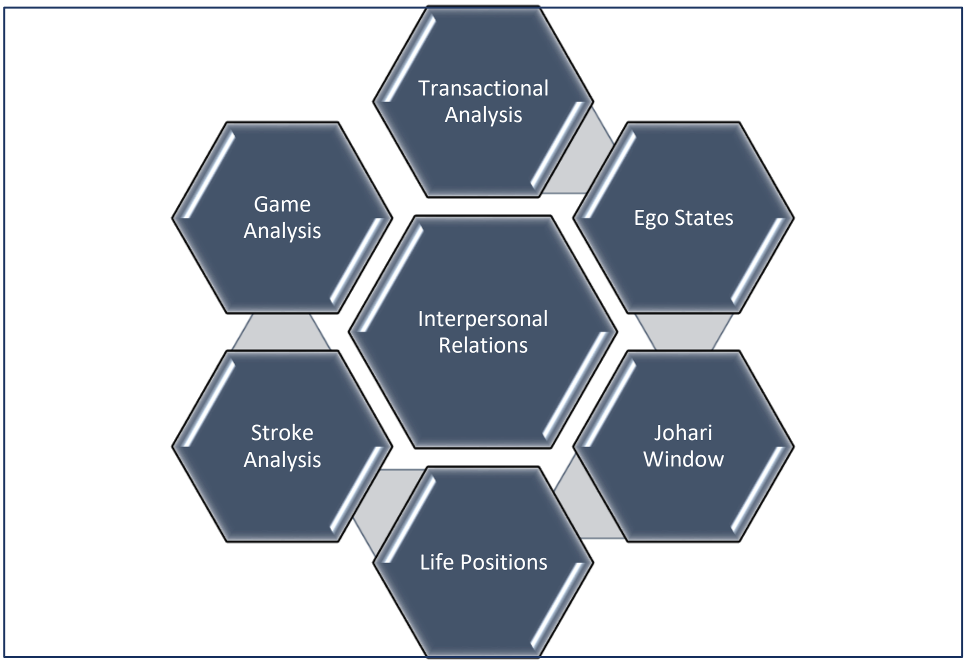


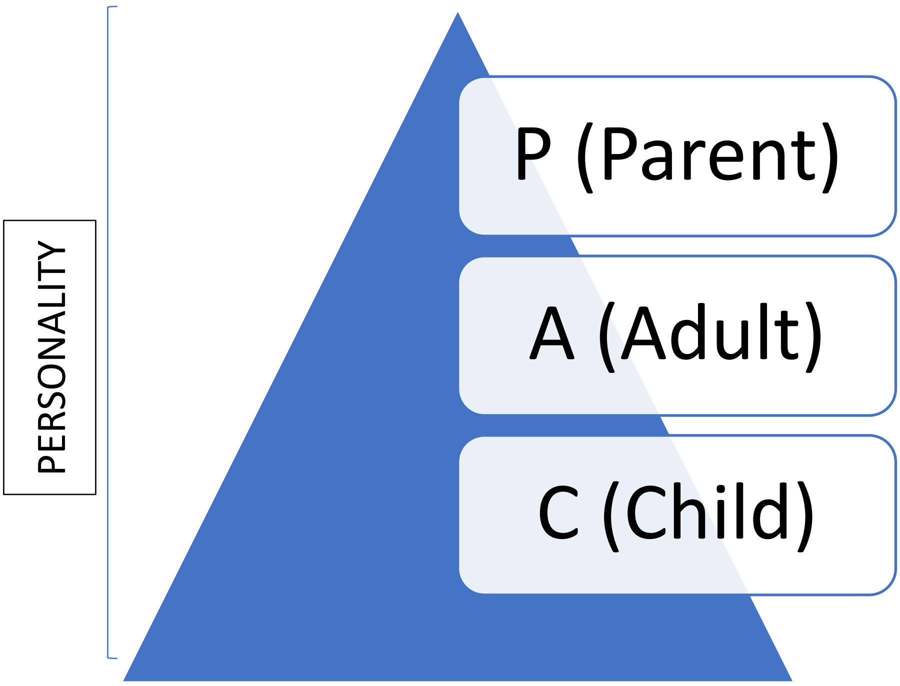
Fig 5.1: Tools for managing and understanding Interpersonal Relations

5.3 TRANSACTIONAL ANALYSIS

The concept of Transactional Analysis was developed by Dr Eric Berne in 1950. It is a technique used to help people better understand their own and others' behaviour, especially in interpersonal relationships. In the interaction between two people, one person respond to another person. This responsive interaction is called social transaction and the study of these interactions is known as transactional analysis. It is considered to be an effective tool to gain a better understanding of interpersonal behaviour. The main concepts involved in TA are levels of self-awareness, ego-states, life positions, transactions and stroking.

5.3.1 EGO STATES:

This concept of Ego States is an extension of the Freudian concept of id, ego and superego. Similar to Freud's concept, Eric Berne suggests that people interact with one another through three behavioural patterns known as ego states- parent, adult and child (as shown in Fig. 5.1.) which shape their personality.



It must be noted that ego states are not tied to one's chronological age. In the course of daily interactions, adults are likely to display all the three ego states though any one state may dominate at some point of time. In other words, the behaviour is governed by a particular ego-state in a particular moment.

ACTIVITY

Think about yourself and some of the most influential people in your life, during your interaction with them try to enlist for yourself and others the ego state that dominates in you and them during interactions.

A) **Parent Ego**: This ego state comprises the judgemental, value laden, moralising and rule-making part of personality. An individual acting with the parent ego tends to be dogmatic, upright and overprotective. There are two types of parent ego states:

(i) **Nurturing Parent Ego**: Nurturing parent ego state shows protective behaviour, sympathy and nurtures not only children but also the other people they interact with.

(ii) **Critical Parent Ego**: Critical parent ego is critical and evaluative in behaviour in their interaction with others. This ego state attacks people's personalities as well as their behaviour. They are always ready to respond with a 'what should be or ought to be to what people tell them.

A) **Adult Ego**: This ego state is a mark of rationality in interactions, they seek information and are willing to provide solutions to problems when interacting with an adult ego. They treat others as equal, worthy and respectable.

B) **Child Ego**: The emotional, creative, spontaneous and impulsive component of personality belongs to the child ego state. The most prominent characteristic of this ego state is to exhibit immature behaviour. Anxiety, dependence, fear, hate and conformity are other some other traits of this ego state.

Behavioural patterns of each of the three ego states are given in Table 5.1

PARENT EGO	ADULT EGO	CHILD EGO
Teaching	Rationality	Spontaneous
Demonstrating	Testing	Impulsive
Rules & Laws	Exploring	Wishing/fantasising
Do's and Don't's	Estimating	Creating
Truths	Evaluating	Experiencing joy/frustration
How to	Storing data	Feeling internally
Tradition	Figuring out	Seeing, hearing, touching

5.3.2 TYPES OF TRANSACTIONS:

The heart of Transactional Analysis is the study of and diagrammatic representation of the exchanges between two people. A transaction is a basic unit of social interaction. It consists of an exchange of words and behaviour between two people. It consists of stimulus (S) from one person and the response (R) from another person. On the basis of ego states of the persons involved transactions can be complementary and non complementary.

COMPLEMENTARY TRANSACTION: A transaction is complementary when a stimulus from one person receives a predicted response from the other person. The transaction is said to be complementary because both the interacting individuals are acting in the perceived and expected ego state. In such a transaction, both the persons are satisfied and communication is complete. Complementary transactions are of following types:

(i) **Adult-Adult Transaction**: This is the ideal transaction because it gives satisfaction to both the interacting persons. Both are rational in their behaviour depending largely on facts and figures. It is also shown in the Fig. 5.2.

Conversation between Supervisor & Operator:

Supervisor: Have you finished your job? (A-A)
Operator: Yes Sir, I finished it long back and it has already been delivered to the assembly section. (A-A).

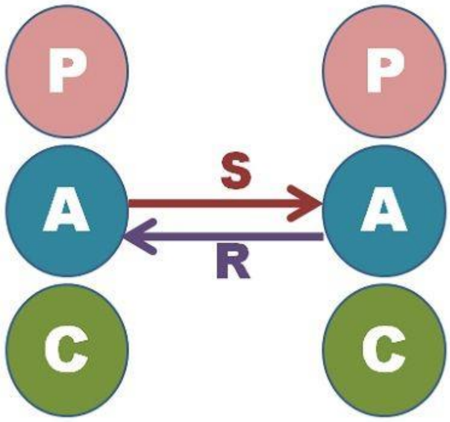


Fig. 5.2 Adult-Adult Transaction

(ii) **Adult-Parent Transaction:** In this transaction, an individual may send a transactional stimulus as adult to another individual but the other individual may respond from the parent ego state. Fig. 5.4 shows the adult-parent transaction.
Conversation between Mr. X and Mr. Y:

Mr. X: Have you seen my file?(A-P)

Mr. Y: You should keep your belongings safely.(P-A)

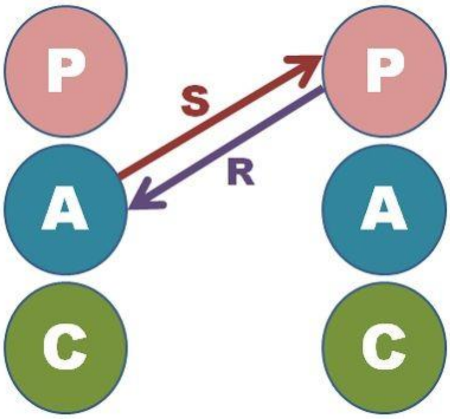


Fig. 5.4 Adult-Parent Transaction

(iii) **Parent-Parent Transaction**: In this type of transaction, the superior uses rewards, criticism, rules and admonitions. The transaction can be beneficial if the subordinate supports the superior. Otherwise there may be needless competition between the two as the subordinate will try to push their own ideas. Fig 5.5. shows the parent-parent transaction.

Conversation between Superior and Subordinate:

Superior: You must not unnecessarily experiment with things. (P-P)

Subordinate: Great things doesn't happen without experiments. (P-P)

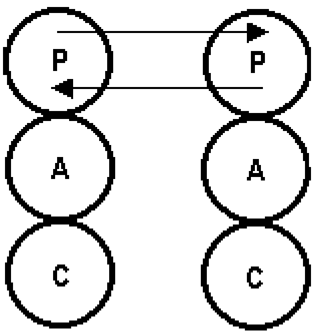


Fig 5.5: Parent-Parent Transaction

(iv) **Parent-Child transaction**: When the manager interacts with parent ego and the employee responds with child ego, there can be satisfaction for both. Conflict and pressure are eliminated. But in the long run the personality of the employee may remain underdeveloped which may create a feeling of frustration. Fig. 5.6. shows the parent child interaction.

Conversation between Manager and Employee:

Manager: You must try to improve your performance!
Employee: Improvement in performance is proportionate to improvement in salary.

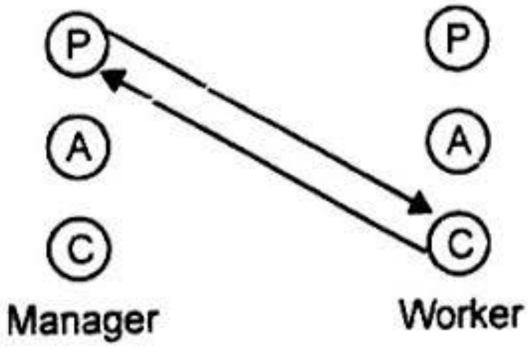


Fig. 5.6: Parent-Child transaction

(v) **Child-parent transaction:** In this type of transaction the employee dominates the manager. A strong and overbearing subordinate may use ridicule to make the boss surrender. Fig. 5.7 shows the child-parent transaction.

Conversation between employee and manager:

Employee: Whom should I submit the file after completing it?
Manager: You must always follow the chain of command for any official work.

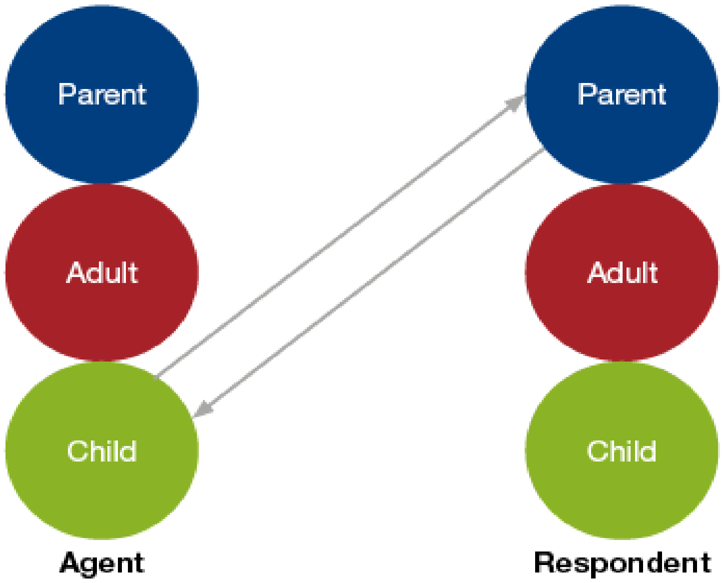


Fig. 5.7: Child-Parent transaction

(vi) **Child-child transaction:** In this type of transaction, both manager and employee are acting on whims, fancies and emotions. Therefore, the organization suffers and the situation cannot last long. Fig. 5.8 shows child-child transaction.

Conversation between subordinate 1 and subordinate 2:

Subordinate 1: Management should always think in favour of their employees.
Subordinate 2: If management will not think in our favour we will also do the same towards them.

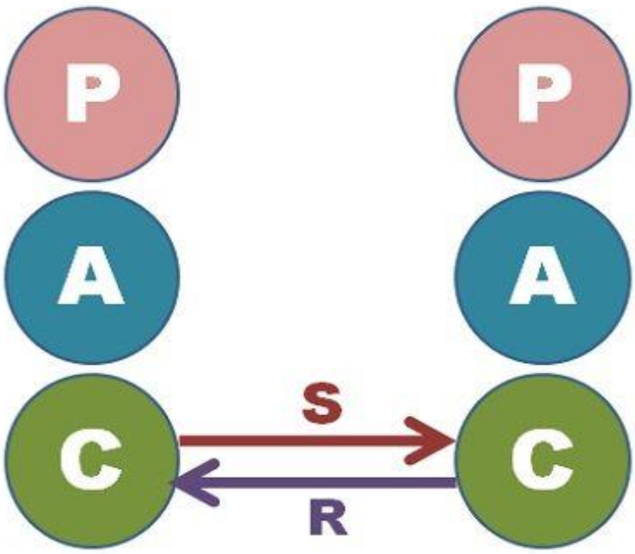


Fig. 5.8 Child to child transaction

NON-COMPLEMENTARY TRANSACTION: A Non-complementary or cross transaction occurs when the person who initiates the transaction does not get the expected response. In such a transaction the stimulus-response lines are not parallel. The non-complementary transaction is shown in Fig. 5.9.

Conversation between supervisor and operator:

Supervisor: How many units have you made till now? (A-A)

Operator: Do not enquire frequently, I will inform you on completing it. (P-C)

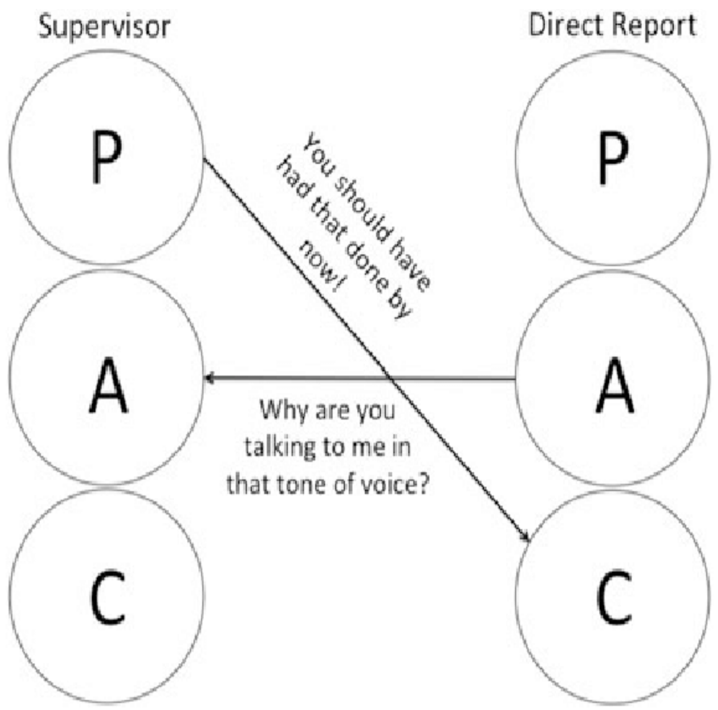


Fig 5.9 Crossed Transaction

Such a transaction will ultimately result in a dispute. Once the transaction is crossed it results in unrest and dissatisfaction leading to arguments and conflicts between the interacting parties.

ULTERIOR TRANSACTIONS: This transaction denotes communication with double meaning. There is a clear message at the surface level, whereas, there is a hidden message on the psychological level. One message can be acceptable at the surface level but can be unacceptable at the psychological level.

Example: Mr. X to Mr. Y "You need not worry, I am there to help you", where Mr. X's motive may be to make Mr. Y feel dependent on him.

GALLOWS TRANSACTION: An inappropriate facial expression at some point of time generally implies a gallows transaction.

Example: A smile in response to a person's misfortune or a father beaming over the risk his son has taken and thereby losing in business.

In a nutshell it can be stated that while interacting with people we transact with various ego states, consciously or subconsciously, some interactions are complementary transactions and some are crossed transactions. It is very important to understand and manage these interactions in an organizational setting to maintain good interpersonal relations.

Adult to adult transaction is most effective in the organization because it is problem solving, treats people as equal and improves understanding. Though the A-A transactions are most desirable yet other complementary or parallel transactions are also workable depending upon situations and both superior and subordinates are willing to develop a workable relationship.

5.3.3 LIFE POSITIONS:

In the process of growing up, people make basic assumptions about their own self-worth, as well as about the worth of significant people in the environment.

Thomas Harris has called these assumptions life positions. They are learned as a result of experiences people go through in early life and these are reflected in the view they hold of their oneself and that of others as being 'OK' or 'NOT OK'. People hold 4 life positions. These life positions are shown in Fig 5.10

Fig. 5.10 Life Positions

i. **I am O.K. you are O.K.:** This is the ideal life position. People having this life position have a positive outlook. They consider life as worth living and show a high level of mutual give and take. Such people can freely express their views and solve their problems easily.

ii. **I am O.K. you are not O.K.:** This life position is adopted by people who were too much ignored or victimised during their childhood. Such people feel whatever they do is right and blame others for their miseries.

iii. **I am not O.K. you are O.K.:** People with this life position feel powerless and keep on grumbling. They feel others are more competent and have fewer problems.

iv. **I am not O.K. you are not O.K.:** People with this life position lack confidence in themselves as well as in others. They feel the whole world is miserable and life is not worth living. This is a desperate life position and may lead to suicide in extreme cases.

One of these four positions dominates each individual's life. The most desirable position is 'I am O.K. you are O.K.'. This position leads to adult-adult transactions. It shows healthy acceptance of self and others. It can be learnt through education, counselling and conscious choice. The other three life positions are less mature and less efficient.

IN-TEXT QUESTIONS

7. Paired interactions among people are known as ________________ relationship.
8. Ego States are important constituents of Johari Window. True / False
9. Which is NOT one of the characteristics of Adult Ego.

   a) Rationality   b) Creating

   c) Evaluating   d) Figuring out
10. Most ideal transaction for an organization is _____________________.
11. _____________________ transaction denotes communication with double meaning.

5.3.4 STROKE ANALYSIS:

The term 'stroke' means giving some kind of recognition to the other. A stroke is a basic unit of motivation. Whenever two individuals interact with each other, strokes are exchanged.

Strokes are of three types- positive, negative and mixed. The stroke that makes one feel good or O.K. is a positive stroke. Praise, affection, pat on the back are examples of positive strokes. On the other hand, the stroke that makes one feel bad or not O.K. is a negative stroke. Criticism, scolding, hating are examples of negative stroke. A mixed stroke is a combination of both positive and negative stroke. For example, a superior's comment to a worker "you did an excellent job despite your limited experience" includes a positive stroke (excellent work) and a negative stroke (limited experience). People do not always seek positive strokes rather they may also accept negative strokes to relieve themselves of their guilt or low self-image. The negative stroke completes a social transaction and provides a social equilibrium for them. But negative strokes rarely change the undesirable behaviour. A manager can secure positive behaviour by avoiding the punishing parent to child approach and adopting an adult to adult interaction. For example, the supervisor might initiate conversation with the employee by saying "Aditya, if you want to discuss something regarding yesterday's task, I am open to discussion." rather than just enquiring about the status of work completion or creating pressure for achieving deadlines.

5.3.5 GAME ANALYSIS:

Strokes keep people motivated, when people fail to get enough strokes at work, they may try a variety of things. One of the most important things is that they play psychological games. According to Eric Berne, " A game is a recurring set of transactions, often repetitions, superficially plausible, with a concealed motivation or more colloquially, a series of moves with a gimmick."

Games prevent honest, intimate and open relationships between the players. Yet people play games because they fill up time, provide attention, reinforce early opinions about self and others and fulfil a sense of density.

A psychological game is a set of transactions with three characteristics:

(i) The transactions tend to be repeated.
(ii) They make sense on a superficial or social level.
(iii) One or more of the transactions is ulterior.

The set of transactions ends with a predictable payoff, i.e., a negative feeling. This negative feeling generally reinforces a decision made in childhood about oneself or about others. However, people still play psychological games because of the following reasons:

(1) **To get strokes:** Every person wants to have positive strokes on the job. When they are not in a position to get these strokes from others, they try to play psychological games to satisfy their needs for strokes.
(2) **To strengthen life positions:** Games are generally played to strengthen the life position which the people hold. If people hold non-OK positions, they try to emphasise it through the games. Sometimes, a person acts like a loser in order to win the game.
(3) **To avoid or control intimacy:** Some people are afraid of openness, accountability and responsibility in relationships. Such people generally play games to avoid or control intimacy, because games generally put distance between people.

5.4 LEVELS OF SELF-AWARENESS

Knowing oneself, including ones traits, feelings, behaviours and knowing your limitations is known as Self-awareness. Everyone interacts with others with a conscious and unconscious image of self and others. This awareness is required to maintain objectivity, it helps one to identify and cope up with stressful situations well. It helps one in effective communication, interpersonal relations and empathy for others.

A simple and useful tool for understanding self-awareness was devised by American psychologists Joseph Luft and Harry Ingham in 1955, calling it 'JOHARI' after combining their first names Joe and Harry. The present model is specially relevant due to its application in improving 'soft' skills, behaviour, empathy, cooperation, inter group development and interpersonal development.

5.4.1 The FOUR Johari Window Perspectives:

Johari Window is made up of four quadrants, also known as 'regions' or 'areas', that together represent the total person in relation to others on the basis of awareness of behaviour, feelings, needs and the like. Sometimes, there may be things which an individual knows about others and others that he or she does not know.

The FOUR quadrants in the Johari Window are discussed below:

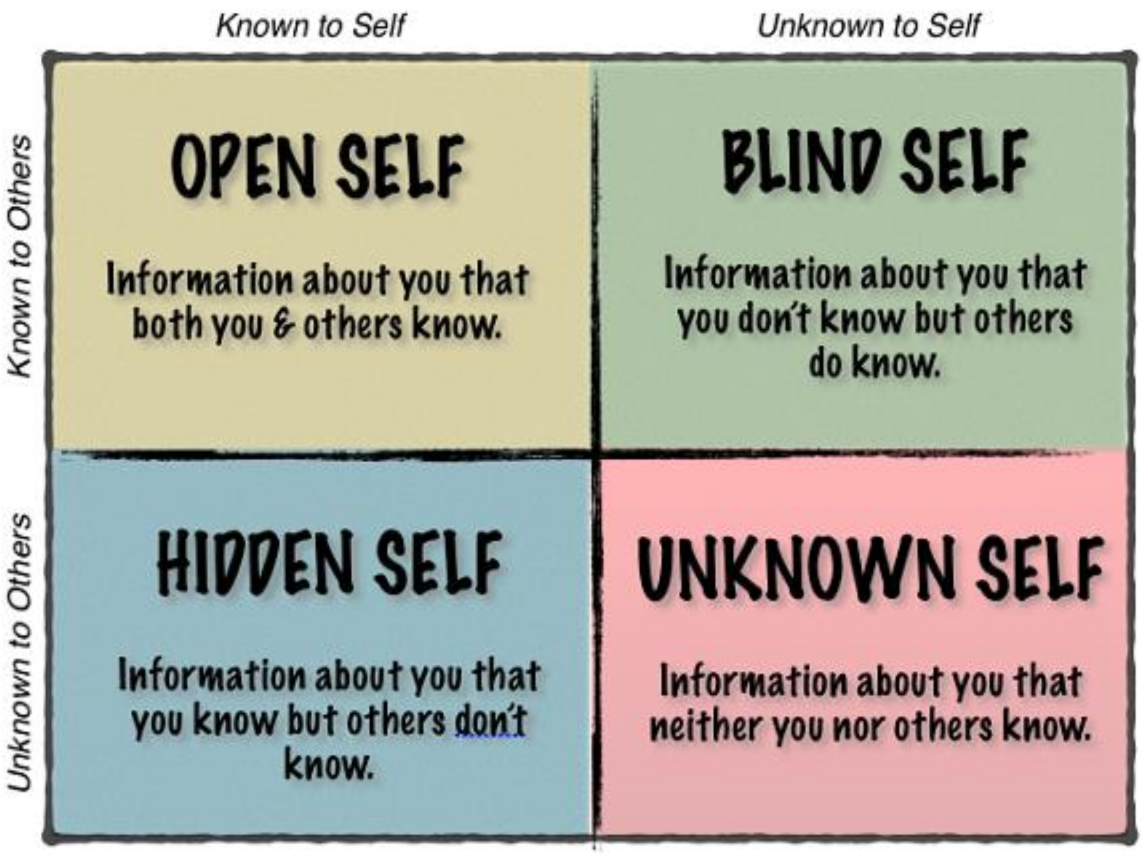


Fig. 5.11 Johari Window

1) **Open area, open self, free area, free self or 'the arena'**: This quadrant reflects behaviour, feelings, and motivation known both to oneself and others. In other words, an individual knows about himself or herself, and about others. This type of interaction is marked by openness and compatibility, and has very little possibility for defensive feeling and behaviour.

2) **Blind area, blind self or 'blind spot'**: It reflects behaviour, feelings and motivation known to other parties but not to self. In other words, in this form of interaction, the individual knows about others but not about himself or herself.

3) **Hidden area, hidden self, avoided area, avoided self or 'facade':** It reflects behaviour, feelings and motivation known to self but not known to others. In other words, the individual understands himself or herself but does not know about others. The individual tends to be hidden from others for fear of their reactions. The true feelings or attitude of the individual may remain a secret from others.
4) **Unknown area or Unknown self:** It reflects behaviour, feelings and motivation known neither to self nor to other parties. In other words, the individual does not know about himself or herself and does not know about others. This form of interaction is highly explosive.

5.4.2 Feedback and Disclosure:

There are two interpersonal processes of 'disclosure' and 'feedback' which cause a redistribution of awareness and changes in the size and form of the four quadrants. The model assumes that an 'open self' becomes larger, the relationship tends to be more rewarding and productive. Thus the model is dynamic and sensitive especially to the interpersonal application of 'disclosure' and 'feedback'. The 'hidden self' can be reduced and 'open self' increased through the disclosure procedure.

The 'blind area' can be reduced by seeking feedback from others and thereby increasing the open area i.e. to increase self-awareness. Managers must promote a climate of non-judgemental feedback, and group response to individual disclosure, and reduce fear.

In the 'hidden area' relevant hidden information and feelings, etc. should be moved into the open area through the process of 'self-disclosure' and 'exposure' process. The extent to which an individual discloses personal feelings and information, and the issues which are disclosed, and to whom must always be at the individual's own discretion. Organizational culture and working atmosphere have a major influence on team members' preparedness to disclose their hidden selves.

Use of self disclosure forms a mechanism for sharing awareness with others. However, self-disclosure involves risk for the individual and the outcome must be worth the cost. Likewise the ‘feedback’ process can be used to decrease ‘blind self ‘and simultaneously increase the ‘open self’.

CASE STUDY

Mr. Aman, aged about 50 joined the bank about 25 years back and is presently working as manager-operations, in a city branch of the bank. He remained very active in Officers' Association activities although, for sometime now, he disassociated himself from such activities.

One morning Mr. Raghav, a junior clerk came to his table and sought his guidance on some issue relating to Know Your Customer documentation guidelines. Mr. Aman informed Mr. Raghav about the guidelines and directed him to follow this. Raghav however, was of the opinion that information given to Mr. Aman is not updated and there is some modification.

Next morning Mr. Raghav again went to Mr. Aman and told him that he has learnt that the guidelines stands modified. He also told him about the changed guideline. This irked Mr. Aman, although he did not say anything. Mr. Raghav, however could notice that Mr. Aman has not taken this information well.

When Raghav went back to his table, he narrated this incident to another clerk stating that Mr. Aman does not know much in spite of his seniority and experience. Mr. Aman over-heard this comment and he was badly upset. In a fit of anger, he started shouting at Mr. Raghav. As a result, Raghav also got angry and maintained that he said nothing that should make Mr. Aman uncomfortable. Everyone present in the branch, including some customers, were looking at Mr. Aman.

Mr. Khurana, an officer, who had joined the branch few months ago, immediately went to Mr. Aman and to pacify him, he regretted for Mr. Raghav's behaviour and assured Mr. Aman that during the lunch break the staff members will sit together and sort out the issue.

Answer the following questions on the basis of above. Taking into account the ego state:

Q1. Explain that in which ego state Mr. Aman directed Mr. Raghavto follow the KYC guidelines, as narrated by Mr. Aman:

a. A nurturing parent ego state
b. Adult ego state
c. Child ego state
d. D. critical parent ego state

Q2. Mr. Aman had advised Mr. Raghav to follow the KYC instruction as narrated by him. Next day Mr. Raghv indicated that the instructions narrated by Mr. Aman stands changed, which irked Mr. Aman. Explain in which of the following ego states, the reaction of Mr. Aman falls:

a. Nurturing parent ego state
b. Adult ego state
c. Child ego state
d. Critical parent ego state

Q3. Mr. Khurana, immediately went to Mr. Aman and to pacify him, regretted for Mr. Raghav's behavior and assured Mr. Gupta that, during the lunch break the staff members will sit together and sort out the issue. Explain in which of the following ego states, the reaction of Mr. Khurana falls:

a. Nurturing parent ego state
b. Adult ego state
c. Child ego state
d. Critical child ego state

Q4. What would you suggest in the meeting to be held during the lunch break? In your view is Transactional analysis helpful in such a situation? How?

IN-TEXT QUESTIONS

6. When the manager interacts with parent ego and employee responds with child ego, there is satisfaction for both. True / False
7. _______________ proposed the concept of life positions..
8. Employee smiling at the misfortune of co-worker is an example of:
   a) complementary Transaction   b) crossed transaction
   c) gallows transaction   d) ulterior transaction
9. People with ____________________ feel powerless.
10. ____________________ is the basic unit of motivation.
11. ____________________ prevents honest, intimate and open relationship.
12. ____________________ means knowing ones traits, feelings, behaviour and limitations.
13. Gold spot is one of the regions of Johari Window. True / False
14. Information that neither you nor others know is _______________.
15. Which process can cause change in the size & form od the 4 Johari Window quadrants:
    a) Suppression   b) Feedback
    c) Disclosure   d) Both B&C

5.5 SUMMARY

One of the most distinctive aspect of human beings is that we are social beings. Interpersonal relations are and have been the core of our social system since the dawn of civilization. A strong bond between two or more people refers to interpersonal relationships. Interaction and transactions between individuals bring them close and eventually results in a strong interpersonal relationship. In an organization it becomes even more important to understand and manage these interpersonal relationships as they exist there for a specific purpose and goal. A disrupted relationship among people working in the organization will also disturb the organizational process creating hurdles in the way of goal achievement. Therefore, to better understand these interpersonal relations some effective tools like Transactional Analysis, Life Positions, Johari Window, Stroking and Game analysis were devised by various management theorists in mid 90's and are still being adopted in organizations.

5.6 GLOSSARY

Transaction: An exchange or transfer..

Quadrant: Quarter of a basic shape.

Dyadic: Group of two people, the smallest possible social group.

Façade: The way somebody/something appears to be, which is not the way he/she/it really is.

5.7 ANSWERS TO IN-TEXT QUESTIONS

1. Dyadic	9. I am not O.K., you are O.K.
2. False	10. Stroke
3. Creating	11. Psychological game
4. Adult-Adult	12. Self-awareness
5. Ulterior	13. False
6. True	14.Unknown Self
7. Thomas Harris	15. Both b & c
8. Gallows transaction	

5.8 SELF-ASSESSMENT QUESTIONS

1. Explain the concept of Transactional Analysis and state its utility.
2. Explain three ego states and various types of transactions between two person with the help of suitable diagrams.
3. Discuss the concept of Life Positions. How can strokes be used to change the behaviour of people in the organization?
4. Explain the FOUR quadrants of Johari Window. How can it help in improving interpersonal relations?
5. Explain the role of disclosure & feedback in the context of Johari Window.

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5.10 SUGGESTED READINGS

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LESSON 6

LEADERSHIP

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STRUCTURE

6.13 Suggested Readings

THE GREATEST CHALLENGE - Opening Case

Your company's Human Resources manager is Prashant. You scheduled a meeting with him because you are having troubles with your supervisor. You told Prashant, "I really need to vent. Can we have a seat and talk?" Prashant extends a seat to you. You proceed to describe Sameer, your supervisor, and how he has recently been managing your team. You state, "When Sameer began working here three months ago, he was a truly exceptional boss. He met with each one of us individually and asked numerous questions. We were all thrilled to have him as our new supervisor, as he exhibited genuine concern and adopted some of our suggestions. However, he has become increasingly short-tempered and insistent on making all the decisions. I've discussed it with him, but he doesn't seem to recognize that it's become a problem. In fact, I am aware of two individuals who are seeking alternative employment as a result." Prashant considers the circumstance and inquires whether Prashant's behavior change coincided with the arrival of (not able to understand this terminology?). I hadn't considered that previously, but the timing would be about correct (what is the meaning). Prashant explains that many managers have been instructed they need to make changes in the organisation, and that these changes must be implemented without employee input. Prashant acknowledges that this is a departure from the branch's typical management approach and asks if you can wait a little longer. He feels that Sameer will revert to his previous self once the necessary adjustments are made. Prashant suggests you discuss your concerns with your manager in the meantime. You believe speaking with Sameer could be beneficial for your department, while feeling apprehensive about doing so.

6.1 LEARNING OBJECTIVES

After completing this lesson, you will be able to:

- Define the meaning and significance of leadership;
- Understand the difference between leaders and managers;
- Explain the theories of leadership;
- Describe different styles of leadership;
- Explain the concept of Transactional and Transformational leadership.

6.2 INTRODUCTION

Leadership is one of the most vital components of organisational studies of human behaviour. The leader establishes the working environment. The success of an organisation is contingent on the effectiveness of its leadership. A leader is defined by his or her characteristics, optimistic attitude, and problem-solving skills. A leader should be able to salvage a dismal situation. In a market climate characterised by intense rivalry and a financial downturn, layoffs are common, product demand is low since the pandemic, and the market continues to experience low or no growth. In this circumstance, a leader needs to maintain composure and shift the tide in his/her favour. A leader should be able to innovate approaches and steer the organisation towards a win-win plan apart from having the ability to motivate team members, vis-à-vis employees.

Effective organisations require excellent leadership and management. In the present times, leaders should challenge the status quo, generate new visions, and encourage organisational members to realise them. The managers should make precise plans, organise effectively, and manage daily activities.

This chapter examines what constitutes a successful leader and what distinguishes leaders from followers. We will review trait theory and prominent behavioural theories. Following the introduction of the contingency theories, the leadership styles are discussed.

6.3 MEANING

Leadership is the capacity to inspire a group of individuals to collaborate in order to achieve a vision or set of objectives. This authority may derive from a formal source, such as a manager's position in an organisation. But not all leaders are managers, and not all managers are leaders. Even if a corporation grants its managers formal rights, that does not guarantee that they will be effective leaders. Non-sanctioned leadership is the capacity to exert influence outside of the established structure of an organisation. Largely it is more important than formal influence. In other words, group leaders may emerge from within or be chosen by the group.

Leadership is an exceptional quality that can generate and transform anything. There are many definitions of leadership which are provided in the following section:

- Leadership according to Alford and Beatty is "the ability to secure desirable actions from a group of followers voluntarily, without the use of coercion."
- According to Chester I Barnard, "leadership refers to the quality of the behaviour of the individual whereby they guide people on their activities in organized efforts."
- According to Terry, "a leader shows the way by his own example. He is not a pusher; he pulls rather than pushes."
- According to Koontz and O'Donnell, "Managerial leadership is the ability to exert interpersonal influence by means of communication, towards the achievement of a goal."
- According to Peter Drucker, "Leadership is not making friends and influencing people i.e., salesmanship. Leadership is the lifting of man's vision to higher sights, the raising of man's performance to higher standards, and the building of man's personality beyond its normal limitations."
- According to Louis A. Allen, "A leader is one who guides and directs other people. He gives the efforts to his followers a direction and purpose by influencing their behaviour."
- In the words of Theo Haimann, "Leadership is the process by which an executive imaginatively directs guides and influences the work of others in choosing and attaining specified goals by mediating between the individuals and the organization in such a manner that both will obtain maximum satisfaction."
- According to Katz and Kalm, "in the descriptions of organizations, no word is used with such varied meanings. The word leadership is sometimes used to indicate that it is an attribute of personality; sometimes, it is used as if it were a characteristic of certain positions, and sometimes as an attribute of behaviour."

From the above definitions, we can assume that leadership is the psychological process of influencing followers (subordinates) and guiding, directing, and leading them.

6.3.1. Nature of Leadership

The distinguishing nature of leadership is discussed below:

1. ***Existence of followers:*** Leaders in an organisation are also people who follow someone else. For example, a supervisor works for a branch head. So, in a formal organisation, a leader must be able to be both a leader and a follower and be able to communicate with people both above and below him.
2. ***Common interest between leader and followers:*** The objectives of a leader and followers are congruent. If a leader pursues one objective while the team pursues another, then it is not leadership.

3. ***Unequal distribution of authority among leaders and group members:*** Group members are obligated or willing to comply with the majority of the leader's instructions. The members of the group cannot similarly influence the activities of the leader, although they will undoubtedly have a variety of effects on those activities.
4. ***Process of Influence:*** Leadership implies that leaders may influence their followers or subordinates in addition to being able to provide them with valid instructions.
5. ***Function of Stimulation:*** Leadership is the function of getting people to work hard on their own to reach the goals of an organisation. A good leader lets the followers set their own goals as long as they don't go against the organization's goals.
6. ***A Leader should be Exemplary:*** A leader should provide an example for the followers. The followers should be inspired by the leader to work diligently and with integrity. In other words, a leader is responsible for setting an exceptional example for the followers.
7. ***Ensures Absolute Justice:*** A leader must be neutral and objective. S/He should not be engaged in unfair behaviours such as favoritism and nepotism. He must demonstrate Ultimate fairness and justice should be demonstrated in all of the judgments and deeds.

ACTIVITY

List out 5 leaders and identify their distinguishing traits.

6.3.2. Importance of Leadership:

One cannot deny the significance of leadership in a company. The employees of an organisation require leaders who can direct the activities of groups of employees to achieve both individual and organisational goals and objectives. The leader directs others in carrying out these obligations in their actions. A good leader stimulates subordinates, inspires their faith, and boosts staff morale.

P. F. Drucker mentioned, "Good leadership is a must for the success of a business but the business leaders are the scarcest resources of any enterprise." The details mentioned below emphasize the significance of leadership:
Leadership is the process of directing the actions of an individual or group toward the accomplishment of a goal.

- A leader inspires the people who work for them to do better.
- Leadership fosters team spirit and teamwork, which are crucial to any organization's growth.
- Leadership contributes to authority. A leader facilitates the efficient application of formal authority.

- Leadership inspires confidence in subordinates by providing them with sound direction and advice.

The history of business is brimming with instances of good leaders who led their companies to incredible heights of success.

6.3.3. Leadership Qualities:

A successful leader requires unique qualities. A good leader must be intelligent, analytical, objective, and critical, in addition to possessing honesty, sincerity, integrity, and accountability. He must be aggressive, watchful, and dependable. Moreover, he must engage well with subordinates. Leaders require innate human qualities. A leader contains numerous qualities that render his activities appealing and effective. The following characteristics must be present in a successful leader:

1. **Physical appearance**- The physical appearance of a leader must be pleasant. Vital to a leader's success is physical fitness and health.
2. **Vision and foresight**- A leader cannot retain power unless he exhibits a commitment to the future. S/se must visualize issues and provide rational solutions accordingly.
3. **Intelligence**- A leader should be intelligent to analyse complex challenges and situations. S/he should be an analyst who evaluates the pros and cons of the scenario and then presents a summary. Therefore, a positive outlook and a sense of maturity are essential.
4. **Communicative skills**- A leader must be able to communicate norms and procedures precisely, professionally, and explicitly. This is important for generating excitement and persuasion.
5. **Objective**- A leader must have a perspective that is free from bias and does not show a preference for a specific individual. A leader’s opinion should be based on evidence and logic.
6. **Knowledge of work**- A leader should be directly associated with the nature of the subordinates' work in order to acquire their trust and confidence.
7. **Sense of responsibility**- To instil a sense of influence, responsibility and accountability towards a person's work is crucial. A leader should have a sense of responsibility towards business goals in order to maximize the potential of his subordinates. To achieve this, s/he should motivate and inspire himself to perform at the highest level.
8. **Self-confidence and willpower**- To earn the respect of subordinates, a leader should possess self-assurance. S/he should be dependable and should exhibit a strong determination to overcome obstacles.
9. **Humanist**- A leader should possess this trait since s/he interacts with and has direct contact with people. As s/he is accountable for treating the personal concerns of the staff with care and consideration. To establish a nice atmosphere, it is vital to treat individuals with humanity.

10. **Empathy-** Putting oneself in the shoes of others is an adage. Only then can fairness and objectivity be achieved. A leader should be able to comprehend the difficulties and complaints of employees and have an in-depth comprehension of their needs and objectives. This enhances employee relationships and personal contact.

From the aforementioned attributes of a leader, one may appreciate the scope and significance of leadership in the business world. Though one person as a leader cannot simultaneously possess all these traits, however, if a leader possesses more of these traits, it adds to positive outcomes.

IN-TEXT QUESTIONS – 6.3

1. Who is a leader?

   a) A leader is a person whose behaviour stimulates action in a group.
   b) A leader is a person whose behaviour stimulates leadership in a group.
   c) A leader is a person whose behaviour stimulates adoption in a group.
   d) None of the above.

2. Which is true about leadership?

   a) It is the ability to influence a group towards achievement of goal, or objective, or purpose.
   b) It is the process of influencing the behaviour of individuals in a given situation.
   c) It is the phenomenon of influencing, guiding and directing the actions and thought of the people in the intended direction.
   d) All of the above

6.4 Leaders vs. Managers

To achieve goals, a manager must execute all five functions: planning, organising, staffing, directing, and controlling. Leadership is a component of these responsibilities. The concept of leadership is distinct from management. A person can be a leader if s/he possesses certain qualities. For example, a club, class, welfare group, or social organization's leader. Therefore, the statement "All managers are leaders, but not all leaders are managers" is correct.

A leader is a person who influences the behaviour and work of others in collaborative efforts to achieve predefined objectives. A manager can only be a true manager, though, if s/he displays leadership skills. Managers at all levels are expected to manage work groups in such a way that subordinates willingly execute their orders and follow their directions. Leading is a much broader concept than managing. Managers who can lead and take people along with them are good leaders.

Leaders and Managers can be compared on the following basis:

Leaders vs. managers

Basis	Manager	Leader
Origin	A person becomes a manager by his position.	A person becomes a leader on basis of his personal qualities.
Formal Rights	The manager has got formal rights in an organization because of his status.	Rights are not available to a leader.
Followers	The subordinates are the followers of managers.	The group of employees whom the leaders lead are his followers.
Functions	A manager performs all five functions of management.	A leader influences people to work willingly for group objectives.
Necessity	A manager is very essential to a concern.	A leader is required to create cordial relation between a person working in and for organization.
Mutual Relationship	All managers are leaders by position.	All leaders are not managers.
Accountability	A manager is accountable for self and subordinates' behaviour and performance.	Leaders have no well defined accountability.
Concern	A manager's concern is organizational goals.	A leader's concern is group goals and member satisfaction.
Followers	People follow managers by virtue of the job description.	People follow them on voluntary basis.

Basis	Manager	Leader
Role continuation	A manager can continue in the office till he performs his duties satisfactorily in congruence with organizational goals.	A leader can maintain his position only through day to day wishes of followers.
Sanctions	The manager has command over allocation and distribution of sanctions.	A leader has command over different sanctions and related task records. These sanctions are essentially informal.

6.5 THEORIES OF LEADERSHIP

6.5.1 Trait theory

Not every manager is an effective leader, and not every leader is an effective manager. Therefore, it is difficult to identify competent managers and leaders. Earlier research on leaders established the qualities that were required of them. Sometimes it was also referred to as the traits of the leader. Therefore, the theory was known as the leadership trait or attribute theory.

Buddha, Gandhi, Narayan Murthy, Vivekanand, Napoleon, Mao, Churchill, Roosevelt, and Reagan have been characterised throughout history by their distinguishing characteristics. Thus, trait theories of leadership emphasise personal strengths and traits. We honour courageous leaders like Mahatma Gandhi from India, Nelson Mandela of South Africa, Richard Branson, the CEO of Virgin Group, Steve Jobs, the co-founder of Apple, and Ken Chenault, the chairman of American Express. The search for psychological, social, physical, and mental characteristics that distinguish leaders from followers dates back to the earliest phases of study on leadership.

Earlier attempts to determine what makes a successful leader encountered numerous obstacles. In the late 1960s, twenty separate research were reviewed, and approximately eighty leadership qualities were identified. However, only five were identified in four or more research. In the 1990s, after several studies and analyses, the best we could say was that most leaders "aren't like other people," but the specific characteristics that distinguished them from others varied greatly from study to study. Thus, the Trait Theory of Leadership was predicated on the idea that people are born with inherited tendencies known as a trait, some of which are especially suited to

leadership. The idea seeks to identify certain leadership and personality qualities and attributes that might accurately predict a leader's likelihood of success or failure. The interests, skills, and personality traits of effective leaders are unquestionably distinct from those of ineffective leaders. Numerous studies undertaken in the latter three decades of the 20th century have established a core set of characteristics of effective leaders. These characteristics are not solely responsible for determining whether a person will be a great leader or not, but they are viewed as prerequisites that equip individuals with leadership potential.
Among the recognised core traits are:

- *Achievement drive:* High level of effort, high levels of ambition, energy and initiative
- *Leadership motivation:* an intense desire to lead others to reach shared goals
- *Honesty and integrity:* trustworthy, reliable, and open
- *Self-confidence:* Belief in one's self, ideas, and ability
- *Cognitive ability:* Capable of exercising good judgment, strong analytical abilities, and conceptually skilled
- *Knowledge of business:* Knowledge of industry and other technical matters
- *Emotional Maturity:* well adjusted, does not suffer from severe psychological disorders.

Emotional intelligence can predict good leadership (EI). EI believers claim that an individual can have superb training, an analytical mind, a compelling vision, and an endless supply of great ideas and still not be a good leader. This may be true when climbing the corporate ladder. Why is EI important for leaders? EI requires empathy. Empathetic leaders can identify others' needs, listen to what followers say (and don't say), and predict reactions. A leader who expresses and regulates emotions skillfully might impact followers' emotions. This can be done by showing joy for good performances and wrath for poor performers.

The link between EI and good leadership may be worth looking into in more depth. Recent research has shown that people with high EI are more likely to become leaders, even when cognitive ability and personality are taken into account. This helps to answer some of the most important criticisms of this research. Based on what we know now, we can come to two conclusions. First, traits can predict leadership, which is the opposite of what we thought 20 years ago. This is because of the Big Five Model. Second, Traits are more effective at predicting who will become a leader and what type of leader they will be than at distinguishing between good and bad leaders. Essentially, trait theories hold that leaders are "born" They frequently use personal attributes, such as charismatic and determined, to describe leaders. Gradually, behavioural theory arose in which it is claimed that leadership can be taught or promoted by providing an individual with the required training and abilities. Consequently, this clarifies the distinction between trait and behavioural models of leadership.

6.5.2 Behavioral theory

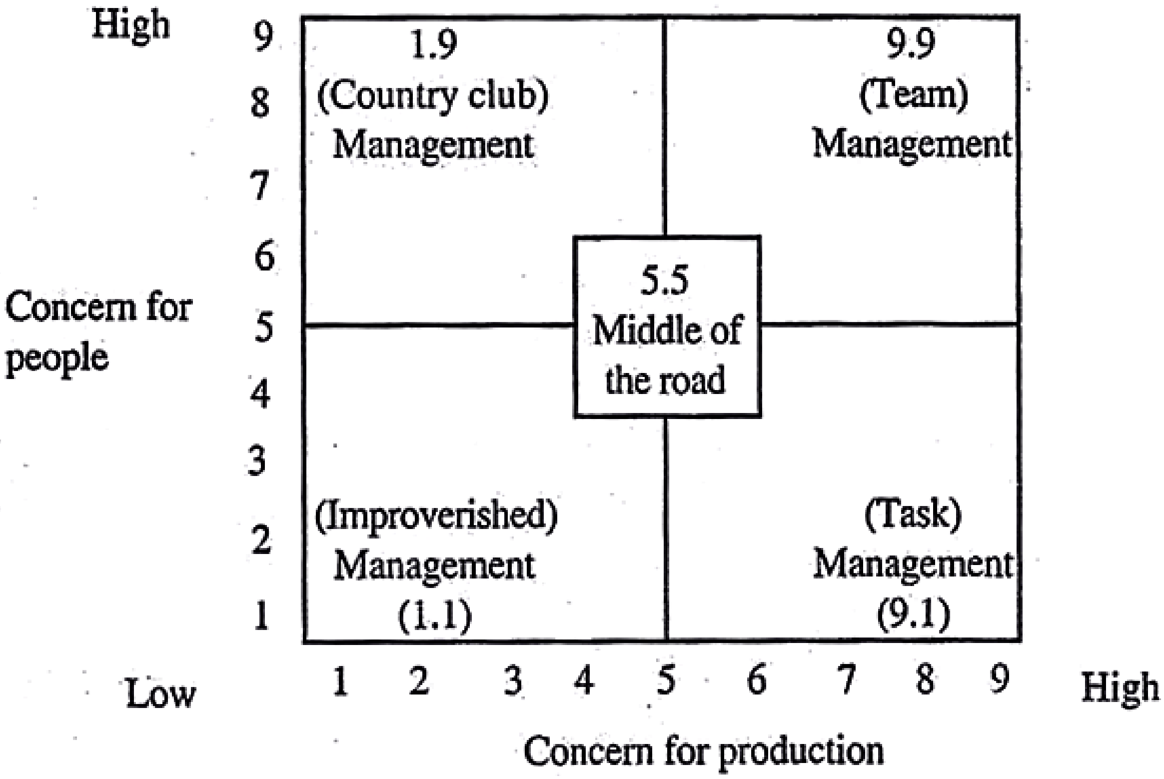
The failures of early trait studies prompted academics from the late 1940s through the 1960s to ask if there was something distinctive about the behaviour of effective leaders. Trait research provides a foundation for picking the best candidates for leadership positions. In contrast, behavioural theories of leadership suggested that leaders could be trained. The Ohio State Studies of the late 1940s, which aimed to discover independent characteristics of leader behaviour, produced the most comprehensive ideas. Beginning with over a thousand dimensions, the studies whittled the list down to two that accounted for the vast majority of the leadership behaviour identified by employees: Initiating Structure and Consideration.

The primary distinction between the trait theory of leadership and the behavioural theory of leadership is how individuals become leaders. According to the behaviourist school of thought, becoming a leader is just a question of training to develop leadership skills; hence, anyone can be trained to become a leader. Trait theory, on the other hand, asserts that a leader must be born with these features that will influence their behaviour. They are essentially "born leaders." Compare, for instance, two extremely unlike individuals. One has always been an outgoing people-person with the capacity to inspire others to achieve their goals. The other individual is reserved, soft-spoken, task-focused, and likes to work alone. Trait theorists would agree that the extroverted people-person is a natural leader, but the introverted loner would be out of place as a leader. Behavioral theorists, however, would argue that both can become effective leaders with the correct leadership training and the development of desirable habits.

6.5.2.1 Leadership Grid

One more leadership style which is studied under Behavioral theory is known as Leadership Grid.

Robert Blake and Jane Mouton created the Managerial Grid leadership style (1969). The management grid model explains a manager's concern for individual productivity. The Blake and Mouton model gauges a manager's proportionate care for individuals and tasks and illustrates the two-way nature of leadership. The managerial grid illustrated in the picture below identifies a spectrum of management behaviour based on the various manifestations of task-oriented and employee-oriented styles, which are depicted as a continuum from 1 to 9 in the figure below. Blake and Mouton have demonstrated their compassion for people and production. Concern for people involves the level of personal commitment to goal achievement, the maintenance of people's self-esteem, the assignment of duties based on trust, the provision of suitable working conditions, and the maintenance of positive interpersonal connections. When a manager cares about people, he prioritises the fulfilment of the numerous need criteria outlined in McGregor's hygiene elements for his motivational style. Components such as worker output, labour efficiency, the quality of policy decisions, and other production line processes and procedures are incorporated in the leadership style that exhibits concern for production. In addition, it includes innovation, research and development, product quality, and employee services. Let us now analyse four forms of leadership.



MANAGERIAL GRID

- ***Impoverished Management 1:1***

This style (as depicted in the bottom left corner of the diagram) is known as impoverished management or Laissez-faire management. Managers are uninterested in the work or the people, and they have abandoned their positions. They serve as the information bridge between leaders and subordinates. They do not care about either the people or the production. They participate minimally in the work assigned to them. This means that the leader only needs to put in the bare minimum of effort to get the work done. This is enough to keep people in an organisation.

- ***Team Management 9:9***

On the opposite end of the spectrum is team management, a style of leadership in which managers balance people's interests with productivity requirements. Their participation is total. They are genuine team leaders with complete knowledge, skill, and aptitude for the job, as well as concern for the well-being of employees. Blake and Mouton believe firmly that management style 9:9 is the most effective. They believe that this leadership style will result in enhanced performance, low absenteeism and turnover, and high job satisfaction under all circumstances.

- ***Country Club Management 1:9***

This style of leadership is characterised by a high concern for people and a low concern for production. They provide a really warm and comfortable atmosphere. There are no organisational objectives and a highly flexible mode of operation exists. The work environment prioritises employee welfare.

- ***Autocratic-task Oriented 9:1***

This type of leadership focuses on establishing organisational goals, developing effective operational systems, utilising organisational resources, achieving objectives, and emphasising work quality and production. The leader operates in an authoritarian manner with little or no regard for the people.

- ***Middle of the Road Management 5:5***

Managers are concerned with both people and output. They meet their moderate production objectives. They care equally about people and jobs. They provide reasonably satisfactory outcomes in maintaining worker morale and meeting production needs. The managerial grid is a common training and development concept for managers. Because leadership is influenced by the personality traits, abilities, and attitudes of both the leader and the followers, the model is incapable of identifying a particular leadership style. In addition to the aforementioned, the work environment and organisational culture have a significant impact on the leadership style.

IN-TEXT QUESTIONS – 6.5.2

8. Tom is a manager that allows employees to relax on the job. He often asks questions like, How are you? Is there anything I can do to help? and Are you satisfied with the working conditions here? Why is this an example of a country club leader?

a) Because he believes in a hierarchical organization.
b) Because he cares about his employee's mental state and happiness.
c) Because he is laid back and doesn't care about social norms.
d) Because he asks a lot of questions which always helps improve relations within the company.

9. Which of the following is the most important for a middle-of-the-road leader?

a) His authority.
b) A balanced concern for both production and his employees.
c) The satisfaction of his employees.
d) He does not care about either the production process or his employees as long as revenue is high.

Consideration is the degree to which a person's workplace relationships are defined by mutual trust, respect for employees' ideas, and consideration for their feelings. A leader with a high level of regard assists employees with personal issues is approachable and friendly, treats all employees equally, and displays gratitude and support. In a recent survey, when asked what motivates them most at work, 66% of respondents indicated appreciation.

Similar objectives guided leadership research at the Survey Research Center at the University of Michigan: to identify behavioural qualities of leaders that appeared to be associated with performance effectiveness. The Michigan group also identified two behavioural dimensions: the employee-oriented leader emphasised interpersonal relationships by taking a personal interest in the needs of employees and accepting individual differences, while the production-oriented leader emphasised the technical or task aspects of the job by focusing on completing the group's tasks. These proportions are very similar to those of Ohio State. Employee-focused leadership resembles thoughtfulness, whereas production-focused leadership resembles establishing structure. In reality, the majority of leading scholars use the phrases interchangeably.

ACTIVITY

You own a regional gifts store in your town. The store opened in 2012 and the same four people have worked together since that time. Recently, the manager left and you need to hire a new manager. You have decided that one of the four people currently working for you would definitely be great for the job, but you need to create a list of criteria for the job and then compare it with the skills of your existing employees. Your task is to develop specific criteria or a "wish list" of skills and abilities for this job based on three different aspects:

- Skills needed for the job
- Human relations skills
- Leadership skills

Once you have created the criteria, rank the skills in each category and provide a written description as to why you ranked as you did.

Every leader in any business must perform two essential functions: one task-related function and two-second functions that encourage group performance (maintenance). When it comes to the progress of the work, managers with a task-oriented leadership style would closely supervise their subordinates. A greater focus is placed on work completion than employee development. In contrast, managers with an employee-oriented leadership style will place a greater focus on employee motivation than on subordinate control. Managers desire amicable, cooperative, and dependable relationships with their personnel. One may observe that no manager is either task- or employee-focused. Each manager employs a small amount of each style. Robert Tannenbaum and Warren H. Schmidt were among the first theorists to explain the numerous variables that affect leadership style. They've created a continuum of leadership styles that ranges from highly boss-centred to highly subordinate-centred. The same is depicted in Figure 1 below. On the continuum, the most influential factor on managers' styles can be identified.

1. *Leader*: When managing subordinates, the manager's personality, talent, aptitude, and attitude toward the work, people, and the organisation he serves are the driving forces. The selection of a certain leadership style is mostly influenced by the leader's confidence in his subordinates and his liking towards a particular leadership style.
2. *Subordinate*: According to Tannenbaum and Schmitt, a manager can allow greater participation and flexibility when people demand independence and freedom of action, desire decision–making responsibility, identify with the organization's goals, and have sufficient problem-solving expertise. They must have the experience necessary for "participative management." When these prerequisites are absent, managers can first exercise authoritarian control and leadership styles. They might adjust the approach as people gain expertise, self-assurance, and organisational commitment.
3. *Situation*: Situational forces play a major impact in the selection of a leadership style. Among these are the organisational value system, tradition, transfer of authority, group cohesion, and time management. The degree of organisational effectiveness is an essential consideration.

At about the same time, between the 1940s and 1950s, both ***Ohio State University*** and the ***University of Michigan*** did research on leadership. Even though at that time, studies of leadership were more influenced by autocracy and democracy, these two universities did more research to find out how good leaders act. These behaviours were later called "leadership styles."

According to the ***University of Michigan's leadership model***, a leader is either more focused on the job or on the people who work for them. The job-centred style has scales that measure two job-related behaviours: putting the focus on the goal and making work easier. Behaviour that is focused on the job is a measure of how much the leader takes charge to get the job done. The leader gives clear roles and goals to subordinates, while the manager tells them what to do and how to do it as they work toward their goals. Scales are used to measure two employee-centred behaviour in the employee-centred style: supportive leadership and interaction facilitation. Employee-centred behaviour is how much a leader focuses on meeting the employees' human needs while building relationships. A leader cares about the well-being of their subordinates and communicates with them to gain their trust, support, and respect.

On the other hand, the **Ohio State University model** asserted that a leader can be on either the high or low end of initiating structure and/or consideration. Because of this, they came up with four styles of leadership:

- low initiating structure and high consideration,
- high initiating structure and high consideration,
- low initiating structure and low consideration, and
- high initiating structure and low consideration.

Leaders with high structure and low consideration utilise one-way communications, and managers make decisions, whereas leaders with high consideration and low structure tend to use two-way communications and share decision-making.

IN-TEXT QUESTIONS – 6.5.2

3. Which leadership theory assumes that leaders are born and not made?
   a) Trait
   b) Behavioural
   c) Situational
   d) Path- Goal

4. In the behavioural theory of leadership, researchers attempt to determine what effective leaders _______, rather than attempting to determine who effective leaders _______.
   a) Are; do
   b) Are; may become
   c) Do; are
   d) Do; might become

6.5.3 Contingency Theories

Some ruthless CEOs seem to get a lot of respect when they take over struggling companies and bring them back from the brink. Bob Nardelli, who used to run Home Depot and Chrysler, wasn't hired for his charm. But it seems like these leaders are quickly replaced when things get back to normal. The rise and fall of leaders like Bob Nardelli show that it takes more than focusing on a few traits or actions to predict leadership success. In their situations, things that worked in very hard or very good situations did not lead to long-term success. When researchers examined situational influences, it appeared that leadership style x would be appropriate for condition a, while styles y and z were more appropriate for conditions b and c, respectively. However, what were conditions a, b, and c? The situational theory, Fiedler model, path-goal theory, and the leader-participation model are the subsequent attempts to isolate situational variables.

Theory of Situational Leadership - The Situational Leadership Theory (SLT) prioritizes followers. It states that successful leadership is dependent on picking the appropriate leadership style based on the followers' preparedness, or the amount to which they are ready and able to do a certain task. A leader should choose one of four behaviours based on the readiness of his or her followers. When followers are both unable and unwilling to complete a task, the leader must give them clear, detailed instructions. When followers are both unable and willing to complete the task, the leader must exhibit high task orientation to make up for the followers' incapacity and high relationship orientation to persuade them to "buy into" the leader's desires.

If followers are both able and unwilling, the leader must utilise a supportive and participatory style; if they are both able and willing, little effort is required. SLT has an inherent appeal. It acknowledges the importance of followers and contends that leaders may make up for followers' lack of talent and motivation. However, attempts to test and validate this theory through study have mostly failed. Why? Possible factors include internal inconsistencies and contradictions in the model as well as flaws with research methodology in tests. Consequently, despite its intuitive appeal and enormous popularity, any current suggestion must be cautious.

The Fiedler Model

Fred Fiedler created the first complete model of leadership contingency. Effective group performance, according to the Fiedler contingency model, depends on the compatibility between the leader's style and the degree to which the situation grants the leader control. Characterizing Leadership Style Fiedler feels that an individual's fundamental leadership style is a crucial aspect of leadership success. He developed the least preferred co-worker (LPC) questionnaire to determine this approach by measuring whether an individual is a task- or relationship-focused. The LPC questionnaire asks respondents to consider all of their former coworkers and rate the one they disliked working with the least on a scale from 1 to 8 for each of 16 sets of opposing descriptors (such as pleasant–unpleasant, efficient–inefficient, open–guarded, supportive–hostile). Fiedler would identify you as relationship-oriented if you characterize the person you are least able to deal with favourably (a high LPC score). If you view your least-liked coworker negatively (a low LPC score), you are primarily concerned with productivity and task orientation. About 16 percent of responders score in the middle range, defying the predictions of the theory. The remainder of our discussion will focus on the 84 percent of LPC questionnaire respondents who scored in either the high or low category.

Fiedler believes that a person's leadership style is fixed. Therefore, if a circumstance calls for a task-oriented leader and the current leader is relationship-oriented, then the situation must be adjusted or the leader must be replaced in order to attain maximum effectiveness.

Path-Goal Theory – The path-goal theory of Robert House integrates elements from Ohio State leadership research on starting structure and reflection, as well as the expectation theory of motivation. It states that it is the leader's job to provide the necessary information, guidance, and other resources for followers to attain their goals. Good leaders describe the paths their followers must travel to achieve their job objectives and make the journey smoother by removing impediments, as indicated by the term path-goal. According to the path-goal theory, a complex analysis of the situation determines whether a leader should be directive, supportive, or exhibit some other behaviour. It anticipates the following:

- When tasks are uncertain or demanding, directive leadership produces greater satisfaction than when they are highly regimented and well-defined.
- When people are doing structured duties, supportive leadership leads to great performance and happiness.
- Leadership that is directive is likely to be viewed as redundant by personnel with the high ability or extensive experience.

Path–goal testing has not been simple. An examination of the research revealed mixed support for the claim that removing impediments is an essential element of good leadership. According to another assessment, the lack of support was "shocking and disappointing."

Others say the theory hasn't been sufficiently tested. So far, no verdict. Path–goal theory testing may take a while due to its complexity. In a study of 162 document-processing workers, conscientiousness was only linked to improved performance when managers set goals and delineated roles, duties, and priorities. Low-conscientious and emotionally unstable subordinates are more likely to experience emotional tiredness under goal-oriented leadership. Goal-setting leaders help conscientious followers achieve higher performance, but they may stress less conscientious colleagues.

IN-TEXT QUESTIONS – 6.5.3

5. Consideration of ____ was missing from the behavioural theories.

   a) Traits
   b) Situational Factors
   c) Employee Satisfaction
   d) Employee Turnover

6. The first comprehensive contingency model for leadership was developed by

   a) Hersey and Blanchard
   b) Blake and Mouton
   c) Fred Fiedler
   d) John Kotter

6.6 LEDAERSHIP STYLES

Leadership style refers to the pattern of behaviour established by a leader in order to influence the behaviour of his subordinates for the purpose of achieving organisational objectives. Different leadership styles have their own advantages and disadvantages, making it difficult to choose one over another. The selection of a leadership style will be contingent on a variety of considerations.

The different types of leadership are:

i. Autocratic or task management leadership,
ii. Participative or democratic leadership,
iii. Laissez-faire or free-rein leadership, and
iv. Paternalistic leadership.

i. Autocratic or Task Management Leadership

The leader who rules by force gives orders that everyone must follow. He makes rules for the group without asking them, and he doesn't tell them much about future plans. Instead, he just tells them what steps they need to take. In other words, an autocratic leader keeps all the power for himself and doesn't give it to anyone else. He is a dictator by nature and doesn't care about those under him. He pushes himself and those under him with the idea that actions must lead to results. An autocratic boss makes all the plans and relies on his subordinates to carry them out. An Autocratic leader operates on the following assumptions:

- The average person dislikes work and will try to stay away from it if he can.
- He thinks that if his subordinate was smart enough, he wouldn't be in that position.
- He thinks that subordinates who aren't smart are immature, unreliable, and careless. So, they should be constantly watched as they do their jobs.
- Because he doesn't care about his subordinates, he gets them to do their jobs by threatening them with penalties and punishments.

Types of autocratic leadership are:

- ***Strict autocratic leaders:*** A strict autocrat depends on negative power and gives orders that everyone else has to follow. He could also use his power to give his group rewards.
- ***Benevolent Autocrat:*** The benevolent makes it easier to get people to work hard in many situations, and his way of getting people to work hard is usually a positive one.
- ***Manipulative Autocrat:*** A manipulative autocratic leader makes his subordinates feel like they are part of the decision-making process, even though he has already made the decision.

ii. Participative or Democratic Leadership

A democratic leader talks to his or her subordinates and asks them to take part in making decisions. He doesn't give orders until he's talked to the group and made sure they agree with them. He also makes sure that policies are made by the group and are accepted by the group. Most of the time, the manager doesn't use power to get things done. He thinks that if employees' needs and wants are met, the organisation will act the way he wants it to. So, he not only gives orders but also explains them and makes sure that the workers have the skills and tools they need to do their jobs. He gives his employees fair work leads and praises them when they do a good job. There is a team approach to meeting organisational goals. He cares more about his subordinates because he knows the value of each person. A participative leader operates on the following assumptions:

- Subordinates can do work and take on responsibility if they are given opportunities and rewards;
- Subordinates work better when they are supervised, guided, and helped instead of being threatened or told to do so.
- People don't take mistakes seriously. The assumption is that putting employees in trouble makes them unhappy and frustrated and makes the workplace unhealthy.

iii. Laissez Faire or Free-rein Leadership

A free-rein leader doesn't tell the group what to do, but instead lets the group do what it wants. The leader doesn't take advantage of his power and lets his followers make decisions. He doesn't tell his employees what to do, so they can do whatever they want. They are done by a group of people who get their own drive from doing them. The manager goes outside to talk to people who can give his team the information and tools it needs to do its job. The assumptions that a free-rain leader makes are as follows:

- He follows the rule of avoiding responsibility as much as possible. If something goes wrong, he is ready to blame his subordinates.
- He doesn't know what needs to be done to reach the goals.
- He cares more about his safety than his status.
- This way of leading can get good results quickly if the people under you are smart, highly educated, and willing to do their jobs.

iv. Paternalistic Leadership

In this kind of leadership, the leader thinks of himself as a father. His way of thinking is that the leader and the people in his group are like family, and the leader is the head of the family. The leader works to help his followers work, guide them, protect them, and keep them happy and working together as a family. He gives them good working conditions, perks, and services for employees. People say that people who work for this kind of boss might work harder out of gratitude.

The **Vroom and Yetton Model** also talks about the different ways leaders can make decisions and helps them figure out how much their subordinates should be involved in making decisions. The Vroom, Yetton, Jago Model, which is an expanded version of their model, suggests that

(1) Organizational decisions should be of the greatest level, and
(2) Subordinates should accept and support such decisions. The model provides ways for assessing the suitability of a leader's style.

This model proposes the following styles-

- ***The Manager makes a Decision and Announces it:*** It is an extreme form of autocratic leadership in which the boss makes all the decisions. The boss figures out the problem think about possible solutions, chooses one, and then tells his subordinates what to do.
- ***The Manager sells his Decisions:*** It's a slightly better way to lead because the manager also tries to convince the subordinates to go along with his decision.
- ***The Manager Presents his Ideas and Invites Questions:*** With this pattern, the employees are more involved. The boss makes the decision, but he gives his subordinates a full chance to find out more about what he was thinking and why.
- ***The Manager Presents a Tentative Decision Subject to Change:*** In this case, the manager makes a tentative decision, but he is open to change and can be swayed by the employees.
- ***The Manager may Present the Problem, get Suggestions and then take his own Decision:*** Here, the employees have enough chances to make suggestions, which the Manager looks at with a cool head.
- ***The Manager may define the Limits and Request the Group to make a Decision:*** A manager who uses this style of management gives the group the power to decide. The manager tells the subordinates how far they can go with the decision.

- ***The Manager may Permit full Involvement of the Subordinates in the Decision-making Process:*** It is usually referred to as "Democratic leadership."

IN-TEXT QUESTIONS 6.6

7. Identify the type of leadership displayed in the following cases:

a) Mr. Umang Patel is the CEO of a leading software company. He is least concerned about the managerial development of his subordinates. The communication flows only from top to bottom in his organisation.
b) Ravish is the head of marketing department of his company. Recently he organized a series of to know the suggestions of his team members on various issues. His subordinates appreciate his habit of consulting his team before he takes any meetings major decisions.

6.7 TRANSACTIONAL AND TRANSFORMATIONAL LEADERSHIP

Transactional Leadership, often known as management leadership, is a leadership style that emphasises the exchange between the leader and his or her subordinates. Transformational Leadership, on the other hand, is a sort of leadership that influences the transformation (change) of subordinates. In this technique, the leader collaborates with subordinates to bring about the desired organisational change.

Basis for Comparison	Transactional Leadership	Transformational Leadership
Meaning	A leadership style that employs rewards and punishments for motivating followers is Transactional Leadership.	A leadership style in which the leader employs charisma and enthusiasm to inspire his followers is Transformational Leadership.
Concept	Leader lays emphasis on their relationship with followers.	Leader lays emphasis on the values, ideals, morals and needs of the followers.

Basis for Comparison	Transactional Leadership	Transformational Leadership
Nature	Reactive	Proactive
Best suited for	Settled Environment	Turbulent Environment
Works for	Developing the existing organizational culture.	Changing the existing organizational culture.
Style	Bureaucratic	Charismatic
How many leaders are there in a group?	Only one	More than One
Focused on	Planning and Execution	Innovation
Motivational tool	Attracting followers by putting their own self-interest in the first place.	Stimulating followers by setting group interest as a priority.

ACTIVITY

Prepare a list of 3 scenarios displaying the three different leadership styles. For example, "a new supervisor has just been put in charge of the production line. He immediately starts by telling the crew what change needs to be made. When some suggestions are made, he tells them he does not have time to consider them".

6.8 SUMMARY

- Leadership is a process of influencing on a group in a particular situation at a given point in time and in a specific set of circumstances that stimulates people to strive willingly to attain organizational objectives, giving them the experience of helping attain the common objectives and satisfaction with the type of leadership provided.

- Leadership style refers to the behaviour pattern adopted by a leader to influence the behaviour of his
- subordinates for attaining the organizational goals.
- The importance of leadership in an organization cannot be denied. People working in an organization need individuals (leaders) who could be instrumental in guiding the efforts of groups of workers to achieve the goals and objectives of both the individuals and the organization.
- The subject of leadership is so vast and perceived to be so critical; there are four distinct approaches to leadership, viz. Traits theory, Behaviouristic theory, Contingency theory and Charismatic theories of leadership.
- The dynamics of the relationship change when two people go from uncommitted companionship to making a lifelong promise in front of God and a few of their closest friends.
- Leadership style is firstly the ability of a leader to act in a manner that will develop a climate conducive to the response from the leader and secondly arouse motivation among the employees.
- Managers who have a task-oriented style of leadership will closely supervise employees as far as the progress of the work is concerned.
- The managerial grid model explains the concern of a manager for production and people.
- When a manager has concern for people, he is more worried about the fulfilment of various need factors that are included in the hygiene factors of McGregor in his motivational style.
- The model cannot determine a particular style of a leader because leadership is influenced by the personality traits, skills, and attitude of the leader and the followers.

6.9 GLOSSARY

- ***Leadership:*** Leadership has been described as the ―process of social influence in which one person can enlist the aid and support of others in the accomplishment of a common task.
- ***Inspiration***: It is best judged when subordinates work with zeal in a hopeless situation.
- ***Human beings***: Human being has different motivational needs at different times and situations.
- ***Physical Traits***: It is energy, appearance, height, intelligence, ability and personality traits such as adaptability, aggressiveness, enthusiasm and self-confidence.
- ***Task Structure***: Task structure is related to a task where all actions required to be taken are explained in a sequential manner and employees understand and anticipate what is coming next.

6.10 ANSWERS TO IN-TEXT QUESTIONS

1-a, 2-d, 3-a, 4-c, 5-b, 6-c, 7a- Autocratic leadership style, 7b- Democratic leadership Style, 8-b, 9-b

6.11 SELF-ASSESSMENT QUESTIONS

1. Are leadership and management different from one another? If so, how?
2. What is the difference between trait and behavioural theories? Are the theories valid?
3. What are the main limitations of behavioural theories of leadership?
4. How can organizations select and develop effective leaders?
5. Leadership is a cornerstone of managing an organization. Discuss.

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LESSON 7

GROUPS

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STRUCTURE

7.1 LEARNING OBJECTIVES

After studying the chapter, student will be able to:

1) Define a group and identify the types of the group.
2) Understand the reasons for joining the group.
3) Identify the stages of group development.
4) Understand the importance of group cohesiveness.

7.2 INTRODUCTION

Organisations require collective efforts of employees to achieve its goals. Common efforts are required to attain the common objectives. Employees need to be motivated and they should keep individual interests aside over the organization's common interest. People form groups within the organisation to achieve its objectives. Keeping aside their differences and developing an environment which promotes mutual trust. Group cohesiveness can facilitate the functioning of the group. Role of leader in the group is crucial in maintaining the group cohesiveness.

7.3 MEANING OF GROUP

An organisation is a system which is operated by individuals. Groups are formed by the individuals to achieve the objectives of the organisation. Interaction among the individuals develops personal and social relationships among them. The term 'group' refers to the cluster of two or more individuals interacting with each other and sharing certain common values, interests and goals. The group interacts primarily not only to share information but also to make decisions to help each group member perform within his or her area of responsibility. The group is a unit of members which have interdependent roles and responsibilities. Thus a group consists of group members who socially interact and whose roles and responsibilities are interdependent.

Groups are formed by individuals to satisfy their professional , personal, social and economic needs.

Two or more people	Free interaction
GROUP	
Common purpose	Common identity

Mere togetherness does not create a group. Any aggregation of individuals to qualify as a group must satisfy the following conditions:

(i) People in a group must interact with each other on a regular basis for a relatively long period of time depending on the type and nature of the group . Each member influences the behaviour of the other members and is in turn influenced by them

(ii) Members of a group are aware of each other and share a common area of interest, goals, activities etc.

(iii) Members in a group should perceive themselves as a collective identity. The identity of a group is separate from its members. Group acquires its own structure, process and goals and performs certain functions.

(iv) Groups are formed to meet a common objective. The achievement of the objective should be a matter of concern and responsibility of each member.

Following are the features of a group:

a) Group has a common leader.
b) Group members have regular direct face to face interaction.
c) Group members are not much committed to work.
d) Group members work in an interdependent manner. Groups membership reduces individual members' accountability

Definition of Group

Given below are a few important definitions of a group which emphasise important features of the group:

R.M. MacIver (1953) "By group we mean any collection of social beings who enter into distinctive social relationships with one another."

Paulus (1989) "A group consists of two or more interacting persons who share common goals, have a stable relationship, are somehow interdependent and perceive that they are in fact part of a group."

7.3.1 Group Properties:

a) Group Roles: Every member in a group has to play a role in a well-coordinated expected manner. Roles are defined as per the position held by the member. Identification of role depends upon how others believe the member to act in a given situation. Thus the importance of understanding what others expect from us. Existence of divergent role expectations can result on role conflict. . Group member roles can be classified into three categories:
   (i) Task-oriented roles such as informer, initiator, clarifier, reality tester, summarizer, and information provider or seeker .
   (ii) Relationship-oriented roles such as harmonizer, gatekeeper, consensus tester, encourager, and compromiser.
   (iii) Individual roles such as aggressor, blocker, dominator, cavalier, and avoidance
b) Group Norms: Groups have established acceptable standards of behaviour (do's and don'ts) which are shared among the group members . There is strong pressure on group members to change their attitude and behaviours to conform to group norms. Status: Is a rank or a position assigned to members of a group or to some group by others . The determinants of status are (i) the power exercised by a person over the others, (ii) ability of a person to contribute to the goals which are set by the group, and (iii) an individual's personal traits.
c) Group Size: The size of the group depends on the group goal and also affects the group's overall behaviour. Small groups are quick in their processes and decisions and each member

actively participates in group activities. Large groups, on the other hand, are slow in their processes and waste time trying to decide role and participation of group members. Cohesiveness: Reflected in the group member's willingness to continue their membership in a group. It is the degree to which group members are motivated to continue being part of the group, as they have spent a great deal of time together. The degree of cohesiveness depends upon the relationship between group cohesiveness and performance norms that affects group productivity.

d) Diversity: It refers to the extent to which group members are different or similar to one another. It identifies both costs in terms of group conflict resulting in dropout rates and benefits in terms of increased productivity.

7.3.2 Reasons for Groups Formation and Joining Groups:

Reasons for Group Formation

a. Opportunity for interaction: Formal organization gives an opportunity to interact with others . Employees when they interact find commonalities among them. Commonalities can be personal or professional and gives them reason to form groups.
b. Personal Characteristics: Individuals find it easy to form groups with people who have similar attitudes, beliefs, and values. . Individuals are likely to form groups with those who are similar to them.
c. Influence and power: Individual power multiplies in a group. Group members have more power and can influence others more than individuals .
d. Interest and goals: Individuals with common goals and interests form groups to achieve them. With mutual cooperation, trust and coordination, even the toughest of goals become realisable.

Reasons for Joining Groups:

People cannot live and survive in isolation for a long period. For a variety of reasons, people join groups. Some of them are as below:

a) **Security**: People join a particular group to get the sense of security from adverse environments created by management and reduce insecurity from threats.
b) **Self-Esteem:** It transmits people's feelings of self-worth. Joining group increases self-esteem .
c) **Affiliation**: People have social needs as per the Maslow's Hierarchy of needs . The social needs can be met through association with group members.
d) **Power:** Group represents power. It gives a sense of power to members of the group . Group power lies in being united as a group. Membership of a group offers power to people and enables them to use it over others.
e) **Status:** People join groups to gain a status in the society. It provides recognition to the members of the group.
f) **Goal achievement:** People may join a group to achieve their goals. The group is able to achieve organizational goals which cannot be achieved if people are working individually.

Importance of Groups for Organizations

(a) Decision making by groups in high uncertainty work environments enables faster and more effective decisions.

(b) Richer and broader perspective, diverse cognitive resources and general problem solving capacity can be gained out of group members' diversity.

(c) Employees and groups can achieve higher levels of productivity, quality, and team member satisfaction through delegation of more task-related decisions to the team.

(d) Effective small groups are the building blocks of high-performance organization, improved quality of working life, practice of open communication and feedback.

Importance of Groups for Individuals

(a) Individuals derive their identities through membership of groups.

(b) Individuals can satisfy their needs for safety, belongingness and esteem.

(c) Individuals join the group as long as the perceived benefits of membership exceeds the perceived costs associated with the same.

IN-TEXT QUESTIONS

Q1. Which of the following statement is True or False?

a) An organisation operates through a group of individuals.
b) The formulation of a group is closely related to some common purpose.
c) Group has a common superior.
d) The size of the group also affects the group's overall behaviour.
e) The determinants of status are the power, ability, and individual's personal traits.

Q2. Fill in the blanks:

a) Group refers as a ....of two or more individuals interacting with each other.
b) Members in a group should perceive themselves as a ....identity.
c) Group has face to face...............
d) Group roles are..........., ... and ....
e) Group norms is related to............. ....

7.4 TYPES OF GROUPS

It is generally seen that an organization has different types of groups which work for the achievement of common organizational goals. Different types of groups are sorted by different parameters are as under:

a) **Formal Group:** Formal groups are created officially. Formal groups are delegated with formal authority to serve a specific purpose and structured with a pre-determined role and the relationship of superior and subordinate is based on formal authority. Members of such groups perform assigned jobs and activities on the basis of predetermined rules, policies and procedures. Formal groups include work groups and committees.

A formal group can be divided into:

Command Group or Functional Group: A command group is reflected through the organizational chart and determines who the reporting officer is. Various functions of the organization like finance, marketing, human resource, research and development have functional groups .

Task Groups or Project Group: It includes task forces, planning groups which are formed for specific tasks at hand. It is created in the organization to identify and provide solutions for specific problems. For a particular project a deadline is fixed and the efforts are made to meet the deadline. Budget for these projects are fixed in advance to facilitate the time bound resolving of the problem. The group is dissolved when the project gets completed.

Committee: it is a formal group that is created for a one-time purpose or they may be a permanent feature of the organization structure. It gets dissolved after making a recommendation on the specific issue. **Quality Circle:** Organizations are committed to maintaining quality in every sphere of their activity. Employee groups is created to deal with productivity, and quality related issues. This group ensures that issues related to quality are resolved so that organization's commitment to quality can be ensured .

b) **Informal Groups:** Informal groups emerge unofficially. Members of an informal group cut across the formal superior-subordinate relationships. They have their own informal norms that govern member conduct. Informal groups coexist with formal groups They develop personal and social relationships on the basis of common interests, needs and values. The employees seek to form informal groups to satisfy their need for belongingness, mutual help, sympathy and acceptance .

Informal groups can be classified into two types

(i) **Interest Group:** Interest group is a group where people come together to accomplish a specific objective. A common interest binds the group members. Members may not belong to the same organization or department. Joining and leaving the group is at the will of the members and nothing is formal. For example, Indian Commerce Association.

(ii) **Friendship Group:** People have social needs and want to be a part of some social group. Social activities, religious beliefs, and other common basis may create friendship groups . Yoga groups , potpourri groups , birthday groups are very commonly found in the organizations.

Features of Informal Groups:

a) It emerges voluntarily and spontaneously out of formal relationships .
b) To control and regulate the behaviour of members, group norms and standards of performance and behaviour are set and applied on them.
c) After formation, it acquires its own structure, processes, goals and functions.
d) It is normally smaller, primary in nature and is marked by a high degree of group cohesiveness and cooperation as compared to formal groups.

7.4.1 Difference Between Formal and Informal Groups

Difference between Formal and Informal Groups:

Basis for difference	Formal Group	Informal Group
1. Meaning	Groups created by organization are to accomplish a specific task	Groups created by the employees for their own sake
2. Formation	Deliberately designed	Emerge spontaneously
3. Purpose	Achievement of predetermined organisational goals.	Satisfying the social and personal needs of members
4. Leadership	Backed by formal authority	Based on competency, personality, abilities and acceptance.
5. Size	Large	Comparatively small
6. Life	Depends on the type of group	Depends on the members
7. Structure	Well defined	Not well defined
8. Importance	Given to position	Given to person
9. Relationship	Professional	Personal
10. Communication	Moves in a defined direction	Stretches in all directions

IN-TEXT QUESTIONS

Q3. Which of the following statement is True or False?

a) Individual with similar beliefs, attitudes and values are more likely to form group.
b) People cannot live and survive in isolation for a long period.
c) Self-Esteem transmits people's feelings of self-worth.
d) Formal groups are created officially.
e) Committee is a formal group that is created for one-time purposes.

Q4. Fill in the blanks:

a) Organizations gain from use of.......
b) Individual derive their ....through membership of groups.
c) Groups works for the ....of common organizational goals.
d) A command group is reflected through the organizational ....
e) Quality circle group ensures that ....related to quality are resolved.

7.4.2 Stages of Group Development Process

Bruce Tuckman proposed the group development model which gained much popularity. This model mentions four stages of group development which are as follows:

a. **Forming:** The first stage of group development is the formation of a new group. In this stage individuals are brought together and they get to know each other through the interactions. Individuals look upon the leader for guidance and direction regarding the goals, tasks, and skills that are required to achieve the goals. In general, individuals want to avoid conflicts and have a core desire to get accepted by others.

b. **Storming**: After the formation stage, the members begin to interact. A midst the lack of clarity, there is confrontation and conflict. Often the interactions are charged with emotions, especially anger which arises due to diversity of age and functional orientation, differences in individual member characteristics, task uncertainty and the low level of collectivism within the group. Members may agree or feel frustrated with the task assigned and with other members of the group. Several issues arise at this stage linked to leadership, roles, authority, responsibility, rules, strategies, evaluation, and reward systems etc.

c. **Norming**: With the completion of the storming stage, the norming stage starts. At this stage leadership positions within the group are relatively clear. Members begin to take greater responsibility for tasks and come forward to resolve issues, setting up of group processes, formulation of group policies, procedures and values resulting in development of confidence in the group and its members and satisfaction accounted to group membership. . Group members with different experiences and skill sets become cohesive and focus on achieving the objectives or the targets.

d. **Performing**: The fourth stage is performing which is characterized by flexibility and interdependence. At this stage, there is acceptance of one another and agreement over norms and tasks. The group is fully functional and synergy is created through combined efforts. Members focus on performance now, assuming the necessary roles and integrating the efforts. Groups adhere to the group norms and collective efforts are made to ensure the group effectiveness.

e. **Adjourning**: This is the final stage of group development. As the task is accomplished, this stage marks the time to move onto the next task, or repeated performance. Once the purpose is fulfilled the group is adjourned. Many of these disbanded group members join other groups and take up the next assignment.

7.4.3 Group Processes:

Once the formation of group is complete, the major processes which are involved in group functioning has to be identified which are as follows:

(i) Group communication: Communication is the basis of most organisational processes. Group communication strengthens interpersonal relationships which plays a significantly contributing to the attainment of organisational goals. .

(ii) Problem-solving and Decision-making in a group: In order to solve problems, informal relations are proven to be more effective as compared to formal ones. It is simply because in a group setting the problem is studied and analysed thoroughly in terms of its origins, causes, effects and dimensions. By pooling the knowledge of various members and with their cooperation and support, a decision is taken to solve the problems.

(iii) Group Leadership : Both formal as well as informal groups have leaders of their own although the basic approach of leadership is the same as to help the group reach its goal and maintain and enhance group life by maintaining cordial and warm relationships with members.

(iv) Group Norms and Values: The term group norms refers to a standard of behaviour which the members are expected to observe whereas values are basic convictions or a philosophy of an individual. It helps to understand the culture of a social group.
According to Kreitner, group norms are enforced to (a) facilitate survival of a group, (b) simplify and clarify role expectations; (c) help group members avoid embarrassing situations; and (d) express key group values and enhance the group's unique identity. Group norms, which are unwritten and informal rules and regulation, have a broader influence on the behaviour of members.

(v) Cohesiveness: It refers to the forces that bind members to each other and to their group, giving them a feeling of 'groupness'. There is a positive relationship between cohesion and team performance especially in smaller groups. Group cohesiveness is important for the smooth functioning of a group. Group differs in their degree of cohesiveness.

7.5 GROUP COHESIVENESS

Cohesiveness is the tendency of group members to remain together while working towards a goal for the emotional need satisfaction of its members. In other words, a group is said to be cohesive if they have trust, friendship and reliability on each other which refers to the closeness amongst the group members.

Henry Ford, the Founder of Ford Motor Company, said, "Coming together is a beginning. Keeping together is progress. Working together is success."

The general characteristics of cohesive group include:

(i) Coordinated behaviour, mutual affection, more attention on other members, and more likelihood of giving due credit to partners.

(ii) Members are more likely to stay on in the group and attract other members to join, and they resist any attempts to disrupt group activity.

(iii) Members are likely to serve group interests rather than individual interests.

(iv) Members of cohesive groups are more productive.

(v) Groups with higher cohesiveness set more difficult goals for themselves and are more committed to their goals.

(vi) Members are accountable for the tasks assigned.

Examples:

a. A group of friends shows group cohesiveness because everyone enjoys spending time together.
b. A family is considered a cohesive unit because each member focuses on collective happiness.
c. Cricket teams show excellent teamwork where everyone works as one unit to win a match.

Importance of Group Cohesiveness: It helps us:

a. To overcome setbacks and challenges.
b. Rely on our team members for support during a crisis.
c. Build rapport with our co-workers and create lasting relationships.
d. Makes one loyal to the team through its ups and downs.
e. Gives a sense of belonging.

Advantages of cohesiveness: Cohesiveness leads to:

a. Improved performance

b. Increased productivity
c. Better results
d. Building trust in teams
e. Worker satisfaction
f. Low turn-over
g. Less absenteeism

7.5.1 Factors Influencing Group Cohesiveness:

(i) Time spent together: The functioning of a group largely depends on the degree of interaction among the members. If it is more frequent then a high degree of interaction among members would create closeness and bring commonness among them in respect of group goals, values and norms.

(ii) Size of the Group: Small size groups invariably have more cohesiveness as they interact frequently and develop emotional and sentimental bonds which bind them together.

(iii) Similarity among members : Demographic and behavioural similarity among group members contributes to a higher state of cohesiveness.

(iv) Role of Leader: Leadership efficacy also plays an important role in developing a high degree of cohesiveness.

(v) Group environment: A group with a friendly and cordial atmosphere would be a strong source of attraction and attachment for its members .

(vi) Common threats in an external environment: it is seen that pressure and threats from outside contribute to more cohesiveness in the group.

(vii) Social s atisfaction: Social needs of its members will attract and motivate them to work in close cooperation and coordination which ultimately increases group cohesiveness.

(viii) Clarity in group goals, norms and procedures: Clarity will decrease instances of confusion and disagreement regarding their use leading to conformity and enhanced cohesiveness.

Factors Affecting Group Cohesiveness Negatively:

(i) Difference of opinion: People working in an organization may have different opinions with their co-workers' ideas which lead to the disagreement.

(ii) Lack of Trust: Groups are formed or built on trust and interpersonal skills. If members of a group can't trust each other , it becomes difficult to communicate or share information.

(iii) Unclear roles and responsibilities: If the role and responsibilities of group members are not clearly defined, it leads to confusion and conflicts.

(iv) Unresolved conflict: If there are unresolved conflicts in the group , it may lead to absence of communication and group members may no longer be willing to be a part of the group.

(v) Problematic Leadership: If the principle of equity is not observed by the group leader, it will hurt the feelings of group members and will negatively impact the unity in the group.

To encourage cohesiveness in the group, following suggestions are given below:

(a) Keep the size of the group small to create a strong bond among its members.
(b) Encourage members to have conformity with group goals.
(c) Time spent together by members should be increased.
(d) Membership in the group should be perceived as difficult to attain and status of the group should be increased.
(e) Offer a reward to the group rather than to individual members .
(f) Encourage inter group competition
(g) Ensure equity in the group.

IN-TEXT QUESTIONS

Q5. Arrange the following in a sequence:

a) Storming
b) Forming
c) Norming
d) Performing

Choose the correct answer from the codes given below:

a c b d
a b c d
b a c d
d b c a

Q6. Which of the following statement is True or False?

a) Group differs in their cohesiveness.
b) There is a positive relationship between cohesion and team performance.
c) Cohesiveness leads to low-turnover and less absenteeism.
d) Group cohesiveness build rapport with your co-workers and create lasting relationships

Q7. Fill in the blanks:

a) The group decision is taken as a result of ………..discussion.
b) Group working has a direct bearing on the ………… in organizations.
c) Pressure and threats from ……….contribute to more cohesiveness in the group.
d) Group cohesiveness help us to ....setbacks and challenges.

CASE STUDY

Group Dynamics at Bharat Tech

In network organizations, virtual groups are formed across the globe. This is more important for those who have a global presence and are backed by state-of-the-art technologies. One such information technology-enabled services (ITeS) company is Bharat Tech, based in Kolkata, India. The company has formed virtual groups, who work together to achieve a common goal using video conferencing supported computer technology, to communicate and achieve results. The team leader sits at Sector-V of Salt Lake City in Kolkata, whereas his 10 team members are spread across 10 different metropolitan cities of Europe, America, and Japan. They meet at midnight over the computer screen and exchange information about the developments at the various client sites. The team leader, wherever required, suggests the steps to be followed and also apprises the team members of the other courses of actions. By definition, virtual groups do not hold face-to-face meetings. Instead, their communication and interaction is conducted through electronic mail (e-mail) and the internet. This allows members to witness interaction, develop a visual picture of their group members, and see their reactions.

Team members are allocated their tasks on a weekly basis and the team leader reviews the progress on a daily basis through the internet. Bob Alexander is the team leader, who operates from Kolkata. Before assigning the tasks to the team members, Bob ensures that all the 10 members understand their jobs, which are highly protocol bound. Since group members are dispersed globally, each member has to perform individually. However, some tasks require group members to interact and develop group responses that need to be attended by each individual. This is required for commonness of technology support sought by different clients, spread across the globe. In order to ensure interaction among group members, the performance-reporting system of the company gives weightage to the frequency of exchange of thoughts among group members, which can be monitored through computer information available in the main server at Kolkata. This ensures forced interaction and agreement among the group members. Another area of performance assessment, in addition to target or goal achievement, is the degree of consensus while group members exchange their thoughts with their team leader. Each meeting is videotaped and monitored by the HR head to understand the group dynamics

CASE STUDY Contd.

Summarizing the last one-year results, the company could identify the following important issues in the group dynamics:

Individual group members are not surfacing to the group as a whole. The company could identify this syndrome by mapping the degree of consistency among group members. Customer satisfaction assessment pointed out various technical aspects of development projects about which customers feel that the members do not have adequate knowledge. The team leader wonders why such things happen when as a team leader all doubts are always clarified and their understanding over the computer is checked back.

Group members failed to clarify and check back less-understood issues with the team leader on real-time basis because of time mismatch. However, expertise for troubleshooting is adequately available with some group members, who can always be consulted on real-time basis because of common business hours for many clients across the globe.

Some of the group members hardly interact with others, even informally. Group members mostly interact only with the team leader, although during group meetings all group members virtually remain present.

During the development of the group norms, the company identified telephone calls as the preferred methods of communication. Each group member can access the information provided by his/her team leader, even though it may not pertain to him/her. In addition, group members can always call their team leader for any contingencies. The team leader feels that although group members remain isolated from each other, they function within the given protocol to complete their assignments.

Questions for Discussion

Q1. Carefully go through the case and identify the important areas that Bharat Tech should consider strengthening to enhance group cohesiveness.
Q2. Can you identify the several stages of group development?

7.6 SUMMARY

An organisation consists of many individuals who work for its successful operation . Formal organisational structures are set up defining authority responsibility relationships. When members of a formal group start deliberating with one another r in respect of how to do the best in the interest of the organisation, they spontaneously become attracted to each other due to common belief, interest, personal and social relationship etc. and form informal groups . T . Group behaviour is the outcome of various factors such as goals, values, norms and procedures prescribed by the group. The effectiveness of a group depends upon the group cohesiveness which develops over time if the group members have trust, reliability and friendship. This creates lasting relationship improves the performance of co-workers resulting in increased productivity, low turnover and absenteeism and better organisational results.

7.7 GLOSSARY

Group: Two or more interacting and interdependent individuals who come together to achieve specific goals.
Procedure: A series of sequential steps used to respond to a well-structured problem.
Role: Behaviour patterns expected of someone occupying a given position in a social unit.
Rule: An explicit statement that tell managers what can or cannot be done.
Attitudes: Evaluative statements, either favourable or unfavourable, concerning objects, people, or events.
Forming stage: The first stage of group development in which people join the group and then define the group's purpose, structure and leadership.
Norming stage: The third stage of group development, characterised by close relationships and cohesiveness.
Storming stage: The second stage of group development characterised by intra-group conflict.

Group cohesiveness: the tendency of a group to remain together.
Norms: Standards or expectations that are accepted and shared by a group's members.

Trust: The belief in the integrity, character, and ability of a leader.
Turnover: The voluntary and involuntary permanent withdrawal from an organisation.

7.8 ANSWERS TO IN-TEXT QUESTIONS

Answer

Q1.	All True		
Q2.	a-cluster	b-collective	c-interaction
	d- individual roles, relationship roles and task oriented roles	e-do’s and don’ts	
Q3.	All True		
Q4.	a-Groups	b- identities	c- achievement
	d- chart	e- issues	
Q5.	(C)		
Q6.	All True		
Q7.	a- group	b-performance	c- outside
	d- overcome		

7.9 SELF-ASSESSMENT QUESTIONS

1. Define the term group.
2. State the conditions to quality as a group.
3. Explain the group properties.
4. State the reasons for group formation.
5. State the reasons for joining the group .
6. State the importance of groups for organisation.
7. What is a formal and informal group?
8. Distinguish between formal and informal groups .
9. Explain the stages of group development.
10. Define group cohesiveness.
11. What are the general characteristics of cohesive groups?
12. Discuss the reasons for which people join groups.
13. State the advantages of cohesiveness.
14. Explain the factors that influence group cohesiveness.
15. Discuss factors affecting group cohesiveness negatively.
16. Write notes on impact of group on the change of individual attitude.

17. . Explain the impact of group cohesiveness on organisational outcomes.

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LESSON 8

ORGANIZATIONAL POWER

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STRUCTURE

8.1 LEARNING OBJECTIVES

After reading this lesson you will be able to:

- Understand the concept of Organizational Power.
- Analyze and understand the contrast between Power and Leadership
- Understand the effect of Power on Organizational Behaviour.
- Identify and analyze the various sources of power.
- Understand the importance of power to managers for managing organizations effectively.
- Analyze and understand the tactics to gain power in organizations.

8.2 INTRODUCTION

In an organization acquiring and exercising power is a natural phenomenon. But at the same time, its management is quite a complex task, as, people who have power deny it, people who want it try not to look like they are seeking it, and those who are good at getting it are secretive about how they do so. Therefore, it is very important to understand the game of power in an organization if one wants to understand organizational behavior.

You must also have heard that "Power corrupts, and absolute power corrupts absolutely". But in contrast to this many theorists are also of the view that Power is not always bad, it is bad only when exercised in an inadequate way at an inappropriate situation. Power is the reality of an organization, and is not going to go away. In order to become an effective manager one needs to learn how power works in an organization. Further in this lesson, we are going to tap on such details related to organizational power and provide readers an ease of understanding the same in real sense.

8.3 ORGANIZATIONAL POWER

In social science and politics, power is the ability to influence and control the behaviour of people. The term "authority" is often used for power perceived as legitimate by the social structure. Sometimes, power can be seen as unjust, but exercising power is accepted as endemic to humans as social beings. Power may be regarded as one of the central concepts of political science. It is said that the concept of power holds the same status in the realm of political science as held by the concept of money in the realm of economics.

In business, power refers to a capacity that one has to influence another so that the other acts in accordance with the former's wish. The most important aspect of power is that it is the function of 'dependence'. The greater B's dependence on A, the greater A's power in the relationship. Dependence, in turn, is based on alternatives that B perceives and the importance B places on the alternative(s) A controls. A person can have power over you only if he or she controls something you desire.

In the words of George Schwarzenbarger, "Power is the capacity to impose ones will on others by reliance on effective sanctions in case of non-compliance".

Hans Morgantheau defined it as "the power of man over the minds and actions of other men".

Therefore, in a nutshell, power is the ability to influence the outcome of events. It involves bringing about an action by someone against the will or desire of another. The dynamics of power plays an important role in the study of leadership as leadership is all about exerting power over followers.

8.3.1 Power & Leadership:

It is a known fact that leaders use power as a means of attaining group goals. Influence is closely related to leadership and power, however both are different. Let us now see point of differences:

LEADERSHIP	POWER
It is the followers who make a leader, hence leadership is driven byfollowers.	Power flows downwards as people have to follow because they have to and they don't have a choice.
It requires some congruence between the goals of the leader and those being led	It does not require goal compatibility as there is dependence on people in power.
It mostly emphasizes style to gain commitment	It focuses on tactics for gaining obedience and compliance.
It focuses on the downward influence	It focuses on the lateral and upward influence
It is the ability to influence people	It is the ability to exercise control

Despite these differences, the two concepts are interlinked as a leader is not a leader in absence of power. The power that makes one a leader. Hence, both coexist.

ACTIVITY

Refer to any real life incident where you emerged as a leader and list down the leadership traits that you discovered in yourself. Also explain how you displayed those traits in the whole incident.

8.3.2 Bases/Sources of Power:

There are a few questions that need to be answered before understanding the Power game better, i.e. where does the power come from? We can answer these questions by dividing the bases of power into two groups- formal and personal, and then narrowing it to more specific details.

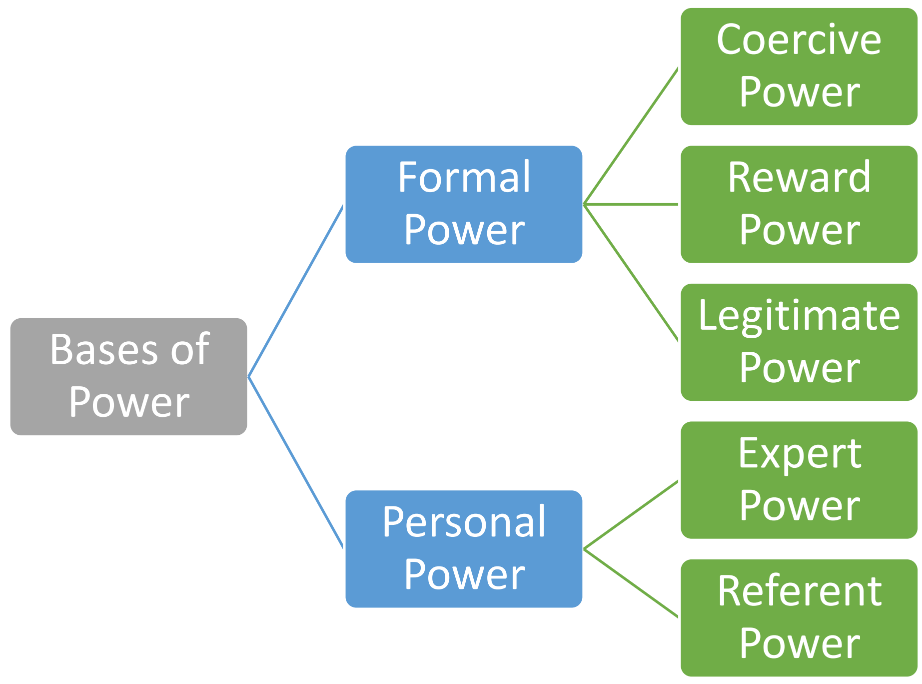

Fig 8.1: Bases of Power

Formal Power: Formal power is based on an individual's position in an organization. It is also termed as positional power. It comes from the ability to coerce or reward, or from formal authority or access to important information.

Legitimate Power: In formal groups and organizations, probably the most common access to one or more of the power bases is through legitimate power. It represents the formal authority to control and use organizational resources based on structural position in the organization.

Coercive Power: The coercive power is a formal power and depends on fear of the negative results from failing to comply. It rests on the application and, or the threat of application, of physical sanctions such as; infliction of pain, frustration through restriction of movement, or the controlling by force of basic physiological or safety needs.

For Example, A has coercive power over B if A can dismiss, suspend or demote B, assuming B value his or her job.

Reward Power: The opposite of coercive power is reward power, with which people comply because it produces positive benefits. As it comes through position, it is also a type of formal power. The rewards can be either financial like controlling pay rates, raises and bonuses- or nonfinancial like recognition, promotions, interesting work assignments, friendly colleagues, and preferred work shifts or sales territories.

It is legitimate power that is broader than coercive power an reward power, it includes members' acceptance of the authority in position.

Personal Power: Personal power comes from an individual's unique characteristics which exists in the form of expertise and the respect and admiration of others.

Expert Power: It is an influence that one has on others due to expertise, special skill, or knowledge. It is a type of personal power. As and when a job becomes more specialized, our dependency on experts increases for the achievement of goals. For Example.- We follow our doctor's advice and seek consultation from the chartered accountants for filing income tax returns because they have expertise in their own fields. They enjoy Expert Power.

Referent Power: This power develops out of admiration by others and their desire to be like that person. It is also personal power. It is based on identification with a person who has desirable resources or personal traits. If I like, respect, and admire you, you can exercise power over me because I want to please you.

For Example- Why celebrities are paid a handsome amount of money to endorse products in commercials? It is so because celebrities like Virat Kohli or Akshay Kumar have the power to influence consumers' choices of various products like cooking oil, cell phones etc. I and you cannot be so influential in pacing up the sales of a product as all the consumers will not connect with us but they can easily connect with these celebrities and will be convinced to follow them.

This is because of the Referent Power that they have. Some other people who are not in formal leadership positions nonetheless have referent power and exert influence over others because of their charismatic quality, likability and emotional connection with us.

Informational Power: This base of power depends on access to information. This power is comparatively short-lived, as it stays for a small duration. As the requirement changes, related information requirements also changes, not necessarily the same person will have access to the required information. The source of power may change, shifting the power from one person to the other.

The key to successful management is not in keeping all the powers in one's hand but to use existing power and authority wisely. The best way is to use a combination of various bases of power according to the prevailing conditions in the organization.

8.3.3 Power-Dependence connect:

Dependence forms the foundation for Power. Higher the dependence of others on you, the higher the power you possess over the other person. When you possess something that other requires but you alone control, their dependence on you increases, and you gain power over them. In contrast, if something is plentiful, possessing it will not increase your power. This phenomenon is best seen when businesses opt for multiple suppliers and do not prefer working under the monopoly of one, as in that case more power to bargain will be in the hands of the supplier than the businessman, which is not a Favorable condition for any business.

Now the question arises is that "What creates Dependence?". The answer is that the dependence increases when the resource one control is important, scarce and non-substitutable.

Importance: This can be explained by a simple point that why a group of engineers is more important in companies like Wipro, Infosys, IBM ,etc and not in Hindustan Lever or Nestle, who are consumer product giants. Similarly, why sales and marketing executives are crucial for these consumer product companies as compared to technical people. It is so because of dependence, in heavily technologically oriented companies the processes completely depend upon technical knowledge whereas in consumer product companies, higher dependence is observed of marketing and sales people.

Scarcity: We often observe that some jobs are very high paying as compared to others. Why is that so? It is so because there is a scarcity of skills to do certain jobs. There are a few people who are skilled enough to take that job. Therefore, they are paid highly for the skill and expertise that they render to an organization.

Where the supply of labor is low as compared to demand, workers can negotiate compensation and other benefits and can make it far more attractive as compared to occupations with an abundance of candidates.

Non-Substitutability: We all witnessed a suitable example of this during the COVID-19 Pandemic, where most of the power was in the hands of pharmacists and other medical tools and gadget providers, due to which the price of all these goods was swaying much higher than their MRP, mostly at the discretion of the providers. This is so because there was non-substitutability of these medicines and products but were extremely essential for the consumers.

IN-TEXT QUESTIONS

12. Power corrupts and absolute power _______________.
13. The term "authority" is often used for power perceived as illegitimate. True / False
14. What doesn't stand true for Power:
    a) Merely Dependence b) focus on downward influence
    c) Has the ability to exercise control d) tactics for gaining compliance
15. ____________________ power base depends on fear of negative results from failing to comply. .
16. The opposite of Coercive power is ____________________ .

8.4 TACTICS TO GAIN POWER IN ORGANIZATION:

Power is never served on a plate to you in the organization but it should be gained. Power is the ability to influence others. They would influence only when they will have trust in you, and trust can be gained in various ways. These can also be termed influence tactics.

Researchers have identified nine distinct influence tactics:

Legitimacy: Relying on your authority position

Rational persuasion: Presenting logical arguments and factual evidence to demonstrate a request.

Inspirational appeals: Developing emotional commitment by appealing to a target's values, needs, hopes, and aspirations.

Consultation: Increasing the target's support by involving him or her in deciding how you will accomplish your plan.

Exchange: Rewarding the target with benefits or favors in exchange for following a request.

Personal appeals: Asking for compliance based on friendship or loyalty.

Ingratiation: Using flattery, praise, or friendly behavior prior to making a request.

Pressure: Using warnings, repeated demands, and threats.

Coalitions: Enlisting the aid or support of others to persuade the target to agree.

Some tactics are more effective than others. Rational persuasion, inspirational appeals, and consultation tend to be effective, especially when the audience is highly interested in the outcomes of a decision process. Pressure tends to backfire and is typically the least effective of the nine tactics. You can also increase your chance of success by using two or more tactics together or sequentially as long as your choices are compatible.

Table 8.1: Preferred Power Tactics by Influence Direction

Upward Influence	Downward Influence	Lateral Influence
Rational Persuasion	Rational Persuasion	Rational Persuasion
	Inspirational Appeals	Consultation
	Pressure	Ingratiation
	Consultation	Exchange
	Ingratiation	Legitimacy
	Exchange	Personal appeals
	Legitimacy	Coalitions

The above table shows that the effectiveness of influence tactics also depends upon the direction of influence. It exhibits that rational persuasion is present across all three levels. Inspirational appeals are best suitable as a downward influence on subordinates. Pressure again works as a downward influence. Most efficient lateral influences are Personal appeals and coalition. Other than that factors like sequencing of tactics, a person's skill in using the tactics and the organizational culture has an effect on the effectiveness of influence.

Talking about the usage of tactics, it is said that the user must begin with "softer" tactics that rely on personal power, such as personal and inspirational appeals, rational persuasion and consultation. If these remain unsuccessful "harder" tactics such as exchange, coalition and pressure, emphasizing formal power and incurring higher cost and risk can be used. An interesting fact is, a single soft tactic is more effective than a single hard tactic, and combining two soft tactics or a soft tactic and rational persuasion is more effective than any single tactic or combination of hard tactic.

Another finding about power tactics also says that people of different countries prefer different power tactics. Among managers of six countries- Germany, Hong Kong, India, Mexico, the Netherlands and the United States- it was found that in all these cultures SIX job tactics universally exist, they are:

a) **Good Soldier tactics:** Working overtime, if necessary, to get the job done.

b) **Rational persuasion:** involved creating dependence of the superior on one's technical expertise.
c) **Image management:** supporting the views of important people in the organization even if one did not truly agree with them.
d) **Personal networking:** cultivating a relationship with a senior person who could serve as a mentor.
e) **Information control:** withholding information to make other person look bad.
f) **Strong arm coercion:** using detrimental information to blackmail someone in a position to help them rise in the organization.

This study also concluded that good soldier tactics and image management tactics are soft or positive strategies, whereas, good soldier tactics and image management tactics are hard and negative strategies, while rational persuasion and personal networking are perceived as middle-level strategies.

The American and Dutch managers gave the highest ranking to soft strategies as a way of exerting influence by subordinates on their superiors, and the lowest ranking to hard strategies such as information control and strong-arm coercion. The Germans and Indian managers showed a greater acceptance of balanced use of all the tactics. Contrary to this, the Mexican and Hong-Kong managers found the hard strategies to be reasonably acceptable and did not perceive the soft strategies in upward influence to be as productive did the other four cultures.

8.4.1 Power in Action: Politics

When employees in organizations convert their power into action, we describe them as engaged in politics. Those with good political skills have the ability to use their bases of power effectively. This type of politics focuses on the use of power to affect decision-making in an organization, or on self-serving and organizationally unsanctioned behaviors.

Political behavior is outside specified job requirements. It requires some attempts to use power bases. It includes efforts to influence the goals, criteria, or processes used for decision-making.

Now, talking further about power and politics, there are research conducted to find out the connection between the two. The major influencing factors of political behavior are Individual as well as organizational.

Certain personality traits, needs, and other factors are identified at the individual level that contribute to political behavior. It purports that employees who are high self-motivators possess an internal locus of control, and have a high need for power are more likely to engage in political behavior. It is for the reason that they know they can control their environment, individuals with an internal locus of control are more prone to take a proactive stance and attempt to manipulate situations in their favor. Such individuals have a high desire for power and are comfortable using politics as a means to further his/her self-interest.

As far as the organizational factors are concerned, when an organization's resources are declining, when the existing pattern of resources is changing, and when there is an opportunity for promotions, there is more room for politicking. When organizations downsize to improve efficiency, resources must be reduced, and people may engage in political actions to safeguard what they have. The opportunity for promotions or advancement has consistently been found to encourage competition for limited resource as people try to positively influence the decision outcome.

Cultures characterized by low trust, role ambiguity, unclear performance evaluation systems, high pressures for performance, and self-serving senior managers will also create breeding grounds for politicking. Therefore low trust within the organization should be replaced by hi-trust among people which suppress political behaviour in general and inhibit illegitimate behaviour in particular.

IN-TEXT QUESTIONS

16. Stress is one of the influence tactics. True / False
17. ________________ is asking for compliance based on friendship or loyalty.
18. Using flattery, praise or friendly behaviour is:

    a) Pressure b) Coalitions

    c) Line Ingratiation d) Personal Appeals
19. ______________________ is best suitable as a downward influence with subordinates.
20. Supporting the views of important people in the organization is ______________________.

CASE STUDY

Kate Louis is the owner and CEO of Louis, a small LA agency that develops advertising, promotions, and marketing materials for high-fashion firms. Louis has tended to keep a strict check and hold on her business, overseeing most projects from start to finish. However, as the firm has grown, she has found it necessary to delegate more and more decisions to her associates. She has recently been approached by a hairstyling chain that wants a transformation and redefinition of its entire marketing and promotions look.

Some experts propose that top executives need to stay very close to the creative core of their business, which means that even if their primary responsibility is to manage, CEOs should never give away too much control to committees of creative individuals or they can loose sight of the firm's overall future direction. Moreover, executives who do fall out of touch with the creative process risk being passed over by a new generation of "plugged in" employees who better understand how the business really works.

Others offer the opposite advice, saying it's not a good idea for a CEO to "sweat the small stuff" like managing individual client accounts or projects. These experts advise executives to identify everything they can "outsource" to other employees and to delegate as much as possible. By eliminating trivial task, executives will be better able to focus their attention on the most important decision making and control aspects of their jobs, which will help the business and also ensure that the top executive maintains control over the functions that really matter.

These pieces of advice are not necessarily in conflict with one another. The real challenge is to identify what you can delegate effectively without giving away too much power and control from the person with the unifying vision. That is certainly easier said than done, though.

Questions:

1. If you were Kate Louis, how would you prioritise which projects or parts of projects to delegate?

Questions (Cont.)

2. Should executives try to control projects to maintain their position of authority? Do they have a right to control projects and keep in the loop on important decisions just so they can remain in charge?

3. What are some tasks in an organization that a top executive should never delegate to others?

8.5 IMPLICATION OF POWER FOR MANAGERS

One needs to have Power; if the aim is to get things done from others, that is what managers do. There are certain things that need to be taken into consideration:

1. If you want to increase your power, you need to increase others' dependence on you. In terms of an organization, you as an employee can increase your power by increasing knowledge, skill, and expertise that is non-substitutable. But you will not only be competing in this battle as others also seek to increase their knowledge base to increase their power, hence it is a never-ending process.
2. Few employees deliberately look around for opportunities to pretend themselves as powerless. Spot them, and as an effective manager avoid putting them in a position where they feel they have no power.
3. To different power bases, the reaction is different. Expert and referent power is derived from an individual's personal qualities. In contrast coercion, reward and legitimate power are essentially organizationally derived. This conveys a message to managers that "Develop and use your expert power base".
4. As an effective manager, one must accept the fact that organizations are political in nature. With this, you will experience an ease of predicting the actions of others and use that information to formulate political strategies that will gain advantages for you and your work unit.
5. Those who are good at playing politics, are expected to get higher performance evaluation and larger salary increases and more promotion as compared to a politically naïve person, job of a manager is to differentiate them and be just in taking decisions.
6. Employees play politics not only as a result of lower job satisfaction, increased anxieties and stree and rivalry, sometimes they are habitual of doing so. As a manager one must be conscious of such people.

IN-TEXT QUESTIONS

11. Working overtime to get the job done is ____________________.
12. ____________________ gave the highest ranking to soft strategies.
13. Political behaviour is outside specific job requirements. True / False
14. If you want to increase your power, you need to increase others _______________.
15. To different power base reaction is different, this conveys the message "-------------------------------"

8.6 SUMMARY

Power is the game played to win influence over others. More is the power, greater is the influence. No matter what sector, industry, or organization one belongs to, no matter what level you are working at, almost everybody seeks power in their hands so that they can work or make others work in their interest. Well, power is not a negative concept. At various positions, you necessarily have to have power, because it is necessary at those positions to influence others and make them work your way for organizational goal achievement. The only point that needs to be kept in mind is 'How much' and 'Where' to use power, as excesses of anything is not good, and so is Power.

For using Power in organization, one must have an understanding of various basic things, as in, various sources/bases of power, on whom you are going to exercise power, how power differ across cultures, what are the various tactics used by managers to exercise power, how power transforms into politics and so on.

8.7 GLOSSARY

Tactics: The particular method you use to achieve something.

Ingratiation: .An individual's attempt to influence another person by becoming more likeable to their target.

Legitimate: Reasonable &Acceptable

Coercion: The use of force to persuade someone to do something that they are unwilling to do.

8.8 ANSWERS TO IN-TEXT QUESTIONS

1. Corrupts absolutely	9. Inspirational appeals
2. False	10. Image Management
3. Focus on Downward Influence	11. Good Soldier
4. Coercive	12. American & Dutch
5. Reward Power	13. True
6. False	14. Dependence
7. Personal Appeals	15. "Develop & use your expert power base"
8. Ingratiation	

8.9 SELF-ASSESSMENT QUESTIONS

6. What is power? How is leadership different from power?
7. Explain the bases of power. What are the similarities and differences among the five bases of power?
8. What is Dependence? What is the role of dependence in power relationship?
9. What are the nine most often identified power or influence tactics and their contingencies?

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LESSON 9
Conflict

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STRUCTURE

9.1 LEARNING OBJECTIVES

The lesson enables you to:

- Familiarize with the concept and different thoughts on conflict
- Understand systems thinking to diagnose and analyse conflict
- Develop an understanding of different Conflict Management Techniques in organization
- Develop their own approach to Conflict and Conflict Management Techniques

9.2 INTRODUCTION

In this chapter, we will understand what is conflict, how conflicts originate in any organization and why conflicts are important to be managed. In addition to this, the chapter also highlight the need and importance to address the conflicts to attain the achievement of the group or team.

Conflicts are very common in almost all organizations. Conflict tends to arise anywhere, whether a family setup or a workplace. The reasons may be varied originating due to the differences in personal background, ideology, perception or likings of the people. Any individual or team may have differences in their opinion, but if they fail to negotiate then conflict arises. Conflict is inevitable amongst those who work in a close environment like in any organization. Conflict occurs in the situation where there is a mismatch of perceptions or emotions among individuals or groups. It arises everywhere and at every level like in personal relationships, in business and professions, in organizations, between groups and organizations, and even among nations.

Conflict to crisis in IndiGo Airline: A case study

No frill carrier IndiGo Airways became largest passenger airline service company after Jet Airways was grounded. This company was founded by Rakesh Gangwal and Rahul Bhatia in the year 2006. They operated for more than a decade with efficiency and good passenger satisfaction. But it is now has become a victim of the conflict between the two founding partners. This can be viewed as a classic example of a disagreement between partners leading to conflict which further escalated to court case and adversely impact the operation of the organization. One of the reasons for conflict was difference in the way forward. Mr. Bhatia wanted to invest in double-aisled aircraft which had the capacity to fly nonstop for more than 10 hours and offer passengers more comfort and services whereas Mr. Gangwal wanted to focus on code shares – a commercial aircraft where two or more airlines sell seats on a flight operated by one of them under their own flight code.

Ideally, this should have been resolved through discussion and evaluation of alternatives based on respective merits. However, ego of the partners became a roadblock in reaching an agreement. Secondly, other reason for conflict was degree of operational control. It was felt that Mr. Bhatia has more control over the executives and management. Because of these issues operational decisions started getting delayed which led to shortage of staffs including pilots resulting into cancellation of flights. In 2018, IndiGo cancelled close to 2000 flights on account of safety concerns and other technical issues. The impact of this conflict between the partners can also be viewed as lost opportunity arising due to Jet Airways shutdown. It is observed that if differences of opinion and perception not get resolved timely, it might lead to operational and financial hardship.

This case has been developed based on information published / reported in various news channels and print media.

9.3 CONFLICT: CONCEPT, SOURCES, TYPES AND STAGES

9.3.1 Concept and Dimensions of Conflict

Conflict is an expected, natural and universal phenomenon among individuals, teams & in organizational life. Conflict may arise from the differences of opinion and may escalate to dispute level and if not resolved will lead to an unhealthy work environment. Thus, proper diagnosis and timely resolution of conflict is essential for the organization. It is good to respect the different views and opinions. A work culture where everyone's view is respected on their merit and discussed in a positive tone and environment leads to a positive impact and does not lead to unproductive behavior and a toxic work environment.

In organizations, managers devote a lot of time and resources in handling and resolving conflicts. It is a very tedious task to estimate the losses due to organizational conflict. So, management of conflict is important for the effective functioning of organizations. In most of the organizational set ups, there are various reasons for conflict like when employees do not get the salary and responsibilities as per their expectations, due to the differences in background of employees, differences in ideology and perception of employees etc.

EXAMPLE

Sanu and Disha, best friends were working on a project as a team. In a brain storming session with respect to the implementation of the project a difference of opinion emerged between them. They were not able to reach a consensus and project went on a deadlock. This is a classic example of origination of conflict. Finally, the project leader intervened and resolved the conflict in smart way without favouring any one and made the project run. He made them understand the losses and negative effect of stalling a project just because of differences in opinion. Project is more important than any one's way of thinking or behaving.

9.3.2 Why Conflict Arises – Understanding the reasons and cause of Conflicts

Conflict can arise in various scenarios and it is important to be able to identify the conflict before it escalates and damages the workplace environment. Conflict can be caused by a number of factors and the first step towards conflict resolution is identifying and understanding the underlying reason. Conflict resolution more often than not begins by asking "What Happened?".

The answer to this question however, can be one or more of the following:

- **Perceived breach of faith and trust**: If any individual or group recognizes and feels breach of faith and trust among them, conflict is very obvious results. Under any situation, when one party puts faith and trust in another and that faith is broken, it can generate an emotional response that leads to conflict. On the other side, a trusting relationship leads to feelings of confidence and security.

- **Unresolved disagreements**: Disagreement is the starting phase of any conflict situation. Disagreements are likely to arise when people work in an interdependent manner. But if the disagreement is left unresolved it can turn to a serious conflict situation. Therefore, it is very important to address and resolve disagreements as soon as possible and not let them get worse and continue.

- **Miscommunication:** Interpersonal communication skills and empathy may help in avoiding conflict situations and if any conflict condition arises, it may also help in handling and resolving the same in a better way. On the other hand, miscommunication may lead aggravation of conflict.

- **Personality clashes:** It is a universal truth that we all are different. According to experts, our personalities are genetically determined which results in different sets of preferred behaviors. It is one of the obvious reasons for personality clashes.

- **Differences in acquired values:** Differences in acquired value is a common source of conflict. Our values are the beliefs we hold that help us to decide between the right and wrong, good or bad, and normal or abnormal. Values develop through the influence parents, siblings, friends, teachers, books etc. So, the value system is a strong driver of behavior and a frequent source of conflict between individuals.

- **Underlying stress and tension:** In the present competitive environment, increased work pressure and paucity of time mounts the stress leading to irritating behavior and creating fuss on petty things. In stressed conditions there is a higher possibility of conflict arising.

- **Ego problems**: Ego is one of the strong drivers of human behavior and often a cause of conflict. One of the fastest and most effective ways to diffuse an argument or conflict is to admit mistakes and try to see the situation from the other person's point.

- Perceived breach of faith and trust
- Unresolved disagreements
- Miscommunication
- Personality clashes
- Differences in acquired values
- Underlying stress and tension
- Ego problems

Figure 1.1 Causes for Conflict

IN-TEXT QUESTIONS

1. Find out the false statement about conflict

   a. It is inevitable
   b. Present opportunities as well.
   c. Offer opportunities for growth.
   d. Creates problems that required to be tackled with into the open.

2. ___________ is not a portion in the definition of conflict?

   a. Perception
   b. Disruption of tasks
   c. Negative effects
   d. Incompatibility

3. __________ is not a reason for conflict?

   a. Unresolved disagreements
   b. Perceived breach of faith and trust
   c. Effective Communication
   d. Personality clashes

9.3.3 Views of Conflict

There are various perceptions regarding conflicts among the people and organizations. Some feels it as a natural happening whereas others treat it as a personality defect. There is an emerging view that conflict is bound to happen if people work in closely and regularly interact with one other. It is because of differences in opinion and is good as it stimulates the thinking process and makes us ready for positive changes. The broad views on conflicts are as follows:

Traditional View: As per this view conflicts are always destructive in nature and leads to violence, so it should be avoided ab initio. It may be because of lack of trust and poor communication among the groups. It advocates for immediate action for resolving the conflict. It feels that delay in resolving the conflict will worsen the situation and will have adverse effect on the performance of the organization. According to this view, senior management should involve to resolve the conflict at the earliest otherwise it will invoke negative feelings among the people which will be damaging in nature.

The Human Relations or Contemporary View: It considers conflict as a dispute which is behavioural in nature and occasional in appearance. It will increase group performance through increased healthy competition. However, if conflict crosses its critical level, then it should be resolved amicably without delay.

The Interactionist View (Modern View): With the emergence of new school of thoughts in management organizations have started accepting conflict as a natural happening. If it is in its primitive stage of differences of opinion then it should be considered good and healthy for the organization as it will increase competitiveness among the workforce. They will become sincere, effective and more productive. This school of thought has highlighted the different kinds of conflicts based on tasks, processes or relationships. Task conflict originates during defining the goals or contents of the work whereas process conflicts arise on account of differences in modus operandi to complete the task. Relationship conflict is due to behavioral issues. However, one should be alert enough to make sure that these healthy and good conflicts should not escalate to destructive levels.

IN-TEXT QUESTIONS

4. The _____________view of conflict says that it must be avoided.
5. As per _______________ interpretation conflict is not only a positive point, but is also necessary to accomplish organizational growth.
6. The _____________ concept trusts that conflict may benefit a group's performance.

9.3.4 Sources for Workplace Conflict

The most common sources of workplace conflict include:

Figure 1.2: Sources for Workplace Conflict

1. Use of common resources: In any organization people have to use common resources like manpower, budget, office spaces, information and other facilities etc. for accomplishment of duties and responsibilities. Scarcity of these resources or unequal distribution of resources between employees or departments may be a source of conflicts among employees. An equitable and transparent basis of distribution of resources by managers may tackle the situation.

2. Tight Deadlines: Tight deadlines of the project promote employees to work faster in an efficient manner. Most of the employees can perform better when they have to meet tight deadlines, but few of them have negative emotional responses. In the situation, where employees cannot meet targets, they might try to shift their responsibilities to another employee, which gives rise to conflicts among employees and even between departments.

3. Goal Differences, unreasonable policies, rules, standards, and procedures: Wherever an organization's goals, policies, rules and procedures are not clearly well-defined and easy to understand, it could create dissatisfaction among people and hinder the work in organization.

4. Communication interruptions: Communication gap or miscommunication are an important cause of conflict within an organization and give rise to misunderstandings. On the other hand, when people don't have the liberty to communicate their issues with their managers, it causes inadequate communication, misunderstandings that often lead to conflicts among employees.

5. Temperament clashes: This is the most common cause for workplace conflict. As we have discussed earlier in the lesson, individuals have different values and perceptions, and in case it does not match with their peers, it leads to severe disagreements among them, between management and employees, or between a manager and an employee.

6. Overlapping or ambiguous jurisdictions: Ambiguity in inter allocation of responsibilities such as job boundaries or the range of powers can create confusion among managers leading to blame game for poor performance. It creates room for conflict to occur.

7. Roles and expectations: Functional responsibilities of any employee is well defined in any organization. Every employee is expected to fulfil for their functional responsibilities as defined by their role assignment. However, sometimes these roles and responsibilities may be overlapping and /or poorly classified leading to conflict among the stakeholders. The conflict in such cases may arise among the peer group members or with seniors / subordinates as well.

8. Task interdependence: Coordination is the key where **t**wo departments work together and interdependently. Any gap in coordination could lead to conflicts among them.

9. Authority Relationships: If authority relationships in an organization are not well defined, they can give rise to conflict. Employees caught in such situations try their best to expand their position or protect their current situation, and conflicts can rise from status disagreements. Status conflicts may also be the outcome of differences in job assignments, status symbols, working conditions, and inequitable rewards.

IN-TEXT QUESTIONS

7. __________ is not considered one of the potential sources of conflict?

   a. Use of common resources
   b. Value similarities
   c. Communication disruptions
   d. Job interdependence

8. __________ is an example of organizational conflict.

   a. Creative Idea Conflict
   b. Leadership Conflicts
   c. Personality-Based Conflicts
   d. All of the above.

9.3.5 Types of Conflict

On the basis of impact on the overall development of any organization, Conflicts may be classified into two categories namely – Functional or Constructive and Dysfunctional or Destructive.

Functional or Constructive Conflict:

As conflict in its initial stage are issues based i.e., differences of opinion on any subject, they may be healthy for the organization. When an individual or team puts forward their views rationally then it benefits the organization. It will be good for the organization because of its constructive approach and positive impact. It creates a constructive competitive environment in the organization.

Dysfunctional or Destructive Conflict:

When an individual or group becomes obsessed with their views and take it personally then they become disrespectful to others' views. This creates an unhealthy atmosphere which leads to rivalry among the groups. This may be escalated further because of mishandling which will spoil the work culture and inter-relationships among the groups and lead to downfall of the organization. Thus, this type of conflict should be resolved at the beginning itself.

ACTIVITY

1. Two work associates Sanu and Pihu have different style and recommendations regarding use of system in the department and projects started in the department.
   Is this a constructive or destructive conflict?
   How would you find to discover destructive and constructive elements and effects? Lists the strategies you use—avoidance, management, or resolution

2. Shiva believes that his superior insulted him and placed him in a bad light in the eyes of his associates. He is livid
   Is this constructive or destructive conflict?
   Find out the most suitable strategies?

9.3.6 Different stages of conflict

Stages in the conflict process highlight the way conflict develops and works within any organization. The five stages indicate how conflict begins, grows, and unfolds among individuals or groups.

The conflict process consists of five stages:

- Potential opposition or incompatibility
- Cognition and personalization
- Intentions
- Behavior
- Outcome

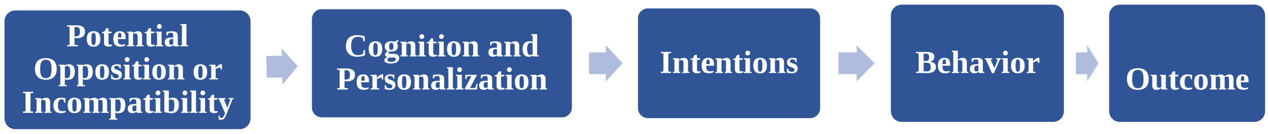

Figure 1.3 Conflict stages

1. Potential Opposition or Incompatibility

This is a latent stage, where conflict has yet not been visualized. In this situation, the people are yet not aware of the conflict, but there may be unseen frustrations which might come on the surface at any time. Communication hindrance, any breach in group composition or team building and personal traits of the employee are few of the reasons which create opportunities for conflict to rise under this stage.

2. **Cognition and Personalization**

After conflict is recognised, it is apparently felt either simultaneously or at a later period, depending upon the situation. In this stage, differences are perceived by the individuals. However, if no one is feeling the conflict, then it is generally said that no conflict exists.

3. Intentions

An intention is nothing but an idea that any individual aim to carry out. In other words, intentions originate between individual's observations and feelings and help the people who are connected in the potential conflict to select to act in a particular way. Under this stage a person infers what the other person meant in order to determine action. The five diverse ways an individual responds to the other people's statements or actions are, competing, collaborating, avoiding, accommodating and compromising. Every group in the conflict tries to adopt one of these responses to resolve conflict.

4. Behaviour

Under this phase conflict becomes apparent, as ae reflected in the statements, actions and reactions of the people involved in the conflict. These behaviors might be apparent efforts to get the other people to reveal intentions.

EXAMPLE

Sonu had taken some money from Monu which had to be returned back in few days but after a month Monu started asking for money back. Initially Sonu kept making excuses for not returning the money but later he started refusing to return back and threatening to Monu.

The intensity of the behaviour falls along a conflict-oriented continuum. If the intensity is low, the conflict might just be a minor misunderstanding, and if the intensity is high as in the above case, it can be harmful or even destroy the relation between the people involved.

5. Outcomes

The outcome of the conflict may be functional or positive. On the other side it may be dysfunctional or negative. In cases where conflicts are a one-time incident, this may be the end. In the situation where it is an ongoing event, it looks like a remarkable highland, like the figure above and more like a continuing loop, it may be destructive.

The conflict map offers a at a glance picture of the conflict and is merely indicative rather than comprehensive. The main elements which need to be denoted on the conflict map are the parties that is major, minor as well as third and external parties, the associations among them, their comparative power, the issues between them, and their interests and goals.

IN-TEXT QUESTIONS

9. _________is the first stage of the conflict process.
   a. Understanding and personalization
   b. Behavioral appearance
   c. Potential opposition or incompatibility
   d. Intention
10. ________ is not a stage of conflict process?
   a. Potential opposition or incompatibility
   b. Cognition and personalization
   c. Communication
   d. Behavior
11. As per interactionist opinion, the overall goal of conflict management is?
   a. Attaining the desired conflict level
   b. Resolution of conflict
   c. Motivating conflict situation
   d. Recognizing conflict

9.4 MANAGEMENT OF CONFLICT

9.4.1 What is Conflict Management?

In the present scenario, globalization has made employees more diverse around the world. As a result, organizational conflict has been a major issue to be addressed. It is the responsibility of managers to cope with the challenges that come with the workforce diversity to avoid conflicting situations.

Conflict management is the method by which disputes get resolved, negative results are minimized and positive results are prioritized. The ability to understand and correctly diagnose conflict is essential to managing it. There are two techniques for managing the organizational conflict: preventive measures and curative measures. Preventive measures try to create an environment so that dysfunctional conflicts do not take place. As in most of the cases, conflict is destructive in nature, it should be resolved as soon as possible after it has developed, but all efforts should be made to prevent it from developing.

Some of the preventive measures to manage the organizational conflict are as follows:

- Establishment of Common Goals
- Minimization of Interdependence
- Reduction in Shared Resources
- Develop Trust and effective Communication
- Develop best Co-ordination
- Exchange of Personnel
- Involvement of Superior Authority as and when required.
- Reorganization of Groups as per project
- Expansion and proper channelization of Resources
- Confronting and Negotiating

9.4.2 Different style of Conflict Management

In the 1970s Kenneth Thomas and Ralph Kilmann identified five main styles of dealing with conflict that vary in their degrees of cooperativeness and assertiveness. According to them individual characteristically have a chosen conflict resolution style. The five styles of conflict management are explained below.

- Collaboration: Collaborative approach recognizes the concerns and interests of both parties, and accordingly finds solutions that satisfy these concerns. This method is suitable wherever the concerns of both the parties are significant to be compromised, both parties are keen to play by collaborative rules, and mutual incentive is high.

- Competition: This style of conflict management takes a firm attitude and denies understanding the viewpoints of the other parties. Under this behavior individuals will keep pushing their viewpoint at others until they get their way. This approach could be appropriate when individuals have to stand up for their rights, need to make a speedy decision and force others to get on board, and want to end a longstanding conflict.

- Compromise: Under this method of conflict management two individuals or groups bargain a mutually acceptable solution which partially satisfies the interests of each party without damaging their working association. In other words, compromising behavior tries to find a solution which ultimately, at least partly, satisfies all the parties.

- Accommodating: In the situation where a matter is important to one party and the outcome has no particular negative consequences for them, under this situation accommodating approach can be a good gesture to keep a cooperative association and build up social credits for future. This method could be suitable to use when an individual cares less about the issue than the opponent

- Avoidance: This style of conflict management technique aims to reduce conflict by ignoring it, removing the conflicting parties, or avoiding it. An avoiding style entirely evades the conflict. This style would be suitable in the condition where conflict seems insignificant.

IN-TEXT QUESTIONS

12. As per compromising of conflict management:

    a. Parties with equal power are at a standstill,
    b. Want to achieve a temporary solution to a complex problem,
    c. Collaboration or competition are not successful, and
    d. All of the above

13. _________ is not a conflict-handling intentions?

    a. Collaborating
    b. Resisting
    c. Competing
    d. Accommodating

9.4.3. Steps that managers must follow to ensure successful conflict management and resolution

Conflict management is the process of addressing the issues and challenges responsible for the origin of Conflict so that it should not ignite any personal dispute or lead to any negative impact on the organization. Rather it should create healthy competition among the employees. Conflict management consists of analytical processes, interactive behavior, negotiation of strategies, and other interferences which is needed to avoid unnecessary conflicts. Thus, we can say that conflict is an absolutely predictable social phenomenon and it should be channeled to useful purpose.

The steps that managers must follow to ensure successful conflict management and resolution between individuals or groups.

Step 1. Find out the source of the conflicts.

First of all, it is necessary to find out the sources and gather information as much as possible before addressing the conflict. Proper information facilitates easier conflict resolution. It is required to ask a series of questions to identify its source. Information on the conflict might be collected by giving a chance to both the conflicting parties to keep their points. A caution is there that for getting a better idea of the situation, one has to show the impartial stand for both the parties.

Step 2. Look beyond the conflicting incident

Sometimes, even a minor issue triggers a conflicting situation that aggravates over time. Under this situation the source of the conflict is forgotten, and only the present behavior is addressed. However, in this situation people must get to the source of the conflict and discuss it.

IN-TEXT QUESTIONS

14. The two general approaches to bargaining are known as ________.

    a. Emotional and rational.
    b. Affective and reflective
    c. Distributive and integrative
    d. Formal and informal.

15. A characteristics of properly managed conflict is:

    a. Dissatisfaction and reduced productivity
    b. Placing blame on others for the problem at hand
    c. A pursuit of "win-win" resolutions
    d. Reduced opportunities for future cooperation

Step 3. Request solutions

After recording the issues of parties, it is required to find out way towards conflict resolution. In most of the cases, the best solutions are provided by the parties themselves. The mediator needs to get solutions after analyzing the issues from both sides. In most cases solutions might not be possible in a single meeting and thus the mediator requires series of meetings to derive it in acceptable form.

Step 4. Identify solutions that both the disputing parties are ready to accept

After getting the viable solutions, point out the merits of each of the solutions from the perspective of the disputing parties and organization.

Step 5: Agree on a solution

The final step is to choose the best solution. The ultimate solution is that which works for both the parties and the organization, and get both parties to accept it as the future course of action.

9.5 SUMMARY

Conflicts are complicated and confusing and there could be multiple reasons for the rise of conflict. Out the dynamics and being able to analyze the elements of the conflict is the first and the tedious step towards resolution. Given that the conflicts could have a beneficial significance, but also terrible, it is crucial that managers identify the most appropriate conflict management technique. Conflict often creates a situation of distrust and suspicion among the members of the group as well as the organization. Sometimes conflict can cause high levels of tension among the individuals and groups. Effective management of organizational conflict is essential for the growth of the firms.

9.6 GLOSSARY

Avoiding: A conflict situation in which disagreements and concerns go unexpressed.

Collaborating: The pooling of individual needs and goals towards a common goal.

Competing: A conflict style in which own needs overwhelm the needs of others person.

Compromising: A conflict style involving tradeoffs.
Conflict styles: Varying approaches of behaving during conflict.

Consensus: A situation in which all members of a group find an outcome together.

Empathy: The ability to put oneself in another person's position to understand that viewpoint.

Formal groups: Formal groups are created to achieve specific organizational objectives and are concerned with the co-ordination of work activities.

Stakeholder: One who has a vested interest in a situation or outcome.

9.7 ANSWERS TO IN-TEXT QUESTIONS

1. c. 2. b. 3. c. 4. Traditional 5. Interactionist 6. Contemporary 7. b 8. d	9. a 10. c. 11. a 12. d 13. b 14. c 15. c

9.8 SELF-ASSESSMENT QUESTIONS

1. Explain the concept of Conflict. Discuss the approaches of conflict Management.
2. Discuss the different views of conflict.
3. Define constructive and destructive conflict.
4. Discuss steps that managers must follow to ensure successful conflict management

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LESSON 10

Organizational Change

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STRUCTURE

10.1 LEARNING OBJECTIVES

At the end of the lesson, students shall be able to:

- Define organizational Change.
- Explain Forces for Change
- Understand the difference between the external and internal forces for Change.
- Explain Lewin's three-step model of the change process.
- Understand the importance of managing organizational Change

- Understand why employees resist Change and how to manage Resistance to change.

Opening Case

Innovative machines' senior managers, Krishna and Mahesh, noticed that in the last few years, hard-working and high-performing employees have been leaving their job, even when the company continuously revises the monetary benefits for all employees. While discussing, Mahesh highlighted a recent case of Ms Sweta, serving her notice period in the company.

Sweta was hired four years back, and she has been working under Johana for the last four years. Her performance plot is quite good. During the human resource teams' interaction with Sweta, they learned that In her previous assignment with a Russian client, Sweta suggested an innovative idea that not only helped the company give deliverables on time but also helped the company get more significant projects from the same client. Johana offered her monetary rewards as per existing practice, but Sweta refused the monetary benefit. Instead, Sweta was looking for recognition and promotion. As a team leader, Johana received a prize in an event, but Sweta's name was nowhere throughout the event. Further, Sweta was not happy with the seniority norms that are followed in the company during promotions.

The senior managers, during their discussion, came across similar cases where the company was losing performing employees due to the seniority norms. Krishna suggested that changing "seniority norms" to "performing norms" for promotion could help the company retain talent. Mahesh said, "Yes it would help us in satisfying young employees like Sweta, but it would dishearten our existing senior employees, who have served the company for a long and are expecting a promotion". Further, he also added that "our company do value loyalty".

Questions: 1. Why are employees leaving the company?

Question 2: Could the company retain efficient and innovative employees like Sweta through monetary norms? Comment.

Question3: Should the company change its existing seniority norms to retain performing employees? Comment

10.2 INTRODUCTION

Organizations, irrespective of industry and type, must embrace change to remain competitive and relevant in the present-day competitive world. Irrespective of the degree of change, organizations must respond to changes in the environment, like changes in technology, taste and preference of customers, demand, competition, etc. In fact, organizational change is an essential feature of organizational development. As seen in the opening case, bright performing employees of "Innovative Machines" leave the company due to their traditional seniority norms. To remain competitive, organizations need to change. Let us assume the company changes its existing norms; this change could lead to two possible situations: it will help the company retain young performing employees but could demotivate the existing loyal employees. For people in managerial positions, it is essential to understand that change is a process that goes through several stages. The present lesson helps students understand the concept of change and development. It answers why people resist change and how to manage resistance to change. Finally, through various models, it elaborates on various stages and theories of change.

10.3 What is Change?

The term "change" refers to any alteration that occurs in an organization's overall work environment. According to Robbins, Change means making things different. Change is inevitable and occurs in all aspects. Therefore, managing change is an integral part of a manager's job. An organization is an open system affected by both the internal and external environment. Organizations voluntarily change to remain competitive; sometimes, change occurs due to an external force (like cutthroat competition). Therefore, change may be voluntary or forced. Managers have two options: to wait until a change is forced on them or to take preventive steps and strengthen the organization for the change by taking voluntary steps. For example, the mobile phone industry has been incredibly volatile; Nokia and Blackberry remained a dominant players; until Android came into the market. Top managers at Nokia could not adapt to the necessary change; eventually, Nokia's sales shrank, and Samsung (and other products like iPhones) captured the market.

10.3.1. Features of Change:

- Change is constant yet varies in degree and direction
- Change produces uncertainty yet is not entirely unpredictable
- It creates both threats and opportunities

10.4 Forces of Change

Change is inevitable. To survive in the present-day scenario, an organization must adapt external environment (e.g., government law and regulation, technology, economic changes, etc.) and must change if required by internal forces (e.g., changes in organizational strategy, workforce changes, new equipment, employees' attitude). Both internal and external forces make it essential for an organization to change.

I. Internal forces

Change in the organization could also be attributed to internal forces. As we see in the opening case, the need for change was due to employees' attitudes. Similarly, other internal factors could lead to change like change in strategy, change in workforce or change in existing equipment. For example, if two organizations are merging, in the process of merger, it is crucial to eliminate duplicate departments or duplicate management positions. Similarly, if new equipment is introduced or the existing method is changing to compete in the industry, it is required to unlearn old practices and learn a new one (e.g., digitalization in the education sector). Sometimes extreme steps are also taken in the process, like new recruitment and termination of existing employees.

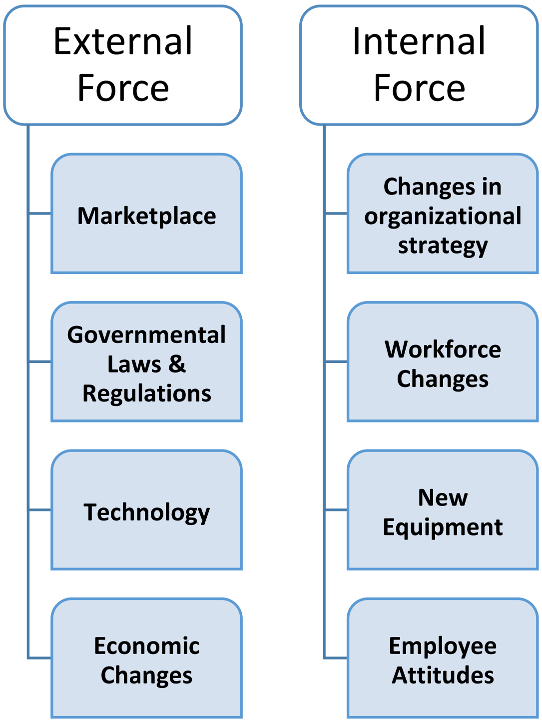

Figure 1 Forces for Change

II. External forces

An organization needs to adapt to external environmental changes, like adopting new technology to remain competitive, new government laws to avoid legal problems, economic changes to survive in the business, etc.

Following are a few popular examples of external and internal forces that made it essential for an organization to change-

External forces responsible for the change in an organization: Examples

- **Nokia:** The company adapted the smartphone (new technology) almost one year after the release of the first iPhone. This led to the fall of Nokia- the global leader in Mobile Phones.
- **Blackberry Motions-** They ruled the mobile industry in 1998 by offering an arched keyboard. To protect what they had, they failed to understand the changing demand in the market for an extensive touchscreen display. This led to the fall of Blackberry motions.
- **Unprecedented lockdown during Covid -19-** To survive a recession, a company must analyze the change in the pattern of consumer demand and should adapt it accordingly. During the lockdown, to survive, organizations were compelled to change their deliverables in line with social distancing norms.
- **During the recession period, consumers restrict their spending (like the 2008 recession period), and** consumers would usually prefer to cut on entertainment budget. Therefore, for the entertainment industry, it becomes important to provide cost effect products and change accordingly.
- **Change in government laws like deregulation, anti-trust laws, Demonetization, etc.-** Change in law could change competition in the market, consumer spending, etc. This could lead to the change in organization.
- **Organisation leaders who are sensitive to environment also introduce change**

IN-TEXT QUESTIONS –

1. Fill in the blanks-
   e) Unprecedent lockdown during Covid -19 is an example of _______ responsible for a change in an organisation. (Internal/External force)
   f) Change in attitude of existing employees is an example of _______ responsible for a change in an organisation. (Internal/External force)

2. MCQs

a) Change is ______
   i) Not required
   ii) Required only in IT industry
   iii) Inevitable
   iv) Voluntary effort

b) _________ is essential for organization to change.
   I) Internal forces
   ii) External Forces
   iii) Government Pressure
   iv) Both (i) and (ii)

10.5 Change Agent and Planned Change

The change was needed in the opening case study due to the performing employees' attitude towards the existing seniority norms. Similarly, some changes could be due to other situational factors; for example, a manager allowing flexi-hour during unprecedented lockdown for better work-life balance.

However, sometimes change is introduced in a planned form by top management. Such change in the organizations is normally introduced to make the organization more competitive and is termed Planned Change or Developmental Change. For example- Expanding product lines or introducing new technology – like automation. The planned change is for the development of the entire organization, and it helps employees to accept the change. Transformation of the organization is essential, but sudden transformation could lead to disastrous results. Planned change could be change in the people, structure, or process. It takes place through a change agent.

A change agent is a person who manages change in an organization. A change agent could be at a managerial or non-managerial position, internal to the organization, external consultant, or current or new employee. They visualize organization's future after change, which others do not identify. The change agent is responsible for determining the transformation process. They need to promote the value of transformation, help employees through smooth transformation process, and is also responsible for identifying ways to implement the change process.

10.6 Resistance to change

Employees see change as a threat; they see the need of change but still resist it. Employees' resistance could erode the organization's energy, especially when all employees start resisting the change together. Normally employees resist changes due to anxiety and fear. Both top-level employees and lower-level employees could resist change. Top-level generally resist changes suggested by lower to middle-level employees when they focus on immediate performance. Lower-level employees resist change because of fear and anxiety. Resistance could be for both major and minor changes.

Superiors are willing to take suggestions from subordinates if they are willing to explore or focus on mastery. In fact, resistance to change could be positive if it leads to positive discussion or a brainstorming process. Such a response is preferred over silence or complete disengagement of employees in the whole process because here, management gets an opportunity to explain why change is important and how it would benefit the organization along with employees. Change is important, but change is also a costly and risky process. Sometimes sudden change or transformation could lead to bad decisions, especially if the change agent is unable to understand the impact of change or cost of change.

10.6.1 Why do employees resist?

1. Due to fear and anxiety: Employees resist "change" due to the fear of failure. If employees are doing good in the organization or are less competitive, they feel that change could make their work harder or jeopardize their job security.
2. Employees' unwillingness to unlearn, know and learn unknown: The process of change involves "Unlearning" the existing ways of doing work and "Learning" new ways of doing work. The process takes effort and is also a concern for employees who are good at doing work using existing ways. The resistance further increases if employees feel that change is not productive for their individual growth and development.

3. Concern related to support from seniors especially when structures are changing Change in structure could have an impact on existing scaler chain (flow of communication from top to bottom), creating psychological concerns related to support from new superiors.
4. Preference to follow the existing routine: Employees fail to understand the importance of change for organization. They resist moving away from their comfort zone. They have more confidence in the existing work environment and feel that new environment could take away their power and they might have to lose control.

10.6.2 Techniques to overcoming resistance to change

To handle resistance, management could opt various strategies. Kotter and Schlesinger suggested following six techniques to overcome resistance to change-

Communication and educating employees about change: This is a common and a positive way to overcome resistance to change. As mentioned earlier one reason for resistance to change is fear, and anxiety among employees about their future in the organization. It is important to communicate the need of change and the objective of introducing change. It is equally important to communicate how change is going to impact the future of employees in a positive way. At least employees who are affected by the change should be communicated about the stage of change, consequences of change, and support system that will be provided to all for a smooth transformation.

Employee participation and involvement in change decision: Though employee participation could be time consuming, but it is helpful in reducing resistance to change. If employees participate in decision making and agree that change is beneficial for the organization, it will be difficult for them to resist something they previously agreed to. Also, involvement of all could increase the quality of change decision.

Support and Facilitation: Lack of support from organization could be one reason for resistance. It is also important to provide emotional support to employees, because change needs employees to move away from their comfort zone. The employees will be able to cope up with change if they will be allowed to express their fear and anxiety.

Developing positive relationships: People accept changes if they trust the change agent implementing them. The positive relationship between change agent and employees affected by change is crucial. As a result, employees feel secure about their future and allow smooth transition.

Agreement and Negotiation: Under this technique organization bargain and negotiate with the resisters. Keeping interest of the organization and resisters in mind, all aspects could be discussed.

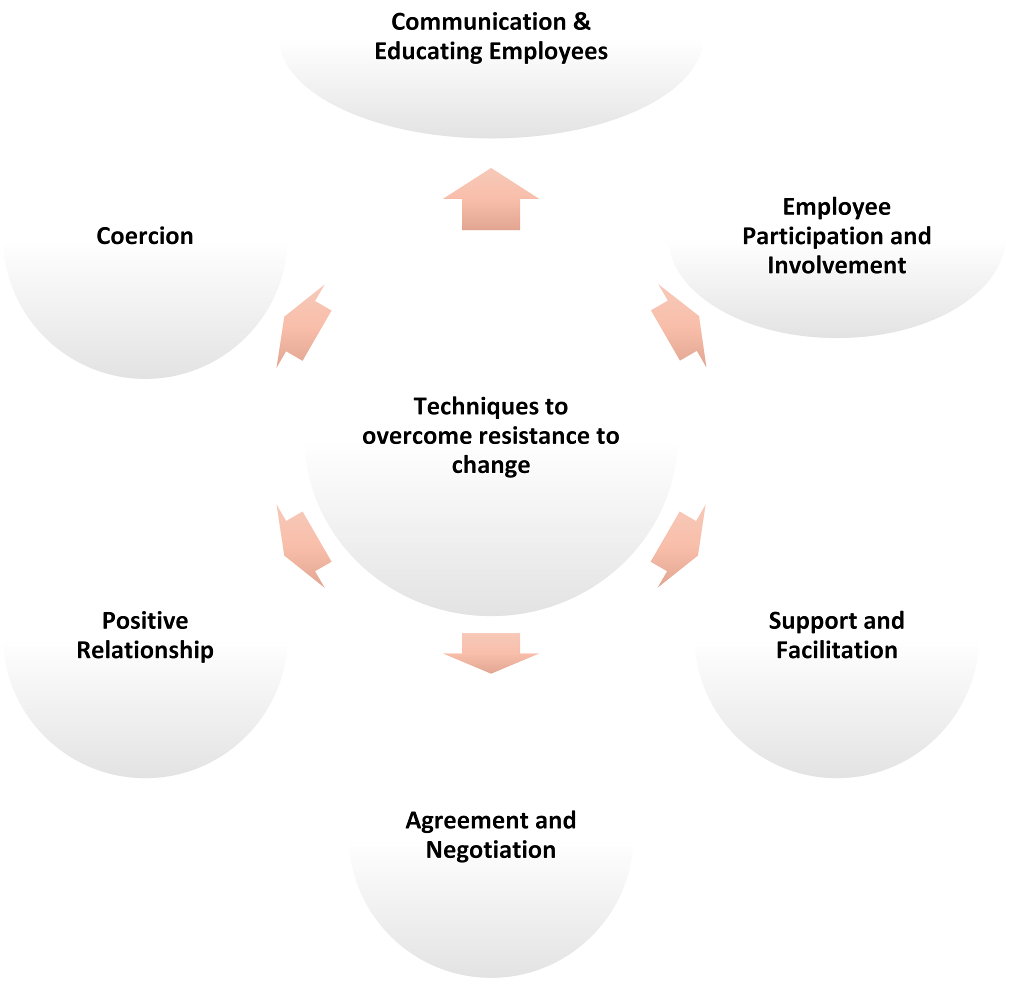

Figure 2 Techniques to overcome Resistance to change

Coercion: The technique of coercion is a negative approach. It is illegal, ineffective and in the long run results in mass resentment. Under this technique, employees are compelled to accept the change through force and threats. For example – threatening employees, pay cuts, negative performance appraisal, etc. This technique should be avoided as far as possible.

10.7. Models of Change

Models of change are theories that provide an approach to change. They aim to provide an understanding or a guide to navigating the transformation process and ensure that change is accepted and put into practice. Each model provides its explanation. The choice between various models depends upon various factors like the organisation's size, nature, situational factors, etc. The following are popular models of change that are effective approaches to change-

I. Lewin's change management model

Kurt Lewin provided 3 stage model of change. The three steps that an organization should follow are as follows – Unfreezing, changing to the new state, and Refreezing to make the change permanent.

Unfreezing – When any change takes place, it is important to prepare employees at all levels before change is made. Two forces need to focus on the organization at this stage. First is the driving force, the force that directs movement towards change, the organization needs to increase this force. The second is restraining force, which includes those who resist change, the organization needs to decrease it. Employees at all levels could be prepared for the change through communication and employee participation. Companies that have been successful in the past are likely to encounter restraining forces because employees question the need for change.

Changing to The New State: At this stage change is introduced. This stage is also known as movement. At this stage, it is important to keep the momentum going, and the organization should support employees who are facing the problem and should keep communicating the need to change to all employees.

Refreezing: When change is implemented, the new situation should be refrozen to sustain it over time. Without this last step, change would not stay long, and employees will attempt to return to the previous equilibrium state. Refreezing aims to stabilize the new situation by balancing the driving and restraining forces.

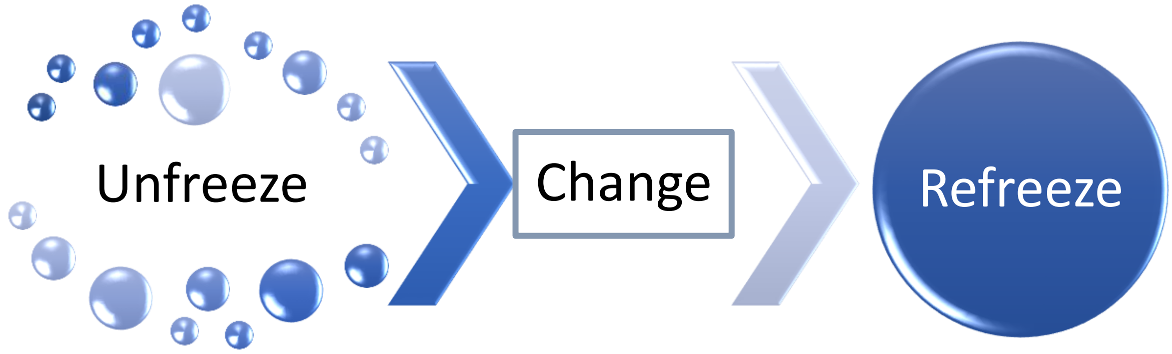

Figure 3 Lewin's Change Management Model

II. Nudge theory: The nudge theory is a step-by-step process of implementing change rather than encouraging a fixed mindset to promote change. The nudge theory explores ways to nudge employees toward change. Under this process, change is viewed from the employees' perspective. Here employees are given a perspective/ or recommendation rather than a command. Throughout the process, employee benefits are communicated, and employee feedback is taken for a better change decision. Nudge theory helps employees see the benefit of change; this reduces resistance among the employees.

III. Kotter's change management theory/ or Kotter's eight-Step plan

John Kotter of Harvard Business School built on Lewin's three-step model to create a more detailed approach to implementing change. Kotter began by listing common mistakes managers make when trying to initiate change. For example, they may fail to create a sense of urgency about the need for change, a coalition for managing the change process, a vision for change and effectively communicate it, and/or to anchor the changes into the organization's culture. They also may fail to remove obstacles that could impede the vision's achievement and/or provide short-term and achievable goals. Finally, they may declare victory too soon. Kotter established eight sequential steps to overcome these problems.

Kotter's eight-Step plan for implementing Change

1. Establish a sense of urgency by creating a compelling reason for why change is needed.
2. Form a coalition with enough power to lead the change.
3. Create a new vision to direct the change and strategies for achieving the vision.
4. Communicate the vision throughout the organization.
5. Empower others to act on the vision by removing barriers to change and encouraging risk-taking and creative problem-solving.
6. Plan for, create and reward short-term "wins" that move the organization toward the new vision.
7. Consolidate improvements, reassess changes, and make necessary adjustments in the new programs.
8. Reinforce the changes by demonstrating the relationship between new behaviors and organizational success.

Source: Robbins, S. T., Judge, T. A., & Vohra, N. (2015). Organizational Behaviour (16th ed.). Pearson Education**.**

IN-TEXT QUESTIONS –

3. Fill in the blanks-

a) ________is a person who manages change in an organization.

b) _________ formulated 3 stage model of change.

c) _______ is a step by step process of implementing change rather than encouraging a fixed mindset to promote change.

4. MCQs

a) Threatening employees, pay cuts, negative performance appraisal, etc. are example of ________ technique to overcome resistance to change-

i) Coercion

ii) Positive Relationship

iii) Negotiation

iv) Support and Facilitation

10.8. Summary

Irrespective of the degree of change, organizations must respond to changes in the environment, like changes in technology, taste and preference of customers, demand, competition, etc. Organizational change is an essential feature of organizational development. To remain competitive, organizations need to change. For people in managerial positions, it is essential to understand that change is a process that goes through several stages. Employees often see change as threatening. Sometimes employees do realize that change is important and is a need of time. Still, they show resistance to change. If employees together resist change because of anxiety or any other reason, it can sap the organization of vital energy when it is most needed. Resistance to change doesn't just come from lower levels of the organization.

In many cases, higher-level managers will resist changes proposed by subordinates, especially if these leaders are focused on immediate performance. The change agent may take the lead in organizational development.

10.9 Answers to IN-TEXT Questions

1.
    a) External forces
    b) Internal Force
2. A) Inevitable
    b) Both (i) and (ii)
3.
    a) Change Agent
    b) Kurt Lewin
    c) The nudge theory

4) Coercion

10.10 SELF-ASSESSMENT QUESTIONS

1. Explain the concept of Change and what you understand by the term change management.
2. Explain the impact of Resistance to Change on the organizations.
3. What are the major challenges the manager faces while introducing a planned change?
4. Explain various models of Change.
5. Change is inevitable due to the growing competition and other external forces. Explain the statement and various forces of Change

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University of Delhi

BBA(Financial Investment Analysis)
Discipline Specific Core (DSC-3)

Bachelor of Management Studies (BMS)
Discipline Specific Core (DSC-2)

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Semester-I

STATISTICS FOR BUSINESS DECISIONS

As per the UGCF - 2022 and National Education Policy 2020

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LESSON 1

INTRODUCTION TO STATISTICS

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STRUCTURE

1.1 LEARNING OBJECTIVES

After reading this lesson, you should be able to :
(a) Learn the meaning of central tendency and other averages
(b) Learn the process of computing arithmetic mean, weighted Mean, Geometric mean, Median, Deciles, Quartiles, Percentiles and Mode under different situations
(c) Comprehend mathematical properties of Arithmetic average
(d) Learn specific uses of different averages.

1.2 INTRODUCTION

The word statistics is used to mean pieces of numerical information. In this sense, the Inflation Rate for the year 2022 is a statistic as is the crime rate in each state across the country or the number of deaths due to COVID19 in a city in the last year. In fact, the notion of statistics was derived from the word state. Traditionally, it has been the function of governments to keep records of population, GDP, Inflation agricultural production, industrial production, exports and imports, employment and unemployment, tax collections, commodity prices, and so on. The counting and measurement of these events results in enormous amounts of quantitative information. Not only governments but all organizations and businesses, big and small, also collect and use huge amounts of numerical information. Today, an annual report without tables and graphs is inconceivable. A company marketing a product without first collecting and using information on customer preferences is just as unlikely. Similarly, a government report on the economy or on any other subject for that matter can most certainly be expected to include numerical data. The newspaper columns and business magazines are full of numerical facts and zigzag graphs presenting such information. Thus, it is no wonder that statistics has been often equated with quantitative information

Statistics can be defined as the body of knowledge which is used for collecting, organizing, presenting, analysing and interpreting qualitative and quantitative data.

Data is defined as "Factual information (as measurements or statistics) used as a basis for reasoning, discussion, or calculation."

A statistical investigation deals with large mass of inter-related facts in the form of numerical figures. These information in the form of numerical figures is generally termed as data. Whereas sometimes data can be in the form of general description or elaboration too.

Or

Data are special type of information, generally obtained through observation, surveys, enquiries, or are generated as a result of human activity for the purpose of research.

1.3 QUALITATIVE AND QUANTITATIVE DATA

The statistical data may be classified on the basis of their characteristics such as qualitative, quantitative, chronological, geographical in nature.

1.3.1 Qualitative Data: When the elements of a sample are recorded as falling into different categories, such type of generated data are termed as qualitative data. The qualitative data are classified on the basis of same attributes or qualities such as sex, religion, employment, status, address, education qualification, income level etc. These attributes cannot not be measured along with a scale. Qualitative data can be only ordinal or nominal. Thus, qualitative data provide only labels or names for categories of the elements under study. The categories for such Data may be identified by either non-numeric descriptions or numeric codes. The qualitative data can be further classified as nominal qualitative data or ordinal qualitative data.

1.3.1.1 Nominal Qualitative Data: The nominal qualitative data are obtained when the elements of the sample are placed in different categories not involving any meaningful ordering. The data on variables Name of Student, Roll Number, Program & section are example of nominal qualitative data.

Some other examples are:

- District-wise classification of businesses according to the address of their respective corporate offices:
- Classification of tax payers for taxation purposes as being resident, not-ordinarily resident, and non-resident is a case in point.
- Classification of students on the basis of streams (Arts, Commerce, Science).
- Cross-classification of corporate employees on the basis of their sex (males or females or transgender) and their attitude towards a new voluntary retirement scheme (VRS) (as favourable, unfavourable or indifferent).
- Classification of employee according to their department. To illustrate, the employees may be asked to specify their department (HR, Sales, Marketing, IT, Others)

1.3.1.2 Ordinal Qualitative Data: An ordinal data set is one where there is a meaningful ordering of the elements so that they can be ranked as being the first, the second, the third, and so on. The data variable ET500 ranking are ordinal qualitative. Some other examples of ordinal qualitative

data include:

i) Ranking of participants in a quiz competition on the basis of their quizzing ability;

(i) Ranking of stocks and bonds by a credit rating agency (Credit Rating Information Services of India Limited, Investment Information and Credit Rating Agency of India Limited, Credit Analysis & Research) as. for example, AAA, AA+, AA, AB, etc.:

ii) Ranking of a set of proposed colour and size schemes for packaging of a product

(iv) Ranking of participants in a beauty contest; and

v) Ranking of students on the basis of elhi University Entrance Exam.

vi) Ranking of athletes in 100-meter sprint.

1.3.2 Quantitative Data:

The **quantitative data** are those which are expressed in meaningful numbers that represent the amount or quantity of some characteristic possessed by an element. Thus, such data indicate either how much" or "how many'" of something. Quantitative data are always numeric and are obtained from either an interval scale or a ratio scale of measurement. The data related to Portfolio investment of an individual such as No. of shares, purchase price, closing price, PE ratio, and Dividend (%) are all quantitative in nature. Quantitative data can be further categorized as being discrete or continuous depending upon the values that the characteristic in question can take.

1.3.2.1 Discrete Quantitative Data: When the variable involved is discrete, then the resulting data are called discrete quantitative data. A discrete variable is one which can assume only selected values and not all. It takes values in jumps. For example, the number of cricket matches held between two nations can be integer and not fractions. It makes no sense to say that the two countries played 20.5 matches. Similarly, the number of accidents in a city can be 0, 1, 2, 3, 4, etc. and cannot be 1.2, 3.7, etc. Other examples include the following:

i) Number of customers visited a bank on a given day;

(ii) Number of computer shutdowns in a corporate in a week;

(ii) Number of shareholders in each company of nifty 50 at a given point of time; and

(iv) Number of insurance claims received by different branches of an insurance company during a week; etc.

1.3.2.2 Continuous Quantitative Data: Continuous quantitative data result when the underlying variable is continuous in nature. A continuous variable is one which can assume any value in a certain range. To illustrate, given a precise measuring instrument and method of measuring. we could find the length of a machine turned steel bar correct to nearest tenth of an inch, hundredth of an inch or to any greater degree of accuracy. A bar given as 12 inches might be found to De 12.2 inches or measured more accurately as 12.18 inches and vet more accurately as 12.1/9 inches, and so on Similarly. the heights of the students, for example. can be measured up to any degree of accuracy and. unlike discrete variables, they need not be only 66", 67", 68", etc. Accordingly, theoretically, a continuous variable can take any value. The variables P/E ratio, closing price and dividend in Table 1.1 data are also continuous in nature because the values each of these can take may be fractions as well as integers. Some more examples of continuous variables are:

(i) Weights of boxers;

(ii) Weight of tea powder filled in tea pouches;

(iii) Diameter of steel rods produced by a manufacturing process

(iv) Volume of juice filled in 1,000 ml bottles;

(v) Length of cricket bat produced by a machine; and

(vi) Rates of return on each of the investments made by a consortium.

(vii) Marks scored by students out of 100

(viii) Time taken by athlete to complete 100-meter sprint.

Broadly speaking, discrete variables result when counting is involved while continuous variables arise when measurements are done.

In terms of the statistical methods used for summarizing data, qualitative data provided by the nominal and ordinal scales employ similar methods. Also, quantitative data provided by the interval and ratio scales employ similar methods.

Finally. one point may be noted. We have already pointed out that the data obtained on nominal and ordering variables cannot be subjected to arithmetic operations. Even numbers may be when data obtained are qualitative in nature. However, care must be taken while handling such numbers. This is because not all numbers can be subjected to arithmetical manipulation. To illustrate, it is logical to add up the heights expressed in inches of some students and find the average height, but it makes no sense to add up the numbers assigned to various categories as 1 (married), 2 (never married), 3 (divorced/separated), etc. and then obtain their average value. Similarly, suppose respondents in a survey are asked to give their opinion on a certain brand of a product by assigning their preference by marking on a scale from 1 to 7, where the numbers indicate the following: O1. Excellent 2. Very Good 3. Good 5. Not So Good 6. Poor In this case although the answers will be obtained in numbers, the data obtained are just ordinal qualitative data. Such data are analysed using appropriate statistical tools. It is not proper in this situation to treat the numbers obtained like they are treated ordinarily because it is not really clear whether the difference, for example, between answers of 6 and 5 is of the same magnitude as the difference between 2 and 1, or, say, between 4 and 3.

However, not all numbers related to qualitative data are not amenable to analysis. If there are only two categories and each item in the sample is assigned 0 or 1 accordingly as one falls in the first or the second category, then in many situations it is possible to treat them as quantitative data and process accordingly.

IN-TEXT QUESTIONS

1. The building is tall: a)Qualitative data b) Quantitative data
2. The building is 50 feet tall: a)Qualitative data b) Quantitative data
3. My friend is 18-years-old: a)Qualitative data b) Quantitative data
4. The paragliding ride is 15 minutes long : a)Qualitative data, b)Quantitative data
5. There are 20 chairs in a class. a)Qualitative data, b)Quantitative data
6. Salt water freeze at 28.4 degrees Fahrenheit a)Qualitative data, b)Quantitative data
7. Pin code of Delhi University is 110007

1.4 SCALE OF MEASUREMENT

Whenever data are collected and analysed, we need to understand about the scale (or scales) of measurement used in the collection of such data. This is because the nature of statistical analysis appropriate for a given set of data on a particular variable depends upon the scale of measurement used for the variable. There are four scales of measurement. They are: nominal, ordinal, interval and ratio scales. The scale of measurement determines the amount of information contained in the data and the data summarization and the statistical analysis that is appropriate. The different scales of measurement are:.

1.4.1 Nominal Scale

When the data obtained for a variable are simply labels used to identify an attribute of the element, the scale of measurement for the variable is termed nominal. For the data given in Table 1.1, the first variable, scrip ID, is measured on a nominal scale. This is because SBI, CASTROL. TCS, etc. are labels which are means of identifying various stocks.

In cases where the measurement is on a nominal scale, we may use numeric as well as nonnumeric symbols. For the data set under consideration, the variable BSE code provides an example where the numeric symbols are used. The only significance that the numbers given here have is that they are used to identify the scrips for trading on BSE, Bombay Stock Exchange Limited. Such a coding is done to facilitate recording and processing of the data on the exchange.

Some other examples of variables where the data have nominal scale include:

(a) Sex (male, female)

(b) Education (educated, uneducated)

(c) Marital status (married, unmarried, widowed, divorced)

(d) Employment status (employed, unemployed)

(e) Component identification code used in inventory control (4307B5, 444C, 2778K etc)

(f) Occupation (service, business, professional, others)

Thus, the key feature of the nominal scale is that the data obtained, both numeric and nonnumeric, are labels used to identify some attribute of elements. What is significant, however, to note is that arithmetical operations like addition, subtraction, multiplication and division make no sense for nominal data, even when they are numeric.

1.4.2 Ordinal Scale

The scale of measurement for a variable is said to be ordinal when the data have the properties of the nominal data and the rank, or the order, of the data is meaningful. An example of this is the variable ET500 Ranking. The given ranking of a company not only provides a means of identification to it but also conveys the relative positioning of the company. Another example of the ordinal scale of measurement is found when organizations place questionnaires to solicit customer/visitor opinions on the quality of service provided by them.

Thus. a restaurant may seek its customers to evaluate its performance in terms of food, service and ambience. and so on, by providing ratings on these variables. The ratings may be (i) excellent, (ii) very good, (iii) good, and (iv) poor. The observations for each variable possess the characteristics of the nominal data in the sense that each response rating is a label for excellent, very good, good or poor quality. But, in addition, the data can be ranked, or ordered, with respect to quality. For example, after collecting the data on food quality variable, from a group of customers, we can rank the data by beginning with excellent, followed by very good, good and, finally, poor.

The data obtained from an ordinal scale can also be just like data obtained from a nominal scale. either non-numeric or numeric. Thus, for recording observations, we may use letters E for excellent, VG for very good, G for good and P for poor. We may as well use the numerals 1, 2. 3 and 4, respectively, for these categories. What is important, however, is that here the numerals do not merely identify the category; they also indicate relative importance so that 1 is better than 2. which in turn is better than 3 and 4. However, like in the case of nominal data, no arithmetic operations can be performed on the ordinal data even when they are numeric.

1.4.3 Interval Scale

The scale of measurement for a variable is said to be interval when the data enjoy the properties of ordinal data and the difference, or the interval between the data values, represents how much more or less of a variable does one element possess in comparison to another element. Thus, when interval data are obtained, it is possible to (i) rank the elements on the basis of the variable values, like for ordinal data, and (ii) calculate difference between any two elements in terms of the variable under consideration by subtracting the data value for one element from that of the other.

The marks scored by candidates in Common Admission Test (CAT) for admission in graduate management program is an example of interval scale data. Thus, three students with scores of, say, 832, 806 and 772 can be ranked or ordered in terms of best to poorest (or poorest to best) on the basis of these scores. In addition, the differences are meaningful so that student 1 scored 832 - 806 = 26 marks more than student 2, while student 2 scored 806-772 = 34 marks more than student 3. Another example of interval-scale data is provided by the temperature. Thus, on a typical day, the maximum temperature of some cities was recorded as follows:

Mumbai 29° C31° C Delhi 38° C Chennai 35° C Kolkata

The interval Celsius-scale temperatures are numeric with the property of ordinal data so that the cities can be ranked in terms of temperature as Delhi, Chennai, Kolkata and Mumbai, with Delhi as the warmest. In addition, it may be seen that Delhi is 9°C warmer than Mumbai and 3°C warmer than Chennai, for example. The given data on maximum temperatures could also be measured on Fahrenheit scale. The values in that case would be Delhi 100.4° F Mumbai 84.2° F Chennai 95°F and Kolkata 87.8° F. The cities may be ranked on the basis of these as well. Also, the temperature differences can be meaningfully calculated. Thus, Delhi is 100.4 84.2 = 16.2° F warmer than Mumbai and 100.4-95 = 5,4°F warmer than Chennai.

It may be noted that interval data are always numeric. With such data, the arithmetic operations of addition, subtraction and averaging are meaningful., As a consequence, data obtained using this scale lend themselves to more alternatives than data obtained from nominal or ordinal scales.

1.4.4 Ratio Scale

The scale of measurement of a variable is termed ratio scale when the data possess all the properties of interval data and the ratio of two data values is meaningful. Examples of variables which use the ratio scale of measurement include height, weight, wages, production, costs, etc. The ratio scale has a key requirement that a zero value is inherently defined on this Scale. The zero value must indicate that nothing exists for the variable at this point. Consider the variable production. The zero value is inherently defined here since a zero production indicates no production. Further, if the production in year 1 is 12,000 units while in year 2, it is 18,000 units, then the ratio property of the data shows that the production in year 2 1S 1.5 times the production in year 1. Now compare this with the variable temperature considered in the context of interval Scale. Neither a temperature of zero-degree centigrade means that the temperature ceases to be there, and nor do temperatures of 40° C in City A and 20° C in City B imply that City A is twice as warm as City B.

Since the ratio scale data has all the properties of interval data, it is clear that they can only be numeric. Further, arithmetic operations like addition, subtraction, multiplication, division and averaging are all feasible with ratio data. Thus, such data lend themselves to greater manipulation and statistical analysis than do other data considered earlier. To conclude, it is evident that the amount of information in the data varies with the scale of measurement. The nominal data contain the least amount of information, followed by ordinal, interval and ratio data. Most of the statistical methods deal with interval and ratio-scaled data.

IN-TEXT QUESTIONS

8. Which of the following is not a level of measurement?
   a. Nominal b. External c. Ordinal d. Interval
9. Nominal scale is also known as ________________ variable.
   a. Categorical b. Continuous c. Predictor d. Rational
10. ____________ scales are used for labelling variables into distinct classifications.
    a. Nominal b. Ordinal c. Ratio d. Interval
11. ___________ scale has a key requirement that a zero value is inherently defined.

1.5 MEASURE OF CENTRAL TENDENCY

Measure of central tendency describe the location of the centre of a set of data or its average. In our daily life we use average to summarized information such as, we often talk about the average income of the family, average marks in all the subjects, average number of defective products manufacture in a factory, average number of customers visiting a bank, average number of kilometres covered by car per day, average time taken for conveyance from home to office. The average is a specific value of the data around which other values are clustered. Let's us take an example of average weight of students in a class , it can be clearly visualized that most of the students will be clustered around the particular value say 70 kg (average) weight although there will be some students with extreme values (heavy and light weight). The average value is used to represent the entire set of data in consideration (like a class prefect represents the whole class) and is used as benchmark for making comparisons.

The different measures of central tendency or averages are available with some unique differences with respects to their characteristics. These measures are:

1. *Arithmetic mean*
2. *Median*
3. *Mode*
4. *Geometric mean*
5. *Harmonic mean*

The arithmetic, geometric and harmonic mean are called mathematical averages while median and the mode are termed as *positional averages*.

1.5.1 Arithmetic Mean

This is the most commonly used and easy to understand measure of central tendency. The arithmetic mean is obtained by dividing the sum of the observation by the number of observations. This is simply referred to as mean and is represented by $\bar{x}$.

For Ungrouped data: for ungrouped data the formula for arithmetic mean is:

1. **Direct Method**

$$\bar{X} = \frac{1}{n}(X_1 + X_2 + X_3 + X_4 \ldots\ldots + X_n)$$

or

$$\bar{X} = \frac{\Sigma X}{n}$$

where, $\bar{X}$ = mean

ΣX= sum of the observation

n = number of observations

Illustration: The following are the weekly salaries (Rs.) of twelve employees in a company. Calculate the average salary of the employees: 150, 200, 200, 300, 400, 500, 700, 800, 900, 1000.

Solution: $\bar{X} = \frac{1}{n}(X_1 + X_2 + X_3 + X_4 \ldots\ldots + X_n)$

$$= \frac{1}{12}(150 + 200 + 200 + 300 + 400 + 500 + 700 + 800 + 900 + 1000+100+ 400)$$

$$= \frac{1}{12}(5650) = 470.8333$$

2. **Deviation method:** In deviation method first, we take any value (A) as assumed mean. Then deviation (d) is measured by deducting assumed mean (A) from the value (x).
   Next, sum of the deviation is calculated and then we put these values in the formulas given below to obtain the average.

   $$\bar{x} = A + \frac{\Sigma d}{n}$$

   where A is assumed mean and deviations or $d = (X\text{-}A)$

Solving the same above problem with short-cut method.

Computation of Arithmetic Mean

Serial Number	Salary (Rupees) X	Deviations from assumed mean where d = (X-A), A(assumed mean = 500)
1	150	-350
2	200	-300
3	200	-300
4	300	-200
5	400	-100
6	500	0
7	700	200
8	800	300
9	900	400
10	1000	500
11	100	-400
12	400	-100
	N = 12	$\sum D = -350$

$$\bar{x} = A + \frac{\Sigma dx}{n}$$

$$\bar{x} = 500 + \frac{-350}{12} \quad = 500 - 29.17 \qquad = 470.83 \text{ Rupees}$$

For Frequency distribution: For both discrete and continuous frequency distributions mean can be calculated by either of the following method.

There are three methods used to calculate mean.

1. **Direct method**

$\bar{x} = \frac{\Sigma fX}{\Sigma f}$

where f = Frequency

$\bar{x}$ = Mean

Illustration: The following distribution shows the number of computers sold by Apple company in the month of March across its 30 Stores. Find the mean number of computers sold at the stores.

Number of computers sold	5	10	15	20	30	40
Number of Store	12	15	8	19	13	3

Solution:

Number of computers sold (x)	Number of stores (f)	fx
5	12	60
10	15	150
15	8	120
20	19	380
30	13	390
40	3	120
Total	**70**	**1220**

$\bar{x} = \frac{\Sigma fX}{\Sigma f}$

$\bar{x} = \frac{1220}{70} = 17.4286$ computers

Illustration: the following is the marks distribution of students from MBA 1st semester. You are required to find the average performance of the class.

Class Interval (Marks Scored)			Number of Students (f)
0	-	10	13
10	-	20	16
20	-	30	23
30	-	40	24
40	-	50	24
50	-	60	19
60	-	70	11
70	-	80	23
80	-	90	22
90	-	100	25

Solution:

Calculation of average marks of the class

Class Interval (Marks Scored)			Number of Students (f)	X(Mid-point) = [Upper CI +Lower CI)/2]	FX
0	-	10	13	5	65
10	-	20	16	15	240
20	-	30	23	25	575
30	-	40	24	35	840
40	-	50	24	45	1080
50	-	60	19	55	1045
60	-	70	11	65	715
70	-	80	23	75	1725
80	-	90	22	85	1870
90	-	100	25	95	2375
TOTAL			**200**		**10530**

$\bar{x} = \frac{\Sigma fX}{\Sigma f}$

$\bar{x} = \frac{10530}{200}$ = 52.65 marks.

2. **Deviation method:**

Formula $\bar{X} = A + \frac{\Sigma fd}{\Sigma f}$

where A is assumed mean and deviations or *d = (X-A)*

Illustration The weight of national level basketball players is given below in continuous distribution. Find the average weight by using deviation method.

Class Interval (Weight in kg)			Number of basketball players (f)
65	-	70	99
70	-	75	65
75	-	80	91
80	-	85	88
85	-	90	75
90	-	95	88
95	-	100	73
100	-	105	99

Solution

Class Interval (Weight in kg)			Number of basketball players (f)	X	d = X - A	fd
65	-	70	99	67.5	-15	-1485
70	-	75	65	72.5	-10	-650
75	-	80	93	77.5	-5	-465
80	-	85	88	**82.5**	0	0
85	-	90	75	87.5	5	375
90	-	95	88	92.5	10	880
95	-	100	73	97.5	15	1095
100	-	105	99	102.5	20	1980
TOTAL			**680**			**1730**

$$\bar{x} = A + \frac{\Sigma fd}{\Sigma f}$$

$$\bar{x} = 82.5 + \frac{1730}{680} \quad = 82.5 + 2.54 \qquad = 85.044 \text{ kg}$$

3. **Step- deviation method**
   This method is the modified version of deviation method.

   Formula : $\bar{x} = A + \frac{\Sigma fd`}{\Sigma f} \times C$

   Where, A = assumed mean,
   f = frequency
   d` = d/C = (X-A)/C
   c = difference in class interval

Illustration Salary distribution of employee in an organisation is given below. You are required to calculate the mean monthly salary of employees.

Salary (in Rs)			No of employee (f)
0	-	20000	26
20000	-	40000	20
40000	-	60000	29
60000	-	80000	24
80000	-	100000	30
100000	-	120000	20
120000	-	140000	11
140000	-	160000	16
160000	-	180000	14
180000	-	200000	10
Total			**200**

Solution

Calculation of average salary by step deviation method

Salary (in Rs)			No of employee (f)	X	d= X-A	d` = d/C	fd`
0	-	20000	26	10000	-80000	-4	-104
20000	-	40000	20	30000	-60000	-3	-60
40000	-	60000	29	50000	-40000	-2	-58
60000	-	80000	24	70000	-20000	-1	-24
80000	-	100000	30	90000	0	0	0
100000	-	120000	20	110000	20000	1	20
120000	-	140000	11	130000	40000	2	22
140000	-	160000	16	150000	60000	3	48
160000	-	180000	14	170000	80000	4	56
180000	-	200000	10	190000	100000	5	50
Total			**200**				**-50**

$$\bar{x} = A + \frac{\Sigma fd`}{\Sigma f} \times C$$

$$\bar{x} = 90{,}000 + \frac{-50}{200} \times 20000 \quad = 90{,}000 - 5000 = \mathbf{85{,}000}$$

1.5.2 Weighted Arithmetic Mean

The weighted mean is calculated when there is a need for weights to be attached to the different values of the variable. For example, suppose if Mr A buys different numbers of shares of X company at different price.

	No of Shares purchased	Share price (Rs.)
1.	100	35
2.	150	40
3.	200	45
4.	50	50

If we want to know the average price at which the investor purchased the shares of X company than it would be unfair if we calculate the average by direct method (35+40+45+50)/4 = 42.50 Rs.. Here we have not considered the number of shares purchased at each price. Therefore, the ideal mean in such cases is weighted arithmetic mean. The correct average price of the share is given by total amount paid divided by total number of shares brought.

Share price (X)	Number of Shares (weights = W)	Total amount (WX)
35	100	3500
40	150	6000
45	200	9000
50	300	15000

TOTAL	750	33500

$$\bar{x}_w = \frac{\Sigma WX}{\Sigma W}$$

Where , $\bar{x}_w$ = weighted arithmetic mean, W = weightage

$$\bar{x}_w = \frac{\Sigma WX}{\Sigma W} = \frac{33500}{750} = 44.67 \text{ Rs.}$$

Illustration

Comment on the performance of the students of ABC College and XYZ college. The program name, pass percentage and number of students are given below:

	ABC College		XYZ College	
Program	**Pass %**	**Number of Students**	**Pass %**	**Number of Students**
B.Com	72	695	84	371
B.A Economics	67	571	74	447
BMS	75	941	79	340
BBA(FIA)	80	863	83	432
B.Sc Physics	69	780	71	483
B.Sc Mathematics	68	714	80	431

Calculate the simple a weighted arithmetic mean.

Solution

	ABC College			XYZ College		
Program	**Pass %**	**Number of Students**	**WX**	**Pass %**	**Number of Students**	**WX**
B.Com	72	695	50040	65	371	24115
B.A Economics	67	571	38257	74	447	33078
BMS	75	941	70575	58	340	19720
BBA(FIA)	80	863	69040	83	432	35856
B.Sc Physics	69	780	53820	71	483	34293
B.Sc	68	714	48552	80	431	34480

Mathematics						
Total	**431**	**4564**	**330284**	**431**	**2504**	**181542**

Simple Average		**Weighted Average**	
ABC College	=431/6 = 71.83	ABC College	330284/4564 = 72.37
XYZ College	=431/6 = 71.83	XYZ College	181542/ 2504 = 72.50

Properties of Mean

1. The sum of deviations of all the observations from the arithmetic mean is always zero. $\sum(X - \bar{X}) = 0$
2. The sum of squares of deviations from mean is minimum. Therefore, it is also known as least squares measure of central tendency. Symbolically $\sum (X - \bar{X})^2$ = smaller than $\sum (X - \textit{any other value})^2$
3. The combined mean of two or more series can be calculated if their individual means and their sizes are given.

$$\bar{X}_{12} = \frac{N_1\bar{X}_1 + N_2\bar{X}_2}{N_1 + N_2}$$

where $\bar{X}_{12}$ = combined average of two groups,
$\bar{X}_1$ =arithmetic mean of first group,
$\bar{X}_2$ = arithmetic mean of second group,
N1 = number of items of first group, and
N2 = number of items of second group

4. The mean of the sum (or difference) of two or more series of equal sizes is given by the sum (or difference) of their individual means.
5. The arithmetic mean is dependent of the change in origin and scale. If each value of a variable X is increased or decreased or multiplied by a constant k, the arithmetic mean also increases or decreases or multiplies by the same constant.

Illustration : The mean wages paid to 50 employee of ABC ltd. in Delhi's Branch is Rs. 500. And the mean wages paid to 60 employees in Mumbai branch is 800. Calculate the daily average salary paid to all the employee from both Delhi and Mumbai.

Solution

Given: = $N_1 = 50$ $N_2 = 60$ $\bar{X}_1 = 500$ $\bar{X}_1 = 800$

Combined Mean $= \frac{N1\bar{X}1 + N2\bar{X}2}{N1 + N2}$

$$= \frac{50 \times 500 + 60 \times 800}{50 + 60} = \mathbf{664}$$

Thus, the average wages of all the employee taken together is Rs 664 per day

1.5.3 Geometric Mean(GM): The geometric mean is an average which is used for certain specific cases where the quantities required to be averaged are drawn from situations in which they follow exponential law of growth or decline. Example, population growth, compound interest on deposits in bank.
GM is defined as the nth root of the product of n values.

$$\text{GM} = \sqrt{(X1 \times X2 \times X3 \ldots \ldots \ldots \ldots .. \times Xn)}^{1/n}$$

Alternatively ,

$$\text{GM} = \text{Antilog}\,\frac{\Sigma \log X}{n}$$

Illustration: Calculate the GM of the data given below

5	3	4	6	11	5	8	11

Solution: $\text{GM} = \text{Antilog}\,\frac{\Sigma \log X}{n}$

X	LogX
5	0.699
3	0.4771
4	0.6021
6	0.7782
11	1.0414
5	0.699
12	1.0792
10	1
8	0.9031
11	1.0414
Total	8.3205

GM $= \text{Antilog}\,\frac{8.3205}{10}$
$= \text{Antilog } 0.83205$
$= 6.79$

1.5.4 MEDIAN

The median is the middle value when all the observation are arranged in either ascending or descending order. The median divides the group in two equal parts where one part comprises the values greater than median and other part comprises the value smaller than median.

Median = size of $\{\frac{N+1}{2}\}$th item.

Median = [size of $\frac{N}{2}$ th item + size of $\{\frac{N+1}{2}\}$th item]/2

Illustration: Find the median of the following series;

(i)	8	6	14	10	12	12	13	9	
(ii)	15	6	7	12	11	12	13	6	16

Solution:

Computation of median

(i)		(ii)	
Serial No.	**X**	**Serial No.**	**X**
1	6	1	6
2	8	2	6
3	9	3	7
4	10	4	11
5	12	5	12
6	12	6	12
7	13	7	13
8	14	8	15
		9	16
N =8		N=9	

For the series (i): Median = [size of $[\frac{N+1}{2}]$ th item = $\frac{8+1}{2}$th item

$$\frac{\text{size of 4th item} + \text{size of 5th item}}{2}$$

$$\frac{10 + 12}{2}$$

= 11 Ans.

(ii): Median = size of $[\frac{N+1}{2}]$ th item

= $[\frac{9+1}{2}]$ th item size of the 5^{th} item = ***12 Ans***

Calculation of Median in Discrete Series

Steps:

1. Arrange the data set in either ascending or descending order
2. Find the cumulative frequency
3. Median = size of (N+1)/2 th item.
4. Locate median according the size i.e., variable corresponding to the size for next cumulative frequency

Illustration: Following are the number of rooms available in the hotels in Delhi. Find the median number of rooms.

Number of Hotels	65	47	90	31	22	93	84
Number of Rooms	10	12	8	6	12	12	11

Solution

Number of Rooms (X)	Number of Hotels (*f*)	Cumulative Frequency (C*f*)
6	31	31
8	90	121
10	65	186
11	84	270
12	47	317
12	22	339
12	94	433

$$\text{Median} = \text{size of } [\frac{N+1}{2}]\text{th item} = (433+1)/2 = 217^{\text{th}} \text{ item.}$$

The median lies in the cumulative frequency of 270 and the value corresponding to this is 11. Thus, the median number of rooms in hotel in Delhi is 11 rooms.

Calculation of Median in Continuous Series

Steps:

1. Arrange the data set in either descending or ascending order.
2. The confidence interval must be exclusive (if not then convert into exclusive)
3. Calculate the cumulative frequencies
4. Use Median = size of (N)/2 th item to ascertain median class
5. Apply formula of interpolation to ascertain the value of median.

$$\text{Median} = l_1 + \frac{\frac{N}{2} - cfo}{f} \times (l_2 - l_1)$$

Where, *l*1 = lower limit of median class
*l*2 = higher limit of median class
cf_0 = cumulative frequency of previous class
f = frequency of median class.

Illustration: The following is the result of a survey of age distribution of CEO of 300 Companies during the last year. Calculate the median age of the CEOs in corporate.

Age (in years)			No of CEO's
20	-	30	38
30	-	40	42
40	-	50	65
50	-	60	70
60	-	70	50
70	-	80	35

Solution:

Age (in years)			No of CEO's	Cf
20	-	30	38	38
30	-	40	42	80
40	-	50	65	145
50	-	60	70	215
60	-	70	50	265
70	-	80	35	300

$$\text{Median} = l_1 + \frac{\frac{N}{2} - cfo}{f} \times (l_2 - l_1)$$

Median = size of N/2 th item = 300/2 =150 = 150 item.
Accordingly, the mean class interval = 50-60, Thus $l_1 = 50$ and $l_2 = 60$, $cf_0 = 145$

Median $= 50 + \frac{\frac{300}{2} - 145}{70} \times (60 - 50)$

$= 50+0.71$ =***50.71 Ans***

The median age of CEOs in Corporate is 50.51 years

1.5.5 Others Positional Averages

The median divides the series of data into two equal parts. Similar there are some other measures which divide the data set into certain equal parts. There are percentiles, deciles and quartiles.

Symbolically this are given below:

1. **Quartile**
   a. First quartile (Q_1) = Size of (N+1)/4 th item
   b. Second quartile = median = Size of 2(N+1)/4 th item
   c. Third quartile (Q_3) = Size of 3(N+1)/4 th item

2. **Decile**
   a. First decile (D_1) = Size of (N+1)/10 th item
   b. Seventh decile (D_7) = Size of 7(N+1)/10 th item
3. **Percentile**
   a. Three percentiles(P_3) = Size of 3(N+1)/100 th item
   b. Thirty-three percentiles(P_{33}) = Size of 33(N+1)/100 th item

Illustration: From the following data calculate Q1, Q3, D3, P5.

Marks:	Below 20	20-40	40-60	60-80	80-100
Number of students	16	20	44	50	10

Solution:

Age (in years)			No of CEO's	Cf
0	-	20	16	16
20	-	40	20	36
40	-	60	44	80
60	-	80	50	130
80	-	100	30	160
			N = 160	

1. Q_1= size of N/4 th item = 160/4 =40^{th} item
Hence Q_1 lies in the class interval 40-60.

$$Q_1 = l_1 + \frac{\frac{N}{4} - cfo}{f} \times (l_2 - l_1)$$

$l1$ = 40, $l2$ = 60, cf_0 = 36, f = 44

$$Q_1 = 40 + \frac{\frac{160}{4} - 36}{44} \times (60 - 40)$$
$$= 40 + 1.82$$
$$=41.82 \text{ Ans}$$

2. Q_3 = size of 3N/4 th item = 160/4 =120^{th} item
Hence Q_3 lies in the class interval 60-80.

$$Q_1 = l_1 + \frac{\frac{3N}{4} - cfo}{f} \times (l_2 - l_1)$$

$l1$ = 60, $l2$ = 80, cf_0 = 80, f = 50

$$Q_1 = 60 + \frac{\frac{3*160}{4} - 36}{44} \times (60 - 40)$$
$$= 60+3.82 = \mathbf{\textit{63.82 Ans}}$$

3. D_3= size of 3N/10 th item = 3*160/10 =48^{th} item
Hence D_3 lies in the class interval 40-60.

$$D_3 = l_1 + \frac{\frac{3N}{10} - cfo}{f} \times (l_2 - l_1)$$

$l1 = 40$, $l2 = 60$, $cf_0 = 36$, $f = 44$

$$Q_1 = 40 + \frac{\frac{3*160}{10} - 36}{44} \times (60 - 40)$$

$$= 40 + 5.45 = \textbf{\textit{45.45 Ans}}$$

4. P_5= size of 5N/100 th item = 5*160/100 =8[th] item
Hence P_5 lies in the class interval 20-40.

$$Q_1 = l_1 + \frac{\frac{5N}{100} - cfo}{f} \times (l_2 - l_1)$$

$l1 = 20$, $l2 = 40$, $cf_0 = 0$, $f = 16$

$$P_5 = 20 + \frac{\frac{5*160}{100} - 0}{16} \times (60 - 40)$$
$$= 20 + 10$$
$$= \textbf{\textit{30 Ans}}$$

1.5.6 Missing Frequency

Illustration: The frequency distribution of profit earned by 150 companies is given below.

Profit (in lakhs)	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Number of companies(in ,000)	8	15	?	12	?	33	19	17

However, the median is known to be **57**

Solution: Lets, assume missing frequency for class interval 30-40 = x , and 50-60 = y

Calculation of Missing Frequency

Age (in years)	No of CEO's	Cf
10 - 20	8	8
20 - 30	15	23
30 - 40	**X**	23+x
40 - 50	12	35+x
50 - 60	**y**	35+x+y
60 - 70	33	68+x+y
70 - 80	19	87+x+y
80 - 90	17	104+x+y
	N= 104+x+y	

From the above table N = Σf = 104+x+y = 150
Therefore, x + y = 150-104
x + y = 46…………………………..equation 1

The Median 57 given lies between the class interval of 50-60.

$l1 = 50$, $l2 = 60$, $cf_0 = 35 + x$, $f = y$

By using the median formula:

$$\text{Median} = l_1 + \frac{\frac{N}{2} - cfo}{f} \times (l_2 - l_1)$$

$$57 = 50 + \frac{\frac{150}{2} - (35+x)}{y} \times (60 - 50)$$

$$57 = 50 + \frac{75-(35+x)}{y} \times 10$$

$$5.7 = 5 + \frac{75-(35+x)}{y} \text{ (Divide by 10)}$$

$$5.7\text{-}5 = \frac{75-(35+x)}{y}$$

$$0.7y = 40\text{-}x$$

$$y = \frac{40-x}{0.7} \text{ ………………. Equation 2}$$

put the value of y in equation 1

$$x + y = 46$$

$$x + \frac{40-x}{0.7} = 46$$

$$\frac{0.7x+40-x}{0.7} = 46$$

$$-0.3x = 32.2 - 40$$

$x = 7.8 / .3$ ***x = 26***

for the value of y, put value x in the equation 1

$x + y = 46$
$y = 46 – x$
$y = 46 – 26$

y = 20 Ans

1.5.7 MODE

The mode is that value of the variable which occurs maximum number of times. The common examples are common size shoes sold at store individual visiting museum, number of weights of a male and female etc. In the continuous frequency distribution, mode is defined as that value of the variable where there is densest concentration of observation. The value of mode is denoted by the alphabet z.

Illustration: Calculate mode from the following data:

Roll Number	1	2	3	4	5	6	7	8	9	10
Marks scored	74	80	55	80	90	74	90	78	30	74

Solution

Calculation of Mode

Marks (X)	Number of Students (f)
30	1
55	1
74	3
78	1
80	2
90	2

The mode (z) here is 74 which occurs most frequently (3 times which is maximum)

Mode in continuous frequency distribution

Formula: Mode (z) $= l_1 + \frac{f1-fo}{2f1-f0-f2} \times (l_2 - l_1)$

l_1 = lower limit of the class, where mode lies.
l_2 = upper limit of the class, where mode lies.
f_0 = frequency of the class proceeding the modal class.
f_1 = frequency of the class, where mode lies.
f_2 = frequency of the class succeeding the modal class.

Example 29 : Calculate modal age of employee in ZYZ Limited. the following frequency distribution is given below.

Calculation of Mode

Age			Number of Employee
0	-	20	30
20	-	40	50
40	-	60	30
60	-	80	25
80	-	100	20

Here the maximum frequency is 50 and its corresponding class interval is 20 - 40

$l_1 = 20$ $l_2 = 40$ $f_0 = 30$ $f_1 = 50$ $f_2 = 30$

Mode (z) $= l_1 + \frac{f1-fo}{2f1-f0-f2} \times (l_2 - l_1)$

Mode (z) $= 20 + \frac{50-30}{2*50-30-30} \times (40 - 20)$

$= 20 + \frac{20}{100-60} \times 20$

$= 20 + 0.5 \times 20$ $= 20+10$

The model age of entrepreneur = 30 years

1.6 SUMMARY

- Qualitative variables are used to identify, categorize or rank the elements
- Quantitative variables can be expressed in number and objectively measured. They may be discrete or continuous.
- The scales used for collecting data may be nominal, ordinal, interval and ratio.
- The nominal scale is the lowest-level and the ratio scale is the highest-level scale of measurement.
- The central tendency indicates the location of the centre of a set of data. It is the average value.
- Mathematical averages can be *simple* or *weighted* and used accordingly as all values enjoy an equal or unequal weightage.
- Geometric mean, which is *n*th root of the product of *n* values, is basically used to obtain population growth, compounded interest rates, price changes etc.

- Median divides the series into two equal parts, similarly quartile divides the series in four equal parts, decile into 10 and percentile into 100 equal parts.
- Mode is defined as the value occurring most frequently in series of items and around which the other items are distributed most densely.

1.7 ANSWERS TO IN-TEXT QUESTIONS

1. Qualitative data 2. Quantitative data 3. Quantitative data 4. Quantitative data 5. Quantitative data 6. Quantitative data 7. Qualitative data	8. External 9. Categorical 10. Nominal 11. Ratio

1.8 SELF-ASSESSMENT QUESTIONS

1. Define data? Explain the difference between qualitative and quantitative data.
2. Explain the various scale of measurement of data.
3. State whether the following random variable are qualitative or quantitative data:
   a. Number of calls made by a call centre daily
   b. Litre of water consumed.
   c. T-shirt size (Large Medium & Small)
   d. Quality of food (Good, Average and Poor)
   e. Annual turnover of companies (in Rs)
   f. City of customer.
   g. Family size
   h. Name of 4 programs offered in college
   i. Number of students in a college
   j. Temperature in Degree Celsius
   k. Rank of employee in a company (Manager, Clerk, Office Assistance etc)

   Ans a) Ratio, b) Ratio, c)Ordinal, d)Ordinal, e) Ratio, f) Nominal, g)Ratio, h) Nominal, i) Ratio, j)Interval, k) Ordinal,

4. Define Average? Discuss the desirable properties of a good measure of central tendency.
5. "An average is a number indicating the central value of a group of observations." How far is it true for mean, median and mode? Give illustrations.

A cab ride in Mumbai costs Rs. 20 for the first one kilometre and thereafter it cost Rs. 11 per kilometre. Let's assume that the cost of each kilometre is incurred at the beginning of the kilometre. The waiting charges are Rs. 30 per hour or a part thereof, subject to a minimum of 15 minutes stay. Calculate the effective average cost per kilometre to a customer who rides a taxi from the Airport to hotel which is 21.7 kilometres away and chooses to stay for a coffee for 25 minutes on the way. ***(Ans12.14 kms)***

6. Define median, quartiles, deciles and percentiles with a suitable example.
7. Find The arithmetic mean of a distribution given below:

CI	10-20	20-30	30-40	40-50	50-60	60-70	70-80
F	12	20	8	15	30	35	25

(Ans 51.28)

8. 500 bulbs were installed government on the streets of Delhi. The failure over the period was also observed and recorded as below

End of week :	1	2	3	4	5	6	7
No. of failures :	12	40	108	242	346	428	500

You are required to calculate the mean life of bulb. (***Ans 4.15***)

9. A factory in Delhi employs 100 workers. The mean daily wages of 99 of these workers is Rs. 85 while the wages of the 100th worker are Rs. 99 more than the mean wages of all the workers. Obtain mean wages of the workers of the factory. ***(Ans. 86)***

10. The following data gives the distribution of rainfall in Delhi over the weekdays of the last month:

Days:	Sun	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
Average rainfall in mm	26	16	12	10	8	10	8

Over the particular month there were 5 Monday & 5 Tuesday. Calculate the mean rainfall per day. ***(Ans 14.27)***

11. A survey of 350 banks in a Mumbai provides the following information :

No. of branches:	0	1	2	3	4or more
No. of banks :	13	94	146	67	30

Find the median number of branches in the families. ***(Ans 2)***

12. Find the missing frequency in the distribution given below. N = 50 and median = 30

Marks	0-10	10-20	20-30	30-40	40-50	50-60
Number of Students	10	?	25	30	?	10

(Ans 15 and 10)

13. ABC limited runs a hotel, the number of customers over the past 20 days is given below:

7	6	13	16	8	5	9	9	10	19
16	8	11	13	7	24	22	15	21	21

Find the Q_1, Q_3, 2^{nd} Decile, 50^{th}, 75^{th} and 88^{th} percentiles.

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STATISTICS FOR BUSINESS DECISIONS

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STRUCTURE

2.1 LEARNING OBJECTIVES

The purpose of this lesson is to

1. Impart knowledge about dispersion measurements. On the basis of which reliability of measure can be assessed by facilitating variability measurement.
2. Serves as the foundation for many other statistical measurements, including skewness, to enable the students to distinguish between average, dispersion, skewness and kurtosis.
3. Facilitate knowledge about Box and Whisker plot and Big data.

2.2 INTRODUCTION

This chapter facilitate an overview of the notion of variability. Variability (also called diversity, uncertainty, dispersion, and spread) is the extent to which data values differ from one another. A measure of variability shows how closely the data values typically are to this central size measure, even though measures of center (like the average, median, or mode) indicate the typical size of the data values. The variability is zero if all the data values are the same. The variability increases with how dispersed things are. In statistics, measures of dispersion aid in analyzing data variability, i.e. trying to ascertain how homogeneous or heterogeneous the inferences are. Basic sense, it indicates how closely or broadly the variable is squeezed or distributed. The traditional choice for measuring variability is the standard deviation, which summarizes the usual separation between the average and a data value. The standard deviation reveals the degree to which individuals deviate from the mean. The deviations measure how far each data value is from the average. Individuals who are positive deviations are above average, and those who are negative deviations are below average. This chapter describes the concepts of positional measures of dispersion, averaging deviation and Lorenz curve. We go into great detail about rescaling the data and how to interpret the range, mean deviation and standard deviation for a normal distribution.

2.3 Meaning and Definition of Dispersion

The numerous measures of central value result in a single statistic that represents all of the data. However, unless all of the observations are the same, the average cannot adequately describe a set of observations. Similarly, the central value of two or more distributions may be the same, but there may be significant differences in the distribution's formation. Since we can not provide the full information about frequency distribution and/or magnitude of the series on the basis of average, the concept of dispersion uses for the solving these problems.

Dispersion measures aid in the inquiry of this important feature of a distribution.

Some important definitions of dispersion are:

1. "Dispersion is the measure of the variation of the items."

-A.L. Bowley

2. "The degree to which numerical data tend to spread about an average value is called the variation of dispersion of the data."

-Spiegel

3. Dispersion or spread is the degree of the scatter or variation of the variable about a central value."

-Brooks & Dick

4. "The measurement of the scatterness of the mass of figures in a series about an average is called measure of variation or dispersion."

-Simpson & Kajka

It is clear from the aforementioned that dispersion (also defined as scatter, spread, or variation) measures how far items deviate from certain central value. Measures of dispersion are also known as average values of the second order because they provide an average of the variations of different items from an average. When dispersion is considered, an average becomes more meaningful. For instance, if the average wage of factory A workers is Rs. 4200 and that of factory B workers is Rs. 4000, we cannot necessarily conclude that factory A workers are better off because wage distribution in factory A may be much more dispersed.

The study of dispersion is remarkably important and effective, as demonstrated by the following example:

STATISTICAL SERIES

	A	B	C
	30	20	50
	30	10	40
	30	10	25
	30	30	05
	30	80	30
TOTAL	150	150	150
AVERAGE	30	30	30

Since the arithmetic mean is the same in all the three series, it is reasonable to conclude that these series are similar in nature. However, a close examination reveals that their distributions differ. They vary significantly from one another. In series A, the arithmetic mean perfectly represents each and every item, or in other words, none of the items in series A deviate from the arithmetic mean, and thus there is no dispersion.

Though the mean in series 'B' is 30, the series' formation is different. The lowest value in this case is 10 and the maximum value is 80. The lowest value is 140 less than the mean, while the maximum value is 70 greater than the mean. Further, dispersion is much significantly larger in series C than in series B, where the lowest value is less than 145 from the mean and the highest value is greater than 100 from the mean.

2.3.1 Absolute and Relative Dispersion

Dispersion can be expressed in two ways: absolute measurement and relative measurement. Absolute measurement occurs when the dispersion is calculated in terms of the original units of a series. Absolute measures, for example, are dispersion in income expressed in Rs., dispersion in weight expressed in Kg., and dispersion in age expressed in years. The major drawback of this measurement is that it cannot be used to compare two or more series. As a result, relative measurement in the form of ratios or percentages is used for comparison purposes. This is known as the "Coefficient of Dispersion."

2.3.2 Significance of Dispersion

The following objectives are functioned by the measurement of dispersion or variation measures:

1.Assess the reliability of average The reliability of average can be evaluated or it can be decided whether or not an average is representative of the series based on the measure of dispersion. If there is little dispersion, the average is appropriately ant the series. On the other hand, the average may not be considered a true representative of the data if dispersion is high, and it may even be quite unreliable.

2.Facilitate the comparison of the variability of two series The degree of variations between two or more series can be diminished using dispersion. The consistency or uniformity values of the variable are inversely proportional to the degree of variability. On the other hand, uniformity or consistency would be implied by a low level of variability.

3.To regulate variability Dispersion is also measured in order to control the variation itself. For example, a country needs to measure the degree of variation of inequality in its wealth and income distributions in order to control it.

4.Act as foundation for further statistical measurement Dispersion measurements are also used as the foundation for a number of other statistical measurements, including skewness, correlation, regression, quality control, etc.

Thus, it is evident that measures of dispersion are crucial for determining the nature of a set of data and that these measurements significantly influence a number of other statistical techniques and measurements.

2.3.3 Prerequisite of Measure of Dispersion

The following characteristics should be prevalent in an ideal measure of dispersion

(1) It should be clearly defined.

(2) It should be simple to calculate and understand.

(3) It should be founded on every component of the series.

(4) It should be amenable to additional mathematical analysis.

(5) It should be least impacted by variations in sampling, according to

(6) The extreme observations shouldn't have a big impact on it.

1.4 MEASURES OF DISPERSION

The various measures of dispersion are as follows

(A) Methods of Limits or Positional Measures of Dispersion

(1) Range

(2) Inter-Quartile Range

(3) Percentile Range

(B) Methods of Averaging Deviations or Calculation of Measures of Dispersion

(4) Quartile Deviation

(6) Standard Deviation

2.4.1 Methods of Limits or Positional Measures of Dispersion

2.4.1.1 Range

The range is the easiest measure of dispersion since it is the difference between the maximum and minimum value of data.

RANGE= $X_{MAXIMUM}$ - $X_{MINIMUM}$

Coefficient of Range= $\frac{MAX-MIN}{MAX+MIN}$

Range in Individual Series

Illustration 1

Let's consider two varieties of tea – Y & Z with different yields.

Tea Y and Z have the following yields for a period of six months:

Months	Y	Z
July	36	58
August	31	42
September	32	33
October	34	29
November	30	50
December	33	20

To know the spread of each variety of tea, Find out its range and coefficient of range.

Solution:

Since in category Y tea the maximum value is 36 and minimum value is 30 then,

Range= $X_{MAXIMUM}$ - $X_{MINIMUM}$

Range= 36-30=6

Coefficient of Range= $\frac{36-30}{36+30}$ **= 0.09**

Further, in category Z tea the maximum value is 58 and minimum value is 20 then,

Range= 58-20=38

Coefficient of Range= $\frac{58-20}{58+20}$ **= 0.487**

As previously stated, the greater the range, the greater the data spread. Thus, Y has a lower range. It means it has less scattered data or a more homogeneous data set has a higher range. It represents a highly scattered data set or a more heterogeneous data set.

Therefore, X has a lower spread than Y. Lower spread means better yield, and a higher spread represents lower yield. Hence, higher dispersion in data means lesser returns, and lower dispersion in the data set means higher returns.

Range in Discrete Series

Under this series range is calculate on the basis of smallest and largest values irrespective of frequencies.

Illustration 2

Find out the Range and Coefficient of Range in the given distribution:

X	6	8	12	14	4
F	10	9	13	12	10

Solution:

In this series the smallest value is 4 and largest value is 14. So,

Range= $X_{MAXIMUM}$ - $X_{MINIMUM}$

Range= 14-4 =10

$$\textbf{Coefficient of Range}= \frac{14-4}{14+4} = 0.556$$

Range in Continuous Series

Illustration 3

Find the range for the following frequency distribution:

Size of Item	**Frequency**
10- 20	7
20- 40	11
40- 60	30
60-80	17
80-100	5
Total	70

Solution

Here, the upper limit of the highest class is 100 and the lower limit of the lowest class is 10.

Hence, the range is 100-10 = 90. Note that the range is not influenced by the frequencies. Symbolically, the range is calculated by the formula L - S, where L is the largest value and S is the smallest value in a distribution.

$$\textbf{Coefficient of Range}= \frac{100-10}{100+10} = 0.82$$

Merit of Range

1.Range is the easiest to understand and compute.

2.It is rigidly defined.

3.Range provides a broad picture of the data in which all of the items occur within the limits.

LIMITATIONS OF RANGE

There are some range limitations, which are as follows

1. It is based on only two items and doesn't encompass the entire distribution.

2. It varies greatly from to sample to sample centered on the same population.

3. It provides no information about the distribution pattern.

4. At last, in the particular instance of open-ended distributions, the range cannot be computed.

Despite these limitations, the range is largely used in scenarios where a quick understanding of the variability or a set of data is required. Whenever the sample size is small, the range is regarded as an adequate measure of variability. As a result, is extensively used in quality control in which a continuous inspection on the variability of raw materials is required. Materials or finished goods are required. The range is also an appropriate measure in forecast of the weather The meteorological department makes use of the range by providing the maximum and minimum temperatures This information is extremely beneficial to the common man, because he is aware of the extent to which temperature can vary on a daily basis on a particular day.

2.4.1.2 INTERQUARTILE RANGE

The interquartile range or the quartile deviation is a better measure of variation in a distribution than the range. Here, avoiding the 25 percent of the distribution at both the ends uses the middle 50 percent of the distribution. In other words, the interquartile range denotes the difference between the third quartile and the first quartile. Symbolically, interquartile range = $Q_3 - Q_1$

Many times, the interquartile range is reduced in the form of semi-interquartile range or quartile deviation as shown below:

Semi interquartile range or Quartile deviation = $(Q_3 - Q_1)/2$

When quartile deviation is small, it means that there is a small deviation in the central 50 percent items. In contrast, if the quartile deviation is high, it shows that the central 50 percent items have a large variation. It may be noted that in a symmetrical distribution, the two quartiles, that is, Q_3 and Q_1 are equidistant from the median.

Symbolically, $M - Q_1 = Q_3 - M$

However, this is seldom the case as most of the business and economic data are asymmetrical. But, one can assume that approximately 50 percent of the observations are contained in the interquartile range. It may be noted that interquartile range is an absolute measure of dispersion. It can be changed into a relative measure of dispersion as follows:

Coefficient of QD $\frac{Q3 - Q1}{Q3 + Q1}$

C.I.	f	c.f.
0-10	5	5
10-20	3	8
20-30	7	15
30-40	5	20
40-50	5	25
50-60	5	30
60-70	3	33

As, the value of Q1 and Q3 denotes middle 50% portion it is not affected by extreme values and proved superior than range. But in the contrast, it is not based on all the observation. Moreover, it is not capable for further algebraic treatment as influenced by sampling fluctuation.

2.4.1.3 Percentile Range

It represents the difference between 90^{th} percentile (P_{90}) and 10^{th} Percentile (P_{10}).It is considered better than range and inter quartile range because it is not influenced by extreme values and covers the middle 80% values.

Illustration 4

From the following data find out inter-quartile range and percentile range

Wages (less than)	10	20	30	40	50	60	70
No. of workers	5	8	15	20	25	30	33

Solution:

$Q_1 \frac{N}{4} = \frac{33}{4} = 8.25th\ item$

$Q1 = L_1 + \frac{i}{f}(q_1 - C)$

$Q1 = 20 + \frac{10}{7}(8.25 - 8)$

$= 20 + \frac{10}{7} X .25$

$= \mathbf{20.35}$

$Q_3 = \frac{N X 3}{4} = \frac{33 X 3}{4} = 24.75th$ item

$Q_3 = L_1 + \frac{i}{f}(q_3 - C)$

$=40 + \frac{5}{5}(24.75 - 20) =44.75$

Inter-Quartile Range = Q_3- Q_1 = 44.75 – 20.35 = **24.4**

$P_{10} = \frac{N\,X\,10}{100} = \frac{33\,X\,10}{100} = 3.3th$ item

$P_{10} = L_1 + \frac{i}{f}(P_{10} - C) = 0 + \frac{10}{5}(3.3 - 0) = 6.6$

$P_{90} = \frac{N\,X\,90}{100} = \frac{33\,X\,90}{100} = 29.7th$ item

$P_{90} = L_1 + \frac{i}{f}(P_{90} - C) = 50 + \frac{10}{5}(29.7 - 25) = 59.4$

Percentile Range = $\mathbf{P_{90}} - \boldsymbol{P_{10}}$ = 59.4-6.6 =**52.8**

2.4.2 Methods of Averaging Deviations or Calculation of Measures of Dispersion

2.4.2 .1 Quartile Deviation

The importance of dispersion measurement by range method is only given to extreme values. To overcome this limitation, the Quartile Deviation measure has been developed.

This metric is based on the first and third quartiles (Q1). Mills defines quartile deviation as "the semi-interquartile range, half the distance along the scale between the first and third quartiles." In layman's terms, quartile Deviation (Q. D.) is half the difference between Q_3 and Q_1 in a series, and it is also known as Semi-interquartile range.

Calculation

The method for calculating Q. D. is very simple. We simply compute the values of the third or upper quartile (Q_3) and the first or lower quartile (Q_1), and then use the following formula for absolute and relative measurements.

$$\boldsymbol{Quartile\ Deviation = \frac{Q_3 - Q_1}{2}}$$

$$\boldsymbol{Coefficient\ of\ Q.D. = \frac{Q_3 - Q_1}{Q_3 + Q_1}}$$

MERITS OF QUARTILE DEVIATION

The following merits are entertained by quartile deviation:

1. As compared to range, it is considered a superior measure of dispersion.

2. In the case of open-ended distribution, it is quite suitable.

3. Since it is not influenced by the extreme values in a distribution, it is particularly suitable in highly skewed or erratic distributions.

LIMITATIONS OF QUARTILE DEVIATION

1. Like the range, it fails to cover all the items in a distribution.

2. It is not amenable to mathematical manipulation.

3. It varies widely from sample to sample based on the same population.

4. Since it is a positional average, it is not considered as a measure of dispersion. It merely shows a distance on scale and not a scatter around an average.

In view of the above-mentioned limitations, the interquartile range or the quartile deviation has a limited practical utility.

Q.D. in individual series

Illustration 5

Calculate Quartile Deviation and its coefficient from the following data:

10 20 21 22 23 24 25

Solution

$Q_1 = \frac{N+1}{4}$th item $= \frac{7+1}{4} = 2nd$ item = 20

$Q_3 = \frac{3(N+1)}{4}$th item $= \frac{3(7+1)}{4} = 6th$ item = 24

$$\boldsymbol{Quartile\ Deviation = \frac{24-20}{2} = 2}$$

$$\boldsymbol{Coefficient\ of\ Q.D. = \frac{24-20}{24+20} = 0.0909}$$

Illustration 6

Compare the following two series of data in regard of their dispersion by Quartile Method

Height (Cm.)	150	155	145	140	163	130	120	100	135
No. of Students	**58**	**56**	**63**	**61**	**62**	**65**	**55**	**66**	**54**

Solution

Firstly, items need to arrange in ascending order

Sr. No.	**Height (Cm.)**	**No. of Students**
1	100	54
2	120	55
3	130	56

4	135	58
5	140	61
6	145	62
7	150	63
8	155	65
9	163	66

Height

$Q_1 = \frac{N+1}{4}$th item $= \frac{9+1}{4} = 2.5th$ item

$2.5th$ item= 2^{nd} term +.5 (3^{rd} term-2^{nd} term)

=120+.5(130-120)

=120+.5 X10 =**125**

$Q_3 = \frac{3(N+1)}{4}$th item $= \frac{3(9+1)}{4} = 7.5th$ item

$7.5th$ item= 7^{th} term+.5(8^{th} term – 7^{th} term)

150+.5(155-150)

150+2.5= **152.5**

$$\boldsymbol{Coefficient\ of\ Q.D.} = \frac{152.5-125}{152.5+125}$$

$$= \frac{27.5}{277.5} = \mathbf{0.099}$$

Weight

$Q_1 = \frac{N+1}{4}$th item $= \frac{9+1}{4} = 2.5th$ item

$2.5th$ item= 2^{nd} term +.5 (3^{rd} term-2^{nd} term)

=55+ .5(56-55)

= 55+.5(1) = **55.5**

$Q_3 = \frac{3(N+1)}{4}$th item $= \frac{3(9+1)}{4} = 7.5th$ item

$7.5th$ item= 7^{th} term+.5(8^{th} term – 7^{th} term)

= 63+.5(65-63)

=64

$$\boldsymbol{Coefficient\ of\ Q.D.} = \frac{64-55.5}{64+55.5}$$

$$= \frac{8.5}{119.5} = \mathbf{0.071}$$

Remark: There is more variability in height as compared to weight.

Q.D. in Discrete series

Illustration 7

Calculate Q.D. and its coefficient from the following observation:

Height (Cm.)	145	146	147	148	149	150	151	152	153	154
No. of Students	15	20	32	35	33	22	20	10	8	4

Solution

Height (Cm.)	f	$c.f.$
145	15	15
146	20	35
147	32	67
148	35	102
149	33	135
150	22	157
151	20	177
152	10	187
153	8	195
154	4	199

$Q_1 = \frac{N+1}{4}$th item $= \frac{199+1}{4} = 50th$ item

$50th$ item exists in $c.f.$ 67, So, Q_1=147

$Q_3 = \frac{3(N+1)}{4}$th item $= \frac{3(199+1)}{4} = 150th$ item

$150th$ item lies in $c.f.$ 157, So, Q_3=150

$Quartile\ Deviation = \frac{150-147}{2} = \mathbf{1.5}$

$Coefficient\ of\ Q.D. = \frac{150-147}{150+147} = \frac{3}{297} = \mathbf{0.1}$

Q.D. in Continuous series

Illustration 8

Calculate Q.D. and its coefficient from the following observation:

Weight (Kgs)	0-10	10-20	20-30	30-40	40-50
No. of Students	4	15	28	16	7

Solution

Weight (Kgs)	f	$c.f.$
0-10	4	4
10-20	15	19
20-30	28	47
30-40	16	63
40-50	7	70

Q1 $= \frac{N}{4}$th item $= \frac{70}{4} = 17.5th$ item

Q1 17.5 lies in $\boldsymbol{c.f.}$ **19, So by applying the** applying the

formula in class 10-20

$$Q1 = L_1 + \frac{i}{f}(q_1 - C)$$

$$= 10 + \frac{10}{15}(17.5 - 5)$$

$$= 10 + \frac{10}{15}(13.5) = 19$$

Q3 $= \frac{3(N)}{4}$th item $= \frac{3(70)}{4} = 52.5th$ item

Q3 52.5 lies in $c.f.$ 63, So by applying the

formula in class 30-40

$$Q_3 = L_1 + \frac{i}{f}(q_3 - C)$$

$$= 30 + \frac{10}{16}(52.5 - 47)$$

$= 30 + \frac{10}{16} \times 5.5$= 30+3.44=**33.44**

$$\boldsymbol{Quartile\ Deviation} = \frac{\boldsymbol{Q_3 - Q_1}}{\boldsymbol{2}} = \frac{\boldsymbol{33.44 - 19}}{\boldsymbol{2}} = \boldsymbol{7.22}$$

Coefficient of Q.D. $= \frac{\boldsymbol{3.44 - 19}}{\boldsymbol{3.44 + 19}} = \frac{14.44}{52.44} = \boldsymbol{0.2754}$

2.4.2.2 MEAN DEVIATION

Mean Deviation is also known as 'Average Deviation' or 'First Moment of Dispersion'. It is the arithmetic average of the deviation of various items from a measure of central tendency (either Mean, Median or Mode). As the name implies, it is the average of absolute amounts by which the individual items deviate from the mean. Since the positive deviations from the mean are equal to the negative deviations, while computing the mean deviation, we ignore positive and negative signs. Symbolically,

$$\boldsymbol{M.D.} = \frac{\boldsymbol{\sum|d\bar{x}|}}{\boldsymbol{N}}$$

OR

$$\boldsymbol{M.D.} = \frac{\boldsymbol{\sum|d\bar{m}|}}{\boldsymbol{N}}$$

Where, MD = mean deviation, $|\ d\bar{x}|$ = deviation of an item from the mean ignoring positive and negative signs, N = the total number of observations

"The Mean Deviation of a series of magnitudes is the arithmetic mean of their deviations from an average value, either Mean or Median." -**Mills**

"Average deviation is the average amount of scatter of the items in a distribution from either the mean or the median, ignoring signs of the deviations. The average that is taken of the scatter is an arithmetic which accounts for the fact that this measure is often called the Mean Deviation."

-Clark and Schakade

Precautions in the Calculation of Mean Deviation (M.D.)

The following factors should be taken into account while calculating M.D.

1. In theory, M.D. can be calculated using deviations from any one of the three averages, namely Mean, Median, or Mode. However, mode is rarely used in practice because its value is frequently uncertain and indeterminate. The median is supposed to be better than the mean because M.D. is the smallest while calculated from the median. However, because mean is widely used in statistics as a measurement of central tendency, mean deviation is commonly computed from mean. In this case, the question may contain instructions. If the question contains no instructions, the median should be used.
2. The algebraic signs (plus or minus) are neglected while taking deviations for M.D., and all deviations are taken as positive. In this case, the sign of deviation 'd' is positioned between two vertical bars known as modulus, i.e., |d|.
3. To compute the coefficient of M.D., divide the absolute measure (M.D.) by the average through which deviations were acquired.

MERITS OF MEAN DEVIATION

1. A major advantage of mean deviation is that it is simple to understand and easy to calculate.
2. It takes into consideration each and every item in the distribution. As a result, a change in the value of any item will have its effect on the magnitude of mean deviation.
3. The values of extreme items have less effect on the value of the mean deviation.
4. As deviations are taken from a central value, it is possible to have meaningful comparisons of the formation of different distributions.

LIMITATIONS OF MEAN DEVIATION

1. It is not capable of further algebraic treatment.
2. At times it may fail to give accurate results. The mean deviation gives best results when deviations are taken from the median instead of from the mean. But in a series, which has wide variations in the items, median is not a satisfactory measure.

3. Strictly on mathematical considerations, the method is wrong as it ignores the algebraic signs when the deviations are taken from the mean. In view of these limitations, it is seldom used in business studies. A better measure known as the standard deviation is more frequently used.

Mean Deviation in individual Series

Illustration 9

Calculate Mean Deviation and its coefficient from mean and median for the given data:

200	**210**	**220**	**225**	**225**	**235**	**240**	**260**	**270**	**295**

Price(X)	**Deviation from Mean (from 238) $d\bar{x}$**	**Deviation from Median (from 230) $\lvert d\bar{m} \rvert$**
200	28	20
210	18	10
220	13	5
225	13	5
225	13	5
235	3	5
240	2	10
260	12	20
270	32	40
295	42	50

$$Mean\ (\bar{X}) = \frac{\sum X}{N} = \frac{2380}{10} = \mathbf{238}$$

Median (M) = Value of $(\frac{N+1}{2})$th Item = $((\frac{10+1}{2})$th item

=Value of 5.5th item = $\frac{225+235}{2}$ = **230**

$$M.D. = \frac{\sum|d\bar{x}|}{N}$$

$$= \frac{176}{10} = \mathbf{17.6}$$

Coefficient of M.D. = $\frac{M.D.}{\bar{X}}$

$$= \frac{17.6}{238} = \mathbf{.074}$$

$$M.D. = \frac{\sum|d\bar{m}|}{N}$$

$$= \frac{170}{10} = \mathbf{17}$$

Coefficient of M.D. = $\frac{M.D.}{\bar{m}}$

$$= \frac{\mathbf{17}}{\mathbf{230}} = \mathbf{.074}$$

Short Cut Method

The process of calculation of M.D. as follows:

On the basis of Mean

Firstly, mean $\bar{X}$of the series is calculated. Further, the sum of values greater than mean ($\sum X_A$) and the sum of values less than mean ($\sum X_B$) are obtained. Furthermore, number of items greater than mean N_A and number of items less than mean N_B are obtained. Then, M.D. is calculated by applying the given formula:

$$M.D.(Mean) = \frac{\sum X_A - \sum X_B - (N_A - N_B)\bar{X}}{N}$$

On the basis of Median

Firstly, the items are arranged in ascending order and the value of median is find out. Further, the sum of values greater than median ($\sum X_A$) and the sum of values less than median ($\sum X_B$) are obtained. Then, M.D. is calculated by applying the given formula:

$$M.D.(Median) = \frac{\sum X_A - \sum X_B}{N}$$

Mean Deviation in Discrete Series

Illustration 10

Calculate Mean Deviation and its coefficient of mean deviation from the given data:

X	10	15	20	30	40	50
f	8	12	15	10	3	2

Solution:

X	f	fX	$\lvert d\bar{x}\rvert$ **from 21.6**	$f\lvert d\bar{x}\rvert$
10	8	80	11.6	92.8
15	12	180	6.6	79.2
20	15	300	1.6	24.0
30	10	300	8.4	84.0
40	3	120	18.4	55.2
50	2	100	28.4	56.8
N=50		**=1080**		**392.0**

$\bar{X} = \frac{\sum fX}{N} = \frac{1080}{50}$= **21.6**

$$M.D. = \frac{\sum f|d\bar{x}|}{N} = \frac{392}{50} = \mathbf{7.84}$$

Coefficient of M.D.= $\frac{M.D.}{Mean} = \frac{7.84}{21.6} = \mathbf{0.363}$

Mean Deviation in Continuous Series

Illustration 11

Calculate the Mean Deviation from the Mean and Median from the following observation along with coefficient:

Class Interval	0-20	20-40	40-60	60-80	80-100
f	30	5	6	4	2

Solution:

C.I.	**M.V.**	***f***	**dx from A= 50**	**fdx**	**$\lvert d\bar{x}\rvert$ from**	**$f\lvert d\bar{x}\rvert$**
0-20	10	3	-40	-120	20	60
20-40	30	5	-20	-100	0	0
40-60	50	6	0	0	20	120
60-80	70	4	40	160	40	160
80-100	90	2	20	40	60	120
	N=20			**-20**		**460**

$\bar{X} = A + \frac{\sum fdx}{N} \times i = 50 + \frac{-20}{20} \times 20 = 50 - 20 = 30$

$$M.D. = \frac{\sum f|d\bar{x}|}{N} = \frac{460}{20} = \mathbf{23}$$

Coefficient of M.D.= $\frac{M.D.}{Mean} = \frac{23}{30} = \mathbf{0.767}$

2.4.2.3 STANDARD DEVIATION

Standard deviation (S.D.) is an ideal, scientific and most popular measure of the dispersion. It was first used by Karl Pearson in the year 1893. As a definition "Standard Deviation is the square root of the arithmetic mean of the squares of deviations of items from their arithmetic mean." Standard deviation can also be defined as positive square root of variance.

Standard Deviation: An Ideal and Scientific Measure

S. D. is considered as an ideal and scientific measure of dispersion and there are following reasons for it

1. S.D. is based on all items of the series.
2. Deviations are always taken from arithmetic mean, which is rigidly defined measure of central tendency.
3. Algebraic sign of '+' and '-' are considered, while taking deviations.
4. S.D. is fully capable of further algebraic treatment.

Rational of Standard Deviation

S. D. is most popular among various measures of dispersion. Range is based on two extreme values of the series and ignores all other values. Quartile Deviation considers only middle (50%) of the items and other items are left out. Mean Deviation is based on all values but at the time of calculating deviations algebraic signs of '+' and '-' ignored. Moreover, its value is also not certain because it can be computed on the basis of any average i.e., Mean, Median or Mode. Standard deviation is free from all these limitations. That is why this measure is more popular.

Merits of Standard Deviation

(1) Based on all values-The calculation of standard deviation is based on values of a series, Thus, it is a reliable measure of dispersion.

(2) Use in higher algebraic analysis-Standard deviation is amenable to algebraic treatment and possesses many mathematical properties. On account of these properties combined standard deviation can be computed and therefore, S.D. is used in advanced studies like skewness, correlation, regression, test of significance, etc.

(3) Rigidly Defined-Standard deviation is rigidly defined and its value is always definite. Moreover, this measure can be obtained in every condition.

(4) Less influence of sampling-S.D. is affected least by fluctuations of sampling than other measures of dispersion.

(5) Determination of the area of normal distribution-Standard deviation is specifically related to the area of normal distribution curve. Hence, the area of this curve is clearly determined on the basis of S.D.

Limitations of S. D.

(1) Difficulty in calculation-Squares and square-roots are calculated in standard deviation, which are comparatively difficult. However, this does not reduce the importance of S. D. because of its high degree of accuracy.

(2) More weightage to extreme values-The extreme values are given more weights on account of squares of deviations.

Calculation of S.D.

Direct Method: Firstly, Arithmetic ($\bar{X} = \frac{\sum X}{N}$) is calculated. After it, deviation of each observation from mean is extracted. Then each deviation is squared up and their sum is calculated. At last, the sum of squared deviation is divided by number of items and square root of their value is obtained by using given formula:

$$S.D.(\sigma) = \sqrt{\frac{\sum d^2}{N}}$$

Coefficient of S.D.= $\frac{S.D.}{Mean}$ or $\frac{\sigma.}{\bar{X}}$

Short Cut Method

This method is applicable when actual mean is given in fraction or when S.D. is to be calculated from assumed mean rather than actual mean.

$$S.D.(\sigma) = \sqrt{\frac{\sum d^2x}{N} - \left(\frac{\sum dx}{N}\right)^2}$$

Or

$$S.D.(\sigma) = \frac{1}{N}\sum d^2x \times N - \left(\sum dx\right)^2$$

Illustration 12

Calculate the standard deviation from the following observation

68	49	32	21	54	38	59	66	40

X	dx from 50	d^2x
68	+18	324
49	-1	1
32	-18	324
21	-29	841
54	+4	16
38	-12	144
59	+9	81
66	+16	256
40	-10	100

$$S.D.(\sigma) = \sqrt{\frac{\sum d^2x}{N} - \left(\frac{\sum dx}{N}\right)^2}$$

$$= \sqrt{\frac{2087}{9} - \left(\frac{-23}{9}\right)^2}$$

$$= \sqrt{231.89 - 6.53}$$

$$= \sqrt{225.36}$$

=15.01

Or

$$S.D.(\sigma) = \sqrt{\frac{1}{9}\, 2087 \times 9 - (-23)^2}$$

$$= \sqrt{\frac{1}{9}\, 18783 - 529} = \mathbf{15.01}$$

Illustration 13

Calculate the Arithmetic Mean, Standard deviation and Coefficient of S.D. from the following observation:

x	2	4	6	8	10
f	**1**	**4**	**6**	**4**	**1**

Solution

x	f	fx	d from 6	d^2	fd^2
2	1	2	-4	16	16
4	4	16	-2	4	16
6	6	36	0	0	0
8	4	32	2	4	16
10	1	10	4	16	16

$$\bar{X} = \frac{\sum fx}{N} = \frac{96}{16} = \mathbf{6}$$

$$S.D. = \sqrt{\frac{\sum fd^2}{N}} = \sqrt{\frac{64}{16}} = \mathbf{2}$$

Coefficient of S.D.= $\frac{\sigma.}{\bar{X}} = \frac{2}{6} = \mathbf{.33}$

Illustration 14

Find out Standard Deviation and its coefficient from the following data:

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	6	8	15	7	3	0	1

Marks	M.V.	f	$d'x$ from 35	$fd'x$	fd^2x
10-20	15	6	-2	-12	24
20-30	25	8	-1	-8	8
30-40	35	15	0	0	0
40-50	45	7	+1	7	7
50-60	55	3	+2	6	12
60-70	65	0	+3	0	0
70-80	75	1	+4	4	16

$\bar{X} = A + \frac{\sum fd'x}{N} \times i \quad = \quad 35 + \frac{-3}{40} \times 10$ = 35-.75= **34.25**

$$S.D.(\sigma) = \frac{1}{N}\sqrt{\sum fd^2x \times N - (\sum fd'x)^2}$$

$$= \frac{10}{40}\sqrt{67 \times 40 - (-3)^2}$$

$$= \frac{1}{4}\sqrt{2680 - (9)^2}$$

$$= \frac{1}{4}\sqrt{2671}$$

$$= \frac{1}{4} \times 51.68 = \mathbf{12.92} \times$$

$$\text{Coefficient of S.D.} = \frac{\sigma.}{\bar{X}} = \frac{12.92}{34.25} = \mathbf{.377}$$

Coefficient of Variation (C.V.) = $\frac{S.D.}{Mean}$**×100 or** $\frac{\sigma.}{\bar{X}}$**×100**

$$\textbf{(C.V.)} = \frac{S.D.}{Mean} \times 100 \text{ or } \frac{\sigma.}{\bar{X}} \times 100$$

Illustration 15

From the prices of shares of X Co. and Y Co. given below, state which is more stable in value:

X Co.	**55**	**54**	**52**	**53**	**56**	**58**	**52**	**50**	**51**	**49**
Y Co.	108	107	105	105	106	107	`104	103	104	101

Solution:

Calculation of coefficient of variation

X Co.			**Y Co.**		
X	d from 53	d^2	X	d from 105	d^2
55	+2	4	108	+3	9
54	+1	1	107	+2	4
52	-1	1	105	0	0
53	0	0	105	0	0
56	+3	9	106	+1	1
58	+5	25	107	+2	4
52	-1	1	104	-1	1
50	-3	9	103	-2	4
51	-2	4	104	-1	1
49	-4	16	101	-4	16
$\sum X$= **530**		$\sum d^2$= **70**	$\sum X$= **1050**		$\sum d^2$= **40**

X Co.

$$\bar{X} = \frac{\sum X}{N} = \frac{530}{10} = 53$$

$$S.D.(\sigma) = \frac{\sum d^2}{N}$$

$$= \sqrt{\frac{70}{10}} = \sqrt{7} = \mathbf{2.646}$$

Y Co.

$$\bar{X} = \frac{\sum X}{N} = \frac{1050}{10} = 105$$

$$S.D.(\sigma) = \frac{\sum d^2}{N}$$

$$\sqrt{\frac{40}{10}} = \sqrt{4} = \mathbf{2}$$

C.V.= $\frac{S.D.\times 100}{Mean}$

= $\frac{2.646\times 100}{53} = \mathbf{4.992\%}$

C.V.= $\frac{S.D.\times 100}{Mean}$

= $\frac{2\times 100}{105} = \mathbf{1.905\%}$

It is clearly evident that the shares of Y co. are more stable as C.V. is low in comparison of X Co.

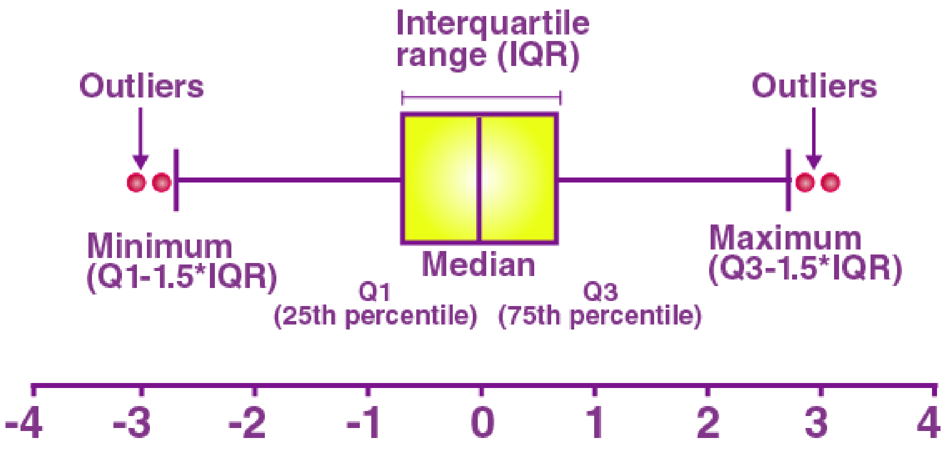
2.5 Box and Whisker Plot

A box and whisker plot is a method of abstracting a set of data that is estimated using an interval scale. It is also known as a box plot. These are mostly used to interpret data. It is a type of graphical method that displays the variation of data in a dataset. The data can also be displayed using the histogram. However, the histogram is a sufficient display. A box and whisker diagram will provide more information than a histogram because it allows multiple sets of data to be displayed in the same graph.

We use box plots or graphical representations to determine:

1. Central Value
2. Variability
3. Distribution Shape

When we plot a box plot graph, we outline a box from the first to third quartiles. The median is a vertical line that runs through the box. As shown in the figure below, the whiskers (small lines) lead from each quartile to the minimum or maximum value.



Source: 1https://byjus.com/maths/box-and-whisker-plot/

A box and whisker plot is a graph that displays data from a five-number summary, including one of the central tendency measures. It does not accurately depict the distribution as a stem and leaf plot or histogram does. However, it is primarily used to determine whether a distribution is skewed and whether there are any potentially outlier observations in the data set. Boxplots are also useful when comparing or involving large numbers of data collections.

Because the centre, spread, and overall range are immediately visible, the arrangements can be easily matched using these boxplots.

A box and whisker plot is a method of presenting a set of data on an interval scale. It is also used to interpret descriptive data. It shows how the data is distributed. There are five pieces of information in the box and whisker diagram (also called a five-number summary).

2.5.2 Elements of a Box and Whisker Plot

The elements required to construct a box and whisker plot outliers are given below.

Minimum value (Q_0 or 0 percentile) The dataset's minimum value, which is shown at the far-left end of the diagram.

The first quartile (Q1) is located on the left side, between the minimum and median values.

The median value is represented by the line in the box's centre**.**

The third quartile (Q3) is located on the right side, between the median and the maximum value.

The dataset's **maximum value,** which is shown at the far-right end of the diagram.

The difference between the upper and lower quartiles, i.e. Q3 and Q1, is referred to as the **interquartile range (IQR).**

Box and whisker diagrams allow us to read data quickly and easily. It compiles data from various sources and displays it in a single graph. It assists us in making an informed decision by comparing data from various categories. When we have multiple datasets from different sources that are related to each other, we use the box and whisker plot. For instance, compare test scores between classrooms.

2.5.3 Process to draw Box Plot

The box and whiskers plot can be drawn using five simple steps. To draw a box and whisker diagram, we need to find:

Step 1: The smallest value in the data is called the minimum value.

Step 2: The value below the lower 25% of data contained, called the first quartile.

Step 3: Median value from the given set of data.

Step 4: The value above the lower 25% of data contained, called the third quartile.

Step 5: The largest value in the dataset is called maximum value.

Illustration 16

Draw the box plot for the given set of data: {3, 7, 8, 5, 12, 14, 21, 13, 18}.

Solution:

Firstly, write the given data in increasing order.

3, 5, 7, 8, 12, 13, 14, 18, 21

Range = Maximum value – Minimum value

Range = 21 – 3 = 18

Now, Median = center value of the given data

Median = 12

Now, we need to find the quartiles.

First quartile = Q_1 = Median of data values present at the left side of Median

Q_1 = Median of (3, 5, 7, 8)

Q_1 = (5+7)/2 = 12/2 = 6

Third quartile = Q_3 = Median of data values present at the right side of Median

Q_3 = Median of (13, 14, 18, 21)

Q_3 = (14+18)/2 = 32/2 = 16

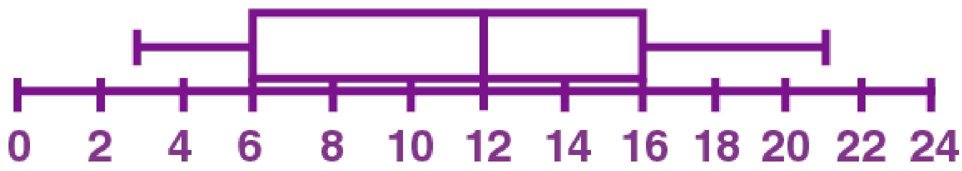
Therefore, the interquartile range = $Q_3 – Q_1$ = 16 – 6 = 10

The five-number summary is given by:

Minimum, Q_1, Median, Q_3, Maximum

Hence, 3, 6, 12, 16, 21 is the five-number summary for the given data.

Now, we can draw the box and whisker plot, based on the five-number summary.



Source: 2 https://byjus.com/maths/box-and-whisker-plot/

2.6 Skewness and Kurtosis

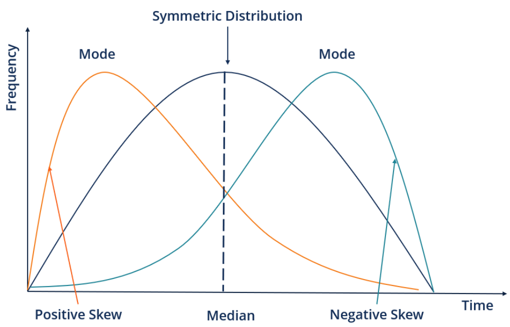
2.6.1 Meaning of Skewness

Skewness is a measure of asymmetry or symmetric distribution distortion. It calculates the deviation of a random variable's given distribution from a symmetric distribution, such as the normal distribution. A normal distribution has no skewness because it is symmetrical on both sides. As a result, a curve is considered skewed if it is shifted to the right or left.

The literal definition of skewness is "lack of symmetry." In other words, skewness occurs when the distribution on either side of the central value is not symmetrical. Some definitions of skewness are as follows:

Measures of skewness tell us the direction and the extent of skewness. In symmetrical distribution the mean, median and mode are identical. The more the mean moves away from the mode, the larger the asymmetry or skewness."

-Simpson and Kafka



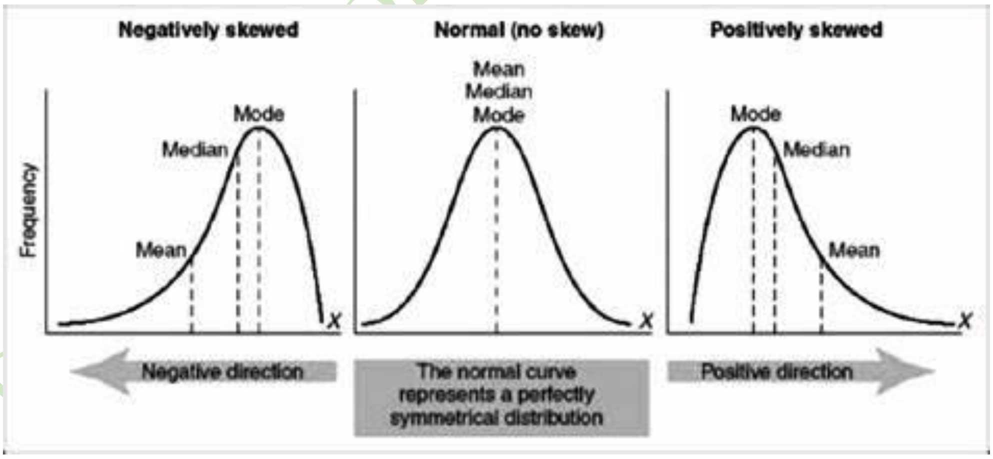
A distribution is said to be skewed when the mean and median fall at different points in the distribution, and balance is shifted to one side or the other."

-Garret

After reviewing the definitions above, it is possible to conclude that skewness is a statistical measure that explains the asymmetrical nature and degree of a frequency distribution.

2.6.1.1 Types of Skewness

1. **Positive Skewness**
   It is a positively skewed distribution if the given distribution is shifted to the left and has its tail on the right side. It's also known as the right-skewed distribution. A tail is the tapering of the curve that differs from the data points on the other side. A positively skewed distribution, as the name implies, has a skewness value greater than zero. Because the skewness of the given distribution is to the right, the mean value is greater than the median and moves to the right, and the mode occurs at the distribution's highest frequency.



2. **Negative Skewness**
   It is a negatively skewed distribution if the given distribution is shifted to the right and has its tail on the left side. It's also known as a left-skewed distribution. Any distribution with a negative skew has a skewness value less than zero. Because the skewness of the given distribution is on the left, the mean value is less than the median and moves to the left, and the mode occurs at the distribution's highest frequency.

2.6.1.2 Tests of Skewness

The following tests can be used to determine whether a distribution is skewed or not. Skewness exists when:
1. The mean, median, and mode values do not coincide.
2. When the data is plotted on a graph, it does not take the typical bellshaped form, i.e. the two halves are not equal when cut along a vertical line through the centre.
3. The total of positive deviations from the median does not equal the total of negative deviations.
4. The quartiles are not equally spaced from the median.
5. Frequencies are not distributed equally at equal deviations from the mode.

When skewness is absent, i.e., in the case of a symmetrical distribution, the following conditions are met:

1. The mean, median, and mode values all coincide.

2. When data is plotted on a graph, it takes the typical bell-shaped shape.

3. The total of positive deviations from the median equals the total of negative deviations.

4.The median is equidistant from the quartiles.

5. Frequencies are distributed equally at equal deviations from the mode.

2.6.1.3 Measures of Skewness

Skewness is measured in three ways, each with absolute and relative values. The relative measure, known as the coefficient of skewness, is more commonly used than the absolute measure. Furthermore, when comparing two or more distributions, it is the relative measure of skewness that is used. The following skewness measures are available:

1. Karl Pearson's measure,
2. Bowley's measure,
3. Kelly's measure, and

These measures are briefly discussed below:

- **Karl Pearson's measure**

The mean, median, and mode of a symmetrical distribution all coincide. These values are pulled apart in skewed distributions; the mean tends to be on the same side of the mode as the longer tail. As a result, the difference provides a measure of the asymmetry (). By dividing by a measure of dispersion, this can be made dimensionless (such as SD). Karl Pearson's relative skewness measure is

$$J = \frac{Mean - Mode}{S.D.} \text{ OR } J = \frac{\bar{X} - Z}{\sigma}$$

Skewness can have a positive or negative value.

The empirical skewness formula (also known as second coefficients of skewness) is

$$J = \frac{3(Mean - Mode)}{S.D.} \text{ OR } J = \frac{3(\bar{X} - Z)}{\sigma}$$

- **Bowley's measure**

The quartiles in a symmetrical distribution are equidistant from the median ($Q_2 - Q_1 = Q_3 - Q_2$). The quartiles will not be equidistant from the median if the distribution is not symmetrical (unless the entire asymmetry is located in the extreme quarters of the data). The skewness measure proposed by Bowley is

$$J = \frac{Q_3 + Q_1 - 2M}{Q_3 - Q_1}$$

When the quartiles are equidistant from the median, this measure is always zero, and it is positive when the upper quartile is farther from the median than the lower quartile. This skewness metric varies between +1and -1.

- **Kelly's measure**

Kelly's coefficient of skewness is calculated using data deciles or percentiles. Kelly proposed a skewness measure based on the middle 80% of the data set's observations.

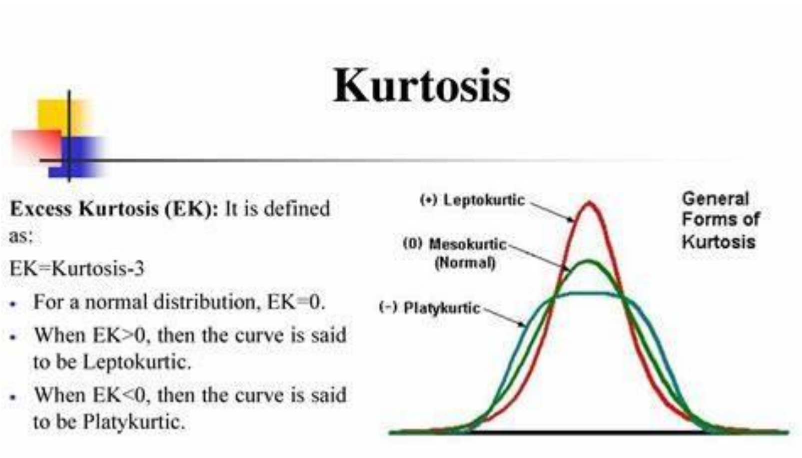
$$J = \frac{P_{90} + P_{10} - 2P_{50}}{P_{90} - P_{10}}$$

- If Sk<0Sk<0, the data is negatively skewed.
- If Sk=0Sk=0, the data is symmetric (i.e., not skewed).
- If Sk>0Sk>0, the data is positively skewed.

2.6.2 Kurtosis

Kurtosis is a statistical measure that describes how much a distribution's tails differ from the tails of a normal distribution. Kurtosis, in other words, determines whether the tails of a given distribution encompass extreme values. Kurtosis, like skewness, is an important descriptive statistic of data distribution. However, the two ideas should not be confused with one another. Skewness essentially measures the distribution's symmetry, whereas kurtosis defines the heaviness of the distribution tails.

Tail data from distributions with high kurtosis outnumber the tails of the normal distribution (e.g., five or more standard deviations from the mean). Tail data in low kurtosis distributions are generally less extreme than tail data in the normal distribution.



Kurtosis is sometimes confused with a measure of a distribution's peakedness. Kurtosis, on the other hand, is a metric that describes the shape of a distribution's tails in relation to its overall shape. A distribution can be infinitely peaked with low kurtosis or infinitely flat-topped with infinite kurtosis. Thus, kurtosis measures "tailness" rather than "peakness."

2.6.2.1 Type of Kurtosis

- **A mesokurtic distribution** is medium-tailed as outliers are neither extremely common nor extremely rare in a mesokurtic distribution. Kurtosis is calculated by comparing the distribution to a normal distribution. Because normal distributions have a kurtosis of three, any distribution with a kurtosis of three or less is mesokurtic.

  Kurtosis is frequently described in terms of excess kurtosis, which is kurtosis 3. Because normal distributions have a kurtosis of 3, excess kurtosis makes comparing the kurtosis of a distribution to a normal distribution even easier. Because normal distributions have zero excess kurtosis, any distribution with an excess kurtosis of about 0 is mesokurtic.

- **A platykurtic distribution** is thin-tailed as outliers are uncommon in a platykurtic distribution because it is thin-tailed. Kurtosis is lower in platykurtic distributions than in normal distributions. To put it another way, platykurtic distributions have a kurtosis less than three and a kurtosis excess of less than 0. Platy kurtosis is also known as negative kurtosis because the less kurtosis is negative.

- **A leptokurtic distribution** is fat-tailed, which means there are many outliers. Leptokurtic distributions are kurtotic in comparison to normal distributions. They have the following; A kurtosis greater than 0 or 3. It is sometimes referred to as positive kurtosis.

	Category		
	Mesokurtic	Platykurtic	Leptokurtic
Tailedness	Medium-tailed	Thin-tailed	Fat-tailed
Outlier frequency	Medium	Low	High
Kurtosis	Moderate (3)	Low (< 3)	High (> 3)
Excess kurtosis	0	Negative	Positive
Example distribution	Normal	Uniform	Laplace

2.7 BIG DATA

Big Data is a contemporary analytics trend that enables businesses to make more data-driven decisions than ever before. When these massive amounts of data are analyzed, the insights they provide lead to real commercial opportunities in marketing, product development, and pricing.

Big data is defined as "high-volume, high-velocity, and diverse information assets that necessitate cost-effective, novel forms of processing for improved insight and decision making." It relates to the large collections of data that are so complicated and vast that neither humans nor traditional data management systems can interpret them. It can now be used and tracked thanks to recent software developments.

When properly analysed with modern tools, these massive amounts of data provide businesses with the information they require to make informed decisions. To the human eye, much of this user data appears meaningless and unconnected. Big data analytic tools, on the other hand, can track the relationships between hundreds of different types and sources of data to produce useful business intelligence.

Data scientists and Big Data solution architects are joining the movement in businesses of all sizes and sectors. With the Big Data market expected to nearly double by 2025 and user data generation on the rise, this is an excellent time to become a Big Data specialist.

The five "vs" of big data—volume, veracity, value, variety, and velocity—combine to form this term.

Today, big data are produced in a variety of ways. As you are aware, there are various types of data and consequently various types of big data.

Structured Data

Structured data is defined as data that can be stored, accessed, and processed in a fixed format. In general, structured data is coded using page markup on the page to which the information applies to. One example of structured data is data stored in a relational database management system. Another example SQL, Excel, ORACLE etc.

Semi- Structured Data

The **Semi-Structured** data can contain both forms of data but has some structure. it lacks a fixed or rigid schema. This type of data is generally found in XML Files. Example POS,POL, IR etc.

Unstructured Data

Unstructured data can get into an unknown form, that is, it is not organised in a definite manner. A heterogeneous data source containing a mix of simple text, videos, and images is an example of unstructured data.

Example

Big Data in social media

Perhaps the most well-known application of big data is this. Millions (in some cases, billions) of user-generated contents are produced daily on social media sites like Facebook, YouTube, Twitter, Instagram, and Pinterest.

These user-generated contents may be audio, visual, graphical, or text-based. Given that there are 86,400 minutes in a day, and that YouTube receives 300 hours of video uploads every minute, you can see that there is a lot of data being generated on a daily basis.86,400 times 300 equals nearly 26 million hours each day. In comparison, 26 million hours are equivalent to nearly 30 centuries. Every day, 30 centuries of videos are posted to YouTube. And while this number is based on 2019 statistics, it is anticipated that in 2020 there will be more YouTube uploads per hour.

In a blog post published in May 2019, Google AI researchers claimed that they used 2,000 "mannequin challenge" YouTube videos as a training dataset to build an AI model that could predict depth from moving videos. This example only scratches the surface of the importance of those 300 hours per minute uploads.

Test Data for Autonomous Vehicles

The majority of us who work in artificial intelligence are familiar with the trends in autonomous vehicle development. And we are aware that the development of autonomous vehicles heavily relies on big data, primarily sensor data from test vehicles. Autonomous and ADA test vehicles, according to Texura, generate more than 11 Terabytes (TB) of data each day. Leading self-driving car firms like Waymo produce a tonne of data yearly just from their test cars. Waymo's test vehicles have logged hundreds of billions of miles in computer simulations and over 20 thousand miles on public roads since their inception (in 2009). What's more shocking is that this only happened in 2019.

A Texura report claims that an autonomous vehicle's sensors can record up to 19 TB of data per hour.A year's worth of 10 million miles equates to 1,142 miles per hour and 27,400 miles per day.Although Waymo hasn't disclosed the size of its fleet, 200 cars travelling for 8 hours a day at 17 mph would correspond to its 10 million annual miles rate.

With the help of the aforementioned estimates, we can determine that Waymo's test cars generate anywhere between 2.2 Petabytes (PB) and 30.4 PB of sensor data each day.

Stock Exchange Data

One excellent example of big data is stock exchange data. Imagine the scene at the stock exchange's main office in your nation. What is the first thought that pops into your head? Numbers. fluctuating stock prices.You know those numbers are important information and a lot of data because you are smart, right? They are, indeed.The New York Stock Exchange can be used as an example, producing 4-5 terabytes of data each day. Of course, you are aware that businesses and individuals use these data for a variety of uses, including stock investing and forecasting.

1.7.1 Characteristic of Big Data

Big Data are characterized by the 5Vs: Volume, Variety, Velocity, Veracity and Value.

Volume

The volume of data is a fundamental component of big data. The term "Big Data" refers to a massive amount of information. The size of the data is very important in determining the value of the data.

This volume addresses the most immediate threat to traditional IT structures. This is the first thought that comes to mind when people think of big data. Many businesses have already huge quantities of archived data in the form of log data but lack the capacity to process it. The main attraction of big data analytics is the benefit gained from the capacity to process a large amount of data.

Variety

refers to a wide range of data sources and data types, alike structured and unstructured. Previously, spreadsheets and databases were the only data sources considered by most applications. Data in the forms of emails, photos, videos, monitoring devices, PDFs, audio, and so on are now considered in analysis applications. This wide range of unstructured data raises concerns about data storage, mining, and analysis.Massive amounts of data are being generated at an alarming rate today, and numerous of these data are unique.

Given the amount of data (structured and unstructured) in big data, big data analysts must collect, analyse, and make sense.

Veracity

In general, big data veracity refers to the accuracy (quality and precision) of a dataset, as well as the degree of trustworthiness of the data source and processing.

When dealing with a high volume, velocity, and variety of data, it is impossible for all of the data to be 100% correct; dirty data will exist. The accuracy of the data captured can vary greatly. The variety of the source data influences the analysis's data accuracy.

Velocity: The rate at which data is generated and processed in order to meet the needs and challenges of growth and development. Real-time access to big data is common. Big data is produced more frequently than small data. The frequency of generation and the frequency of handling, recording, and publishing are two types of velocity in relation to big data. Massive amounts of data must arrive quickly enough to qualify as big data. In fact, for some businesses, data that does not arrive on time is rendered useless (invaluable).

Big data velocity is more than just data arriving frequently; it is also about data arriving as soon as possible. Real-time data provides strategic and competitive advantages to organisations, particularly businesses.

Value

The data must be valuable, but value comes in various forms and sizes.Consider a scenario in which a self-driving car company collects massive amounts of data relating to plant diseases and pests in real time.That data is, of course, valuable, but is it valuable to the self-driving car company working on developing fully autonomous vehicles? The primary reason that organisations undertake big data projects is to create value for themselves. If the big data project is not providing any value to the organisation, it is a waste of the organization's resources.

2.7.2 Stages of Big Data Processing

1st Stage: Data Extraction

The first step in Big Data Processing is to collect information from various sources such as enterprise applications, web pages, sensors, marketing tools, transactional records, and so on. Professionals in data processing extract information from a variety of Unstructured and Structured Data Streams. For example, in the construction of a Data Warehouse, extracting entails combining information from multiple sources and then verifying the information by removing incorrect data. To make future decisions based on the outcomes, the data collected during the Big Data Processing data collection phase must be labelled and accurate. This stage establishes both a quantitative standard and a target for improvement.

2nd Stage: Data Transformation

The Big Data Processing transformation phase defines changing or modifying data into required formats, which aids in the creation of various insights and visualisations. Aggregation, Normalization, Feature Selection, Binning and Clustering, and concept hierarchy generation are just a few of the transformation techniques available. Developers use these Big Data Processing techniques to convert Unstructured Data into Structured Data and Structured Data into a user-friendly format. As a result of the transformation, business and analytical operations become more efficient, and firms can make better data-driven decisions.

3rd Stage: Data Loading

During the load stage of Big Data Processing, the converted data is transported to the centralised database system. Index the database and remove constraints before loading the data to make the process more efficient. Loading became automated, well-defined, consistent, and batch-driven or real-time using Big Data ETL.

4th Stage: Data Visualisation

Data Analytics tools and Big Data Processing methods enable businesses to visualise massive datasets and create dashboards to gain a comprehensive view of their entire business operations. Analytics in Business Intelligence (BI) provide answers to fundamental business growth and strategy questions. On the transformed data, BI tools make predictions and what-if analyses that assist stakeholders in understanding the depth patterns in data and the correlations between the attributes.

5th Stage: Machine Learning Application

The Machine Learning phase of Big Data Processing focuses on the development of models that can learn to evolve in response to new input. The learning algorithms allow for faster analysis of large amounts of data.

Supervised Learning is the first type of Machine Learning, and it uses labelled data to train models and predict outcomes. Supervised learning employs data patterns to identify new information output for labels. This method is frequently employed in applications that use historical data to forecast future outcomes.

The second type is **Unsupervised Learning**, in which the data is unlabeled and trained by the algorithm. Unsupervised Machine Learning is applied to data that does not have any historical labels.

Reinforcement, the final type is learning, in which no primary data can be used as input to models. The algorithms must make decisions on their own based on observations or situations that occur around them. The models attempt to make correct decisions by manipulating the decisions with a reward function.

The Machine Learning phase of Big Data Processing enables automatic pattern recognition and feature extraction in complex unstructured data without human intervention, making it a valuable resource for Big Data research.

2.8 Glossary

Dispersion	Formulas
Range	$X_{MAXIMUM} - X_{MINIMUM}$
Coefficient of Range	$\frac{MAX - MIN}{MAX + MIN}$
Quartile Deviation	$\frac{Q_3 - Q_1}{2}$
Coefficient of Q.D.	$\frac{Q_3 - Q_1}{Q_3 + Q_1}$
Mean Deviation (Individual Series)	$\frac{\Sigma\lvert d\bar{x}\rvert}{N}$ or $\frac{\Sigma\lvert d\bar{m}\rvert}{N}$

Mean Deviation (Discrete Series)	$\frac{\sum f\lvert d\bar{x}\rvert}{N}$
Mean Deviation (Continuous Series)	$\frac{\sum f\lvert d\bar{x}\rvert}{N}$
Coefficient of Mean Deviation	$\frac{M.D.}{\bar{X}}$ Or $\frac{M.D.}{\bar{m}}$
Standard Deviation (Individual Series)	$\sqrt{\frac{\sum d^2}{N}}$
Coefficient of Standard Deviation	$\frac{S.D.}{Mean}$ or $\frac{\sigma.}{\bar{X}}$
Coefficient of Variance	$\frac{S.D.}{Mean}$×100 or $\frac{\sigma.}{\bar{X}}$×100
Karl Pearson's Measure	$J = \frac{Mean-Mode}{S.D.}$ OR $J = \frac{\bar{X}-Z}{\sigma}$
Bowley's Measure	$J = \frac{Q_3 + Q_1 - 2M}{Q_3 - Q_1}$
Kelly's Measure	$J = \frac{P_{90} + P_{10} - 2P_{50}}{P_{90} - P_{10}}$

2.9 SELF ASSESSMENT QUESTIONS

(I) Long Answer Questions:

1. Define dispersion and discuss its various measures.
2. What is Standard Deviation? Explain its superiority over other measures of dispersion.
3. Explain Quartile Deviation, Mean Deviation and Standard Deviation. Discuss the circumstances in which they may be used.

(II) Short Answer Questions:

1. Differentiate absolute and relative measures of dispersion.
2. Differentiate between mean deviation and standard deviation.

(III) If in a series the lowest value is 240 and the largest value is 350.Find out coefficient of range.

[0.184]

(IV) Find the coefficient of standard deviation for the data set: 32, 35, 37, 30, 33, 36, 35 and 37

(V) The mean and variance of seven observations are 8 and 16, respectively. If five of these are 2, 4, 10, 12 and 14, find the remaining two observations.

(VI) In a town, 25% of the persons earned more than Rs 45,000 whereas 75% earned more than 18,000. Compute the absolute and relative values of dispersion.

(VII) If $Q_1 = 41, Q_3 = 49$, find out the value of coefficient of Q.D.

[.089]

(VIII) Find the Variance and Standard Deviation of the Following Numbers: 1, 3, 5, 5, 6, 7, 9, 10.

[5.75]

(IX) Calculate the range and coefficient of range for the following data values.

45, 55, 63, 76, 67, 84, 75, 48, 62, 65

[0.302]

(X) Find Range and Coefficient of Range of the following

x	5	10	15	20	25	30
f	8	12	15	10	5	2

[R=25 Coefficient of Range= 0.714]

(XI) Find Range and Coefficient of Range of the following

$class$	1-10	11-20	21-30	31-40	41-50
f	3	7	20	15	6

[R=50, Coefficient of R= 0.98]

(XII) Find out Q.D. and its coefficient from the following observation

$size$	20	25	30	35	40	45	50
f	7	12	14	19	10	8	3

$\mathbf{[Q_1 = 25\ , Q_3 = 40, Q.D. = 7.5, Coefficient = 0.231]}$

(XIII) Find out Q.D. and its coefficient from the following observation

$class$	f
4-8	6

8-12	10
12-16	18
16-20	30
20-24	15
24-28	12
28-32	10
32-36	6
36-40	2

$[\ \boldsymbol{Q_1 = 14.5}\ , \boldsymbol{Q_3 = 24.92, Q.D. = 5.21, Coefficient = 0.264}]$

(XIV) Calculate M.D. from mean and median from the following data

size	0-10	10-20	20-30	30-40	40-50	50-60
f	10	12	25	35	40	50

[M.D.(Mean)=41, M.D.(Median)=12.45]

(XV) Calculate M.D. from mean and median from the following data

Marks	No. of Students	Marks	No. of Students
10-20	2	10-60	63
10-30	8	10-70	83
10-40	20	10-80	93
10-50	38	80-90	7

[M= 54.8, M.D.=12.95, Coefficient=0.236]

(XVI) Calculate Mean and S.D. of the following

size	13	12	11	10	9	8	7
f	5	7	10	18	12	5	3

$[\boldsymbol{\bar{X} = 10.13,\ S.D. 1.53}]$

(XVII) Calculate Mean, S.D. and coefficient of S.D. of the following

size	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f	6	8	15	7	3	0	1

[$\bar{X} = 34.25$, $S.D.\,12.92, Coeff.\,0.377$]

(XVIII) Draw a box plot for the given set of data {3, 7, 8, 5, 12, 14, 21, 15, 18, 14}.

(XVIV) Find the five-number summary for the given set of data {25, 28, 29, 29, 30, 34, 35, 35, 37, 38}.

2.10 Suggested Readings

1. Business Statistics by Amir D. Aczel and J. Sounder pandian. Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. Business Statistics by S.P. Gupta and M.P. Gupta. Sultan Chand and Sons., New Delhi.
3. Statistical Method by S.P. Gupta. Sultan Chand and Sons., New Delhi.
4. Statistics (Theory & Practice) by Dr. B.N. Gupta. Sahitya Bhawan Publishers and Distributors (P) Ltd., Agra.
5. Statistics for Business and Economics by Kohlar Heinz. Harper Collins., New York.
6. Statistics for Business and Economics by R.P. Hooda. MacMillan India Ltd., New Delhi.
7. Statistics for Management by G.C. Beri. Tata McGraw Hills Publishing Company Ltd., New Delhi.
8. Statistics for Management by Richard I. Levin and David S. Rubin. Prentice Hall of India Pvt. Ltd., New Delhi.
9. Press, W. H.; Flannery, B. P.; Teukolsky, S. A.; and Vetterling, W. T. "Moments of a Distribution: Mean, Variance, Skewness, and So Forth." §14.1 in Numerical Recipes in FORTRAN: The Art of Scientific Computing, 2nd ed. Cambridge, England: Cambridge University Press, pp. 604-609, 1992.
10. Stuart, A.; and Ord, J. K. Kendall's Advanced Theory of Statistics, Vol. 1: Distribution Theory, 6th ed. New York: Oxford University Press, 1998.

LESSON 3

CORRELATION ANALYSIS

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STRUCTURE

3.1 LEARNING OBJECTIVES

The objectives of this lesson is to study the relationship between two variables. The aim is to present different measures of relationship between two variables and understand the difference between them. The lesson also explains suitability of different measures under different conditions. The concepts have been explained through suitable numerical examples. The concepts will enable the students to understand and interpret the relationship between two variables through scatter diagram as well as through different coefficients.

3.2 INTRODUCTION

In the previous lessons you have learnt about different types of data. It was also explained how to summarize the data. These summarizations are of immense importance in data analysis. In this lesson we will concentrate on a bivariate data. Bivariate data is a data where there are two variables. For example, you collect a monthly income and expenditure data of different households in a city. The collected data will be of form (x_i, y_i), $i = 1,2,\ldots,n$, where x_i and y_i represents income and expenditure respectively of i-th household. Here, the data (x_i, y_i), $i = 1,2,\ldots,n$ may be referred to as a bivariate data. Sometimes we are interested in knowing how the two variables are related. In our case we might be interested in exploring if a higher value of income suggests a higher value of expenditure in general or vice versa. Or there does not exist any relationship between the variables! The present discussion will help us to understand the relation between two variables.

In this section we will present different techniques to measure the relationship between two variables. We will begin with presenting different types of correlation. Next, we will graphically examine the relationship between two variables using 'Scatter diagram'. The section will proceed further with giving numerical measurement of relationship between two variables. Three numerical measures: covariance, coefficient of correlation, and coefficient of determination will be discussed. At the end, statistical test concerning coefficient of correlation will be explained. The techniques presented in the section will be illustrated through suitable numerical example.

3.3 Correlation: Meaning and Types

Correlation means relation between two or more variables. Correlation analysis deals with studying the relationship between two or more variables. The foundation of correlation analysis was laid by Sir Francis Galton (Millar, 1996) in 1880s. It was further developed by Karl pearson (Stigler, 1986). He expressed coefficient of correlation in product moment form. During the initial years of introduction of the idea, correlation was used mainly in the areas related to biology. Now, there is hardly any field where correlation is not used and it finds application in social sciences, finance, marketing etc to name a few.

Correlation can be studied from many perspective. Some of the important types of correlation is as below:

- Positive and Negative correlation
- Linear and non-linear correlation
- Simple, multiple and partial correlation

Positive and negative correlation. In case of positive correlation, two variables change in the same direction in general. If one variable increases, then other variable also increases.

Similarly, if one variable decreases then other also decreases. In general, there is a positive correlation between work experience and salary, height and weight, salary and work satisfaction. When the two variables are negatively related, they change in opposite direction. Examples of negative correlation are: winter temperature and energy consumption, price of a product and demand etc.

Linear and non-linear correlation. Correlation is linear if variation in the values of the two variables is either proportional or constant. The points of scatter diagram in a linearly related data fall around a straight line. Variation in the values of two variables in a non-linear relationship is neither proportional nor constant. Some of the important types of non-linear relationship is curvilinear, logarithmic, and exponential.

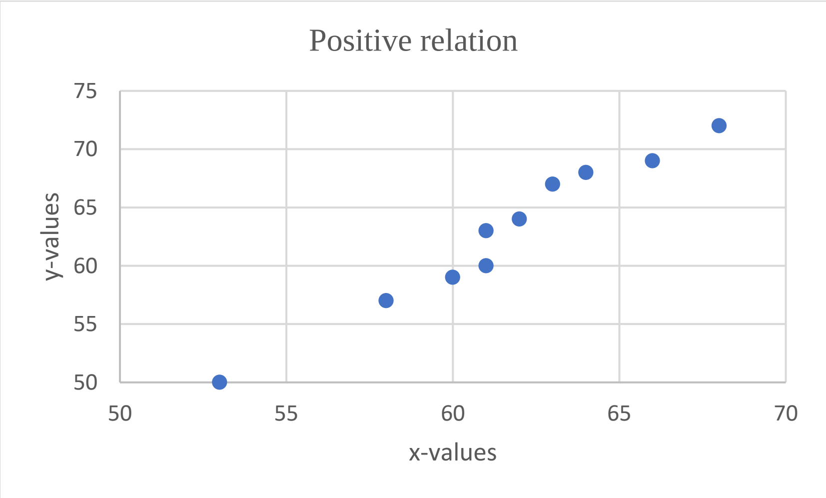
Simple, multiple and partial correlation. The correlation between two variables is referred to as simple correlation. In case of more than two variables, we can think of multiple and partial correlation. The correlation between one variable and combined influence of all other variables is called multiple correlation. Partial correlation is defined as The correlation between two variables eliminating the influence of all other variable is called partial correlation. Let us illustrate the case of multiple and partial correlation through example. Consider three variables as family expenditure (x_1), family income (x_2), and number of members in family (x_3). Then correlation between expenditure (x_1) and joint influence of income (x_2) and number of members (x_3) will be termed as multiple correlation. On the other hand, correlation between expenditure (x_1) and income (x_2) treating number of members (x_3) as constant is an example of partial correlation.

In the following sections, we will concentrate on simple linear correlation.

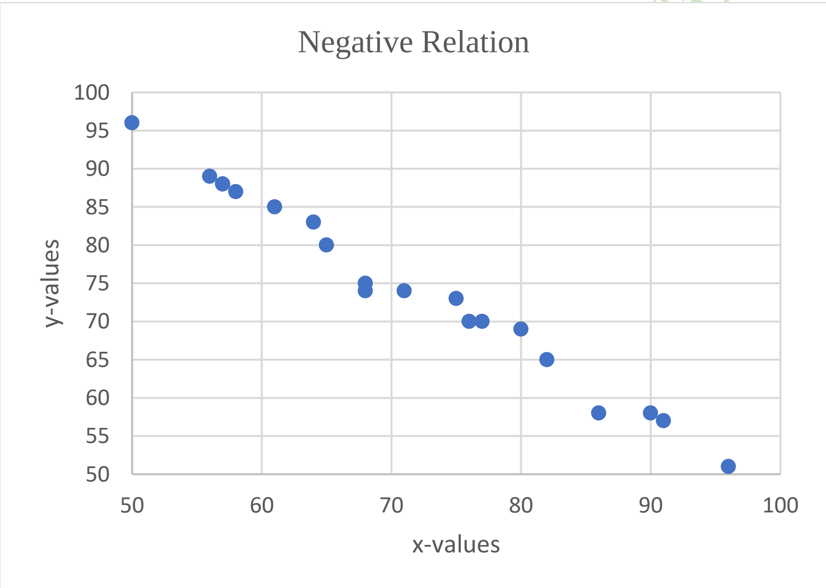
3.4 Graphical measure of relationship

Scatter diagram represents a bivariate data in xy-plane. It is a useful way of graphically representing the data through which pattern in the data, if any, can be visualized. In the present context, a scatter diagram can be used to understand the linear relationship between two variables. Generally, we label the dependent variable as y and independent variable as x. If there is no dependency of one variable on the other, the variables are labelled as x and y arbitrarily. Each of the data point (x_i, y_i), i = 1,2,…,n is plotted as a point in the xy-plane to give the scatter diagram of the bivariate data. The pattern of the points reveals about degree as well as direction of the relationship. If the points of the scatter diagram appear to fall around a straight line, a linear relationship can be understood. The variation of two variables in the same direction suggests a positive linear relationship, whereas the variation of the two variables in opposite direction suggests a negative linear relationship. A strong relation can be inferred if the points are lying very close to a line. Wide scattering of the points about a line indicates moderate to low degree of relationship.

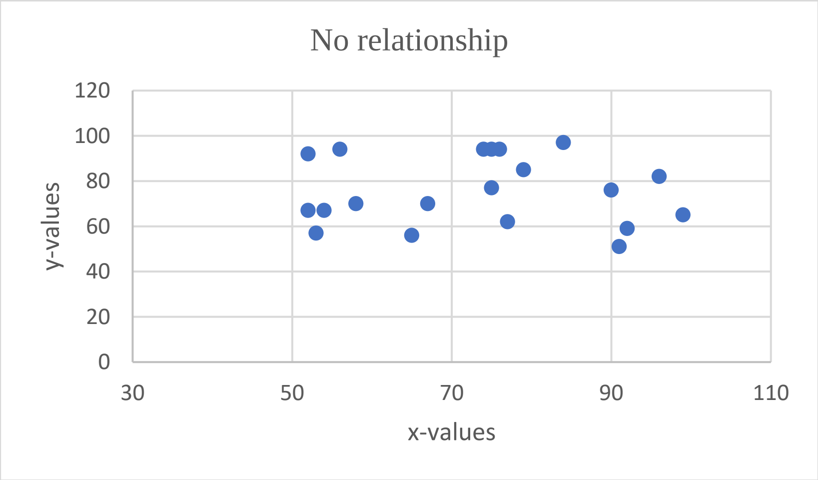
Positive relationship: In the following scatter plot, both the variables change in the same direction, in general. It should be noted here that we talk about the average relationship. Therefore, you can always find fewer points not following the general pattern of the data.



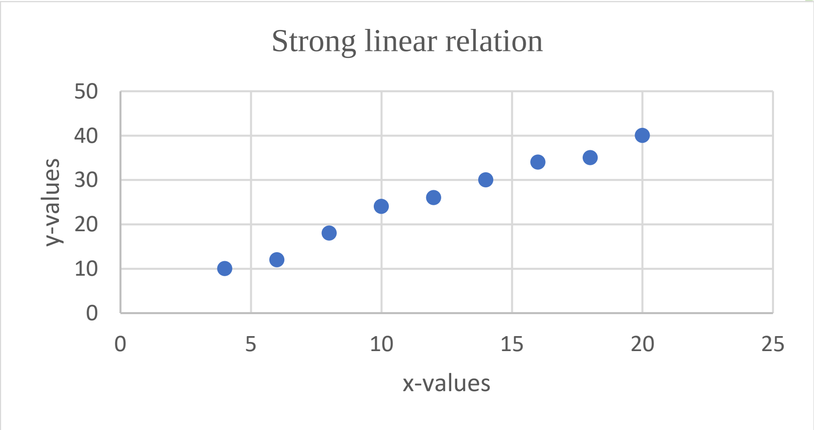
Negative relationship: In the following scatter plot, a negative linear relationship may be concluded as the variables change in the opposite direction.

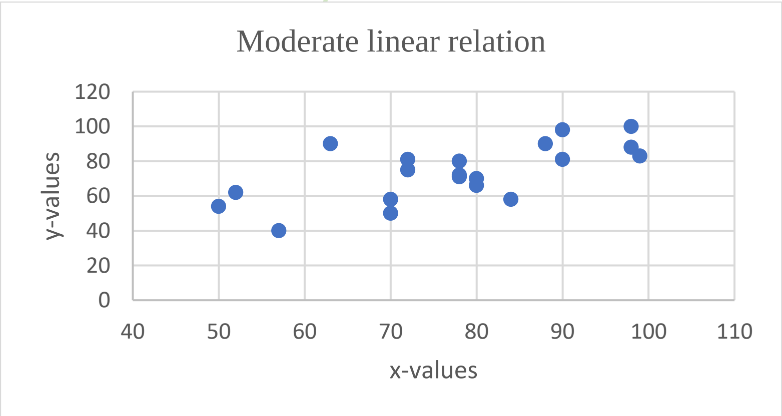


No linear relation: It may also happen that there exists neither positive nor negative linear relationship between the variables. The variables may be related to each other through a non-linear relationship or they may be unrelated also. Following scatter diagram depicts a case of no relationship. The dispersion of the points can be observed to follow a horizontal pattern in this case.



Strong and weak linear relationship: When there exists strong linear relationship between the variables, the scatter plot is closely dispersed. In case of moderate and low degree of relationship, the scatter plot is widely dispersed.





ACTIVITY

Collect on your own or download from website the following datasets:

(i) a data comprising of selling price and area of 20 homes in an area.
(ii) A data comprising of SGPA and Attendance (%) of 25 students of a class

Draw the scatter diagram and interpret the linear relationship between the variables

IN-TEXT QUESTIONS

1. Scatter diagram is used to plot a __________data.
2. Scatter diagram is useful for understanding degree as well as direction of linear relationship between two variables. True / False
3. If in general, by increasing value of one variable, the other variable is also increased, there exists

   a) Positive relationship   b) Negative relationship

   c) No relationship   d) Undefined relationship

4. If there exists a a perfect linear relationship between two variables, all the points in the scatter diagram will lie:

   a) in the xy-plane   b) in a straight line

   c) very close to a straight line   d) in a curve

5. If the slope of the line representing the scatter diagram is negative, then there is

   a) negative relation   b) positive relation

   c) no relation   d) non-linear relation

3.5 Numerical measures of linear relationship

Scatter diagram describes relationship between two variables graphically. Sometimes only visual understanding of linear relationship may not be enough and a numerical measure of relationship may be required. A numerical measurement brings objectivity in the statistical analysis. The three important numerical measures of linear relationship are: Covariance, Coefficient of correlation, and Coefficient of determination.

3.5.1 Covariance

Covariance is a measurement of strength of linear relationship between two variables. It gives information about how two variables change together. A positive value of covariance indicates that both the variables change in the same direction on an average. Similarly, if the variables change in opposite direction then the covariance is negative. Zero covariance means that the variables are linearly unrelated.

Populations covariance cov(x, y) is given by the following formula:

$$cov(x,y) = \frac{1}{N}\sum_{i=1}^{N}(x_i - \bar{x})(y_i - \bar{y}),$$

where (x_i, y_i) denotes *i*-th observation, *i* = 1,2,…,N and N is the population size. The formula can also be written alternativey as below:

$$cov(x,y) = \frac{1}{N}\sum_{i=1}^{n} x_i y_i \ - \bar{x}\bar{y}$$

Sample covariance is given by:

$$cov(x,y) = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y}),$$

where (x_i, y_i) denotes *i*-th observation, *i* = 1,2,…,*n* and *n* is the sample size.

Covariance is an important statistical measure. It finds application in many areas which includes Portfolio Theory and Principal Component Analysis among others. A higher value of covariance is related with strong linear relationship. However, covariance does not have any prescribed range of values. It depends on the data points. Therefore sometimes it is difficult to understand the degree of relationship by looking at the value of covariance. Unit of covariance is product of x and y unit. For example if the unit of x is kilogram (kg) and that of y is meter, then unit of covariance would be (kg)x(meter).

Example 3.1 Consider the following example to illustrate the computation of covariance:

x-value	5	7	12	8	13
y-value	4	6	10	12	8

$$\bar{x} = \frac{5+7+12+8+13}{5} = 9,\ \ \bar{y} = \frac{4+6+10+12+8}{5} = 8$$

$$cov(x,y) = \frac{(5-9)*(4-8)+(7-9)*(6-8)+(12-9)*(10-8)+(8-9)*(12-8)+(13-9)*(8-8)}{5}$$

$= \frac{16+4+6-4+0}{5} = 4.4$

Since cov(x,y) > 0, therefore there exists a positive linear relationship between the variables.

3.5.2 Coefficient of correlation

Coefficient of correlation is a very popular measure of linear relationship between two variables. It not only tells the direction, but also the degree or strength of the relationship. Moreover,

it is free from any unit. Here, we are going to talk about two types of coefficients; Karl Pearson's and Spearman's.

Karl Pearson's coefficient of correlation: It is also called product moment coefficient of correlation. Pearson's coefficient of correlation is used for continuous data. Greek symbol ρ (rho) or sometimes r is used to denote the Pearson's coefficient of corrlelation.

$$r = \frac{cov(x,y)}{\sigma_x.\sigma_y} = \frac{\sum_{i=1}^{N}(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum_{i=1}^{N}(x_i-\bar{x})^2}\sqrt{\sum_{i=1}^{N}(y_i-\bar{y})^2}} = \frac{N\sum_{i=1}^{N}x_iy_i - \sum_{i=1}^{N}x_i \sum_{i=1}^{N}y_i}{\sqrt{N\sum_{i=1}^{N}x_i^2-(\sum_{i=1}^{N}x_i)^2}\sqrt{N\sum_{i=1}^{N}y_i^2-(\sum_{i=1}^{N}y_i)^2}}$$

The formula can be viewed as a normalized value of covariance as it is obtained by dividing covariance by product of two standard deviations. As a resut of this the value of coefficient of correlation always lies between -1 and +1. A value of +1 corresponds to perfect positive linear relationship. In this case all the data points of the scatter diagram falls on a straight line with slope of the line positive. Similarly, in case of perfect negative relationship, the value of coefficient of correlation is -1. In this case, all the points of the scatter diagram will lie on a line having a negative slope. If the value of coefficient is closer to -1 or +1, the relationship or association is strong. If the variables are linearly unrelated, the value of coefficient of correlation is zero. It should be noted here that, zero cefficient of correlation only tells no linear relationship. Therefore, some other relationship may be possible.

Example 3.2 Let us compute Karl pearson's coefficient of correlation for the bivariate data given in Example 3.1

$$\rho = \frac{cov(x,y)}{\sigma_x.\sigma_y}$$

The value of covariance between x and y is already computed as 4.4.

$$\sigma_x{}^2 = \frac{1}{5}\sum_{i=1}^{5}(x_i-\bar{x})^2 = \frac{1}{5}[(5-9)^2+(7-9)^2+(12-9)^2+(8-9)^2+(13-9)^2]$$

=9.2

$$\sigma_y{}^2 = \frac{1}{5}\sum_{i=1}^{5}(y_i-\bar{y})^2 = \frac{1}{5}[(4-8)^2+(6-8)^2+(10-8)^2+(12-8)^2+(8-8)^2]$$

= 8

Therefore, $\rho = \frac{4.4}{\sqrt{9.2*8}} = 0.512$

The value 0.512 indicates that there exists a moderate positive linear relationship between the variables x and y.

Example 3.3 In an experiment, following values related to a bivariate data were obtained:

$N = 20,\ \sum x = 125, \sum x^2 = 919, \sum y = 113, \sum y^2 = 773, \sum xy = 745$.

$$r = \frac{N\sum_{i=1}^{N} x_i y_i - \sum_{i=1}^{N} x_i \ \sum_{i=1}^{N} y_i}{\sqrt{N\sum_{i=1}^{N} x_i^2 - (\sum_{i=1}^{N} x_i)^2}\ \sqrt{N\sum_{i=1}^{N} y_i^2 - (\sum_{i=1}^{N} y_i)^2}} = \frac{20*745 - 125*113}{\sqrt{20*919-(125)^\wedge 2}\ \sqrt{20*773-(113)^\wedge 2}}$$

Simplifying the above, we obtain the value of ‘r’ as 0.284.

Assumptions of Karl Pearson’s coefficient of correlations. The calculation of pearsonian coefficient of correlation is based on following assumptions:

i. The variables under consideration are interval or ratio type
ii. There exists a linear relationship between the variables
iii. The variables are normally distributed

Properties of Karl Pearson’s coefficient of correlations. The main properties of Pearsonian coefficient of correlation is as below:

i. The value of coefficient of correlation lies between -1 and +1
ii. Coefficient of correlation is free from any unit
iii. Calculation of correlation coefficient is unaffected by change of origin and scale
iv. Coefficient of correlation is symmetric in nature

Correlation does not mean causality

Even if the value of coefficient of correlation is high, it may not be concluded that there is a cause and effect relationship between the variables. A high correlation only suggests pattern present in the data. The strong linear relationship may be due to another variable or reason. Therefore, further investigations should be done to understand if one variable is causing other to change.

Correlation is not causation! Often people make causal claims based on spurious or misleading correlation. In an article Michael Luca (HBR, 2021) has pointed out that business leaders and managers often confuse correlation with causation. For instance, in a study, a positive correlation was established between taking baths and cardiovascular disease. Based on the study, people may arrive at a conclusion that taking bath regularly reduces the risk of cardiovascular disease. But this is hard to conclude. It is likely that people who take bath regularly are less stressed and they have free time to relax. This could be the real reason why such people are at a lower risk of heart disease. Similarly, in 2013, marketing team of ebay believed that areas where more advertisements were shown, sales was high. An analysis was carried out by economists Tom Blake and others. Through experiment they found that ebay was targeting customers who were already likely to shop on ebay. Thus actually it was targeted customers' pre-existing purchase intentions responsible for both advertisement being shown and the purchase decisions.

Human capital is an important concept. It consists of health, education, knowledge, skills etc. of the people. Researchers have found a positive correlation between human capital and economic growth. S. Self and R. Grabowski (2004) found a significant positive correlation between various levels of education (Primary, Secondary and Tertiary) and growth in India. Education and growth are not only related but education has a causal impact on growth. Researchers perform causality tests to understand the causality.

Spearman's rank correlation. Karl Pearson's coefficient of correlation is useful for interval and ratio data. It is not appropriate for ordinal or ranked data. Charles Spearman (1863-1945) introduced the idea of correlation coefficient for ranked or ordinal data. However, the formula can be used for continuous data as well. Similar to Karl Pearson's coefficient, Spearman's rank correlation coefficient is also a measure of the degree and direction of association between two ranked data. But unlike Karl Pearson's correlation, Spearman's rank correlation does not require the assumption that there exists a linear relationship between variables (J. Hauke et al. 2011). It is a pure number and it always lies between -1 and +1. When the rankings of two seies of the data is same, rank correlation coefficient will be 1. On the other extreme, when the ranking of two series is diametrically opposite the rank correlation coefficient will be -1. We will use the notation r_R to represent rank correlation coefficient. The formula for computing r_R is given by:

$$r_R = 1 - \frac{6\sum d_i^2}{n(n^2-1)}$$

n is the number of observations and d_i , i=1,2,…,n represents difference in ranks of i-th observation.

Example 3.4 Two financial experts were asked to rank ten stocks for the benefit of investors. The rankings given by the experts are as below:

Stock	A	B	C	D	E	F	G	H	I	J
Expert I ranking	4	1	2	10	9	3	5	6	8	7
Expert II ranking	3	2	1	9	5	4	6	7	10	8

Here rankings of the stocks by experts are already given. Spearman's rank correlation coefficient can be computed as below:

Stock	Expert I ranking	Expert II ranking	d	d^2
A	4	3	1	1
B	1	2	-1	1
C	2	1	1	1
D	10	9	1	1
E	9	5	4	16
F	3	4	-1	1
G	5	6	-1	1
H	6	7	-1	1
I	8	10	-2	4
J	7	8	-1	1

n =10, and $\sum d_i^2 = 28$.

Therefore $r_R = 1 - \frac{6\sum d_i^2}{n(n^2-1)} = 1 - \frac{6*28}{10*(100-1)} = 0.8303$

The value of rank correlation coefficient suggests that the similarilty in ranking of the stocks by two experts is high.

It may happen that while assigning ranks to the data, the values in the series are equal. This may lead to the case of tied ranks. In such cases the modiefied rank correlation coefficient formula is used. The modified formula:

$$r_R = 1 - \frac{6[\sum d_i^2 + \frac{1}{12}(m_1^3 - m_1) + \frac{1}{12}(m_2^3 - m_2) + \cdots]}{n(n^2-1)}$$

Example 3.5 Calculate the rank correlation coefficient for the following data:

X	14	10	12	17	10	15	10	12	19	11
Y	21	16	32	25	30	16	20	22	35	23

In the given data set ranks are not given. First we require to rank the data. Smallest element in a series is given rank 1. One can alternatively choose to give rank 1 to greatest element in the series also. Next smallest element is given rank 2. The process should be repeated till all the element of a series are ranked. In case of tie, a tied rank is given to all such elemnts. For instance, in series 1, a value 10 is repeated thrice. If we put the data in increasing order these three 10s will occupy position first, second and third. Arithmetic mean of position 1,2, and 3 turns out to be 2. Therefore a common rank 2 is assigned to all the three 10s. Next smallest value 1 is assigned rank 4. Continuing this process all the values in both the series is assigned ranks as given in the following table:.

X	Y	r_1	r_2	$d=r_1-r_2$	d^2
14	21	7	4	3	9
10	16	2	1.5	0.5	0.25
12	32	5.5	9	-3.5	12.25
17	25	9	7	2	4
10	30	2	8	-6	36
15	16	8	1.5	6.5	42.25
10	20	2	3	-1	1
12	22	5.5	5	0.5	0.25
19	35	10	10	0	0
11	23	4	6	-2	4

Number of observation n = 10, $\sum d_i^2 = 109$. Three values in series 1 have got equal rank 2 and two values have got equal rank of 5.5. In series 2, two values have got equal rank 1.5. Therefore, $m_1 = 3$, $m_2 = 3$, and $m_3 = 3$.

$$r_R = 1 - \frac{6[\sum d_i^2 + \frac{1}{12}(m_1^3 - m_1) + \frac{1}{12}(m_2^3 - m_2) + \frac{1}{12}(m_3^3 - m_3)]}{n(n^2-1)} = 1 - \frac{6[109+2+0.5+0.5}{990} = 0.321.$$

Thus, there is positive correlation between two variables. The strength of correlation is low.

3.5.2 Coefficient of Determination

Coefficient of determination is obtained by squaring the value of coefficient of correlation. It's a pure number lying between 0 and 1. It tells about the strength of the relation only. Yet this concept is useful because quite often we are interested in knowing the strength of the relation rather than direction. Moreover, the value of coefficient of determination interprets the amount of variation in dependent variable explained by independent variable. Coefficient of determination is generally denoted by R^2 or r^2. Coefficient of determination is also useful for comparing the strength of relationship between different datasets. For instance, consider coefficient of correlation for one dataset is 0.4 and for another dataset is 0.8. Then it can be said that extent of correlation in second dataset is four times stronger than that in first dataset as the values of coefficient of determination for the two datasets is respectively 0.16 and 0.64.

Example 3.6 Let us consider the value of coefficient of correlation between income and level of education as 0.8. Here income can be regarded as a dependent variable and level of education as independent variable.

For this example coefficient of determination turns out to be 0.64. Therefore, 64 percent of the variation in income is due to level of education. It also means that remaining variation in income is explained by other factors.

Coefficient of determination can also be computed directly using the following formula:

$$R^2 = 1 - \frac{Explained\ variability\ in\ y}{Total\ variablility\ in\ y} = 1 - \frac{\sum(y_i - \hat{y_i})^2}{\sum(y_i - \bar{y})^2}.$$

Here $\bar{y}$ is the mean of the dependent variable y, and $\hat{y}$ denotes estimated value of y for a given value of the independent variable.

ACTIVITY

(iii) Investigate the relation between consumer spending and GDP. Collect a relevant data of consumer spending and GDP in Indian context and compute the coefficient of correlation

(iv) In order to study the correlation between stock prices of two software companies, collect their weekly stock price data (30 weeks). Determine coefficient of correlation and coefficient of determination.

(v) Collect a data of 40 students of your class. The data should comprise of two variables, 'time spent on social media' and 'marks scored in statistics class test'. Compute the coefficient of correlation. Do you think there exists a cause and effect relationship.

IN-TEXT QUESTIONS

6. Covariance is an absolute measure. True / False
7. Covariance is free from any unit. True / False
8. Covariance measures degree as well as direction of the relationship. True / False
9. Karl Pearson's coefficient of correlation is a relative measure. True / False
10. Karl Pearson's coefficient of correlation is a pure number. True / False
11. The value of Karl Pearson's coefficient of correlation lies between_______________.
12. Karl Pearson's coefficient of correlation:
    a) has same unit as that of covariance
    b) is dependent on origin
    c) is dependent on scale
    d) is independent of origin and scale
13. Which of the following does not measure linear relationship between two variables:
    a) variance
    b) scatter diagram
    c) covariance
    d) coefficient of correlation
14. Which of the following is not true about Spearman's rank correlation coefficient:
    a) it's a pure number
    b) it is suitable for ordinal data
    c) it lies between -1 and +1
    d) it's an absolute measure

3.6 Hypothesis test for Correlation Coefficient

The computation of correlation coefficient is based on a sample data. Occurrence of sampling error may not be ruled out during analysis. Thus, presence of correlation between variables may be due to chance also. For example, in above paragraph we talked about correlation between income and level of education as 0.8. This indicates a strong correlation between the variables. However, we are not sure if this value is valid for the entire population.

To deal with this situation, test of hypothesis concerning population correlation coefficient (ρ) is done. It is tested if the population correlation coefficient (ρ) is zero. Null and alternate hypothesis is constructed as below:

Null Hypotheis (H_0) : $\rho = 0$

Alternate Hypothesis (H_1) : $\rho \neq 0$

Test statistic consists of t-test and is given by:

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$ with n-2 degrees of freedom.

Here n is number of observation and r is the correlation coefficient computed from sample.

Example 3.7 Consider in above example of income and level of education, n=20, r = 0.8 and level of significance $\alpha = 0.05$.

$$t = \frac{0.8*\sqrt{20-2}}{\sqrt{1-0.8^2}} = 5.66$$

Critical value: $t_{18,\ 0.05} = 2.1$. Since computed value of t-statistic is greater than 2.1, therefore reject the null hypothesis that population correlation coefficient is zero. It may be concluded that there is statistical evidence the variables income and level of education are correlated.

Probable error of correlation coefficient. Probable error (PE) of correlation coefficient can also be used to validate the value of correlation coefficient. Probable error of the correlation coefficient is given by expression 0.6745*SE(r). Here SE(r) is the standard error of r, and is given by:

$$SE(r) = \frac{(1-r^2)}{\sqrt{n}}. \qquad \text{Thus } PE = \frac{0.6745(1-r^2)}{\sqrt{n}}.$$

It can be observed here that greater the value of 'n' (sample size), smaller is the value of probable error. The observed correlation coefficient is considered significant if it is six times greater than the value of probable error. If the value of r is less than probable error then r is not considered significant.

In Example 3.7, $PE = \frac{0.6745(1-0.8^2)}{\sqrt{20}} = 0.054$

6*PE = 6*0.054 = 0.324

Since the value of of r is greater than 0.324, therefore correlation coefficient can be regarded as significant.

IN-TEXT QUESTIONS

15. F-test is used for testing the significance of correlation coefficient. True / False.
16. In an analysis of correlation, sample size n is 16. While testing the significance of correlation coefficient, degrres of freedom in t-test will be ____.
17. Correlation coefficient is considered significant if it is six times greater than __.

3.7 SUMMARY

In this chapter an attempt was made to understand the association between two variables. We learned how to measure the correlation between two variables. Correlation was measured graphically as well as numerically. First scatter diagram was used to present the idea. Then three numerical measures; covariance, coefficient of correlation, and coefficient of determination were utilized to study the correlation between two variables. Testsing of hypothesis concerning population correlation coefficient was also discussed. At the end another useful idea of probable errors for checking the significance of correlation coefficient was explained. Numerical examples were presented to illustrate the idea.

3.9 GLOSSARY

Correlation analysis: It deals with relation between two or more variables

Scatter diagram: A diagram obtained after plotting all the data points in an xy-plane.

Simple correlation: Correlation between two variables.

Standard error: Standard error is nothing but standard deviation of a statistic. It gives an idea about how much a statistic would vary if different samples are taken.

3.10 ANSWERS TO IN-TEXT QUESTIONS

1. bi-variate	9. True
2. True	10. True
3. a) positive relationship	11. -1 and +1
4. b) in a straight line	12. d) is independent of origin and scale
5. a) negative relation	13. a) variance
6. True	14. d) it's an absolute measure
7. False	15. False
8. False	16. 14

	17. probable error (PE)

3.11 SELF-ASSESSMENT QUESTIONS

14. On a certain performance test, ten employees in an organization were given following scores by two HR managers:

Manager 1	10	14	13	15	20	16	10	17	19	16
Manager 2	16	14	15	16	18	22	15	20	23	21

Calculate Spearman's rank correlation coefficient for the data.

15. A data of an organization reveals that the ratio between 'dividends paid' and 'net income' has always been 1:3. Calculate the correlation coefficient between 'dividends paid' and 'net income' of the company.
16. In an experiment, following values related to a bivariate data were obtained:
$N = 10,\ \sum x = 150, \sum x^2 = 2352, \sum y = 180, \sum y^2 = 3336, \sum xy = 2766$.
Based on the given information, compute the following:
(i) Variances of x and y series
(ii) Covariance(x,y)
(iii) Karl Pearson's coefficient of correlation
17. A data of ten alumni of a B-school was collected to understand how much income they are earning after working for certain number of years

Number of years	12	6	5	10	8	9	15	6	10	9
Income (in lacs)	30	20	18	25	20	18	30	10	15	14

Calculate the Karl Pearson's coefficient of correlation. What percentage of variation in income is explained by number of years (working). Test the significance of correlation coefficient.

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LESSON 5

PROBABILITY THEORY

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STRUCTURE

5.1 LEARNING OBJECTIVES

After going through this unit, you should be able to:

- Understand the difference between deterministic and random experiments.
- Define sample space, events and use of different algebraic operations for events.
- Define probability using classical, empirical and axiomatic approach.

- Understand the concept of conditional probability and able to solve problem based on it.
- Prove and apply Baye's theorem
- Define random variable, discrete random variable and continuous random variable and understand the difference between them.

5.2 INTRODUCTION

The use of statistical methodology is indispensable in modern era. It has a wide application in every discipline, be it physical sciences, engineering and technology, economics or social sciences. For their advance research they are applying statistical tools. It is essential for the students to get acquainted with the subject of probability and statistics at an early stage. The first attempt to give quantitative measure of probability was made by, an Italian mathematician Galileo (1564-1642). This course is design to provide you with a basic, intuitive and practical introduction into Probability Theory. In this unit topic covered are Probability: meaning and need, different definition of probability, theorem of addition and multiplication, conditional probability, Baye's theorem, random variable, discrete and continuous random variable.

5.3 PROBABILITY: MEANING AND NEED

The probability can be defined as the "Mathematics of Chance". The word probability or chance we often experienced in our daily life. We usually say that it is very probable that it will rain today or it is expected that today is a sunny day. It is obvious that these expectations are comes from our personal view. For the clearer view of probability we explore the few definitions.

***Deterministic and Random Experiments*:**

Every experiment consists of three major steps:

- Input: It relates to the equipments, material, input data etc which involves in any experiment.
- Action: Any experiment is performed using the input.
- Output: The results or outcome of the action, called the output of the experiment.

Definition: A **deterministic experiments** are those experiments in which fixed input and action yields fixed output. We can predict the output of the experiment. For example; distance covered by a car travelling at a constant speed, ohm's law, determining gravitational constant at a place, *etc*.

In all the above mentioned examples for a fixed input and action, we get a fixed output.

Definition: A **random or non-deterministic experiments** are those experiments in which fixed input and action does not yields the fixed output. For example; tossing a coin or throwing a dice, *etc*. In these examples we does not predict the exact outcome beforehand.

In probability theory we are mainly concerned with the random experiments.

***Sample Space*:**

It is the set of all possible outcomes of a random experiment. Usually it is denoted by the Ω and a point belonging to Ω by $\omega \in \Omega$. Some examples of sample space are:

- In tossing a coin the sample space is $\Omega = \{H, T\}$
- In throwing a dice the sample space is $\Omega = \{1, 2, 3, 4, 5, 6\}$
- In a coin tossing experiment if we toss a coin three tiems then the sample space is $\Omega = \{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$.
- In observing the queue size at a college fee counter, the sample space is given by $\Omega = \{0,1,2,3, \dots, \dots\}$.
- The sample space for the time taken (in minutes) to download a website is observed as $\Omega = \{t: 0 < t < \infty\}$.

***Events*:** It is the set of possible outcomes of a random experiment or An event A is a set of specific outcomes we are interested in. It is obvious that an event is a subset of sample space Ω. If we denote an event associated with a random experiment by A and Ω is the corresponding sample space then $A \subseteq \Omega$. For example:

- Toss a coin and we define event A that outcome is "H" then
  $A = \{H\}$
- Throw a dice. Let A be the event that outcome is an odd number
  A={1,3,5}
- Toss a coin until we obtain an "H". A be the event that number of tosses is more than 3
  A={TTTH, TTTTH…}
- No customer in the queue at the college fee counter
  A={0}

Firstly, we have to define about random experiment and sample space then only we can talk about event. Otherwise it make no sense. In throwing a dice (random experiment), $\Omega = \{1, 2, 3, 4, 5, 6\}$ (sample space), and define A be the event that outcome is an odd number then, A={1,3,5}, and if outcome is 3, then A occurs whereas if outcome is 4 then A does not occur.

An event is said to be a **sure event** if it is occur in a single trial. In other word sample space Ω is sure to occur. Further, the **null or impossible event** is denoted by ϕ.

***Algebra of Events*:**

Since an event is a subset of the sample space, it is also a set and we can perform different algebraic operations like union, intersection, complement *etc.* on events.

Let A and B be two events on the sample space Ω. Then we have different algebraic operations are as follows:

- **Union:** $A \cup B$ is an event which occurs when either A or B (or both) occur.
- **Intersection:** $A \cap B$ is an event which occurs when both A and B occur.
- **Complement:** An event which occurs whenever A does not occur is called the complement of event A and is denoted by A^c or $\bar{A}$.
- **Difference**: $A \sim B = A \cap B^c$ be an event which occurs when A occurs and B does not occur. It is obvious that $A^c = \Omega \sim A$.

***Exhaustive events*:** The total number of possible outcomes in an random experiment is called exhaustive events. In tossing a coin experiment, there are two exhaustive cases, *viz.*, head and tail and In throwing a dice experiment, there are six exhaustive cases, *viz.*, 1, 2, 3, 4, 5, 6.

***Mutually exclusive events*:** Two events A and B are said to be mutually exclusive if $A \cap B = \phi$ *i.e.*if the occurrence of one does not precludes the occurrence of other. In throwing a dice experiment "2 occurs" and "5 occurs" are mutually exclusive events.

***Equally likely events*:** Two events A and B are said to be equally likely if P(A)=P(B). In a pack of well-shuffled 52 cards, all the cards are equally likely to appear at the time of experiment of dwaing a card at random.

5.3.1 The Classical Definition of probability

Let us assume that, N is the total number of elementary events in the sample space and is finite. We also assume that all the elementary events are equally likely to occur. Under these assumption the classical (or mathematical or a priori) definition of probability is:

***Definition*:** If a random experiment can result in N mutually exclusive, exhaustive and equally likely outcomes, out of which n are favourable to occurrence of an event A, then the probability 'p' of occurrence of A is given by:

$$p = P(A) = \frac{n}{N} = \frac{total\ number\ of\ favourable\ cases}{total\ number\ of\ exhaustive\ cases}.$$

Example 1: An unbiased (all faces of the dice are equally likely) dice is thrown. Let A be the event that we obtain an odd number. Then

$$\Omega = \{1, 2, 3, 4, 5, 6\}; A = \{1,3,5\}$$

so that, $P(A) = \frac{3}{6} = \frac{1}{2}$.

Example 2: Two unbiased coins are tossed. Let us define an event A that getting at least one head. Then

$$\Omega = \{HH, HT, TH, TT\}; A = \{HH, HT, TH\}$$

so that, $P(A) = \frac{3}{4}$.

Remark: The classical definition of probability, however suffers from some serious darwbacks.

i. When outcomes of the random experiments are not equally likely then this definition fails.
ii. It is a circular definition means the term equally likely is defined in terms of probability and the term equally likely is used in defining probability.
iii. When the total number of elementary events in the sample space is infinite.

ACTIVITY

Take a coin and spin it 5000 times. Note down the value, *n*, the number of times spins made and *m*, the number of heads in the spins. Now find out the proportion between these two values and see their fluctuations and draw it on a graph.

5.3.2 Empirical or Statistical Definition of Probability

Relative Frequency Ratio: Let an event A occurs n times in m repititions of a random experiment. Relative frequency ratio of event A is defined as

$$f_A = \frac{n}{m}.$$

Obviously,

i. $0 \le f_A \le 1$
ii. $f_A = 1$, iff, A occurs every time in m repetitions of the experiments;
iii. $f_A = 0$, iff, A never occurs in m repetitions;
iv. For two mutually exclusive events A and B

$$f_{A \cup B} = f_A + f_B.$$

As $m \to \infty$, f_A converges to P(A) in certain probabilistic sense. This property gives the empirical or statistical definition of probability.

The only assumption for this definition is that the experiments must be conducted under identical conditions and the number of trials must be large.

Remark: The disadvantage of this definition is that if an experiment is repeated a large number of times, the experimental conditions may not remain identical and homogeneous.

5.3.3 Axiomatic Definition of Probability

Axiomatic definition of probability was formulated by Russian Mathematician A.N. Kolmogorov. There are three simple axioms on which the whole field of probability theory for finite sample space is based, is given below:

Definition: Probability Function, P(A) is the probability function defined on a $\sigma - field$ B of events if the following axioms hold.

1. *Axiom of non-negativity*: $0 \leq P(A) \leq 1$.
2. *Axiom of certainty*: $P(\Omega) = 1$.
3. *Axiom of additivity*: For pair wise mutually exclusive events $A_1, A_2, \dots, \dots$
   $\left(A_i \cap A_j = \emptyset\right) \forall i \neq j, P(\cup_i A_i = \sum_i P(A_i))$.

Remark:

i. $\sigma - field$: A $\sigma - field$ B is a non-empty class of sets that is closed under the formation of 'countable unions' and complementations, *i.e.*,
   (i) $A_i \in B, i = 1,2, \dots \Rightarrow \cup_{i=1}^{\infty} A_i \in B$. (ii) $A \in B \Rightarrow \bar{A} \in B$
ii. The above axiomatic definition of probability has an obvious advantage, that is, it does not concerned with assigning numerical values to the probabilities of events.

5.3.4 Some Important Results on Probability

Some important results as below:

(i) $P(A^c) = 1 - P(A)$

Proof: We have

$$A \cap A^c = \emptyset$$

Thus A and A^c are mutually exclusive. Further

$$A \cup A^c = \Omega$$

Hence,

$$P(A \cup A^c) = P(\Omega)$$

$P(A) + P(A^c) = 1$, (by axiom 2 and 3)

or, $P(A) = 1 - P(A^c)$

(ii) $P(A \cap B^c) + P(A \cap B) = P(A)$

Proof: We observe that

$$(A \cap B) \cap (A \cap B^c) = A \cap (B \cap B^c)$$

$$= A \cap \emptyset = \emptyset$$

So that $(A \cap B)$ and $(A \cap B^c)$ are mutually exclusive. Further

$$(A \cap B) \cup (A \cap B^c) = A \cap (B \cap B^c)$$

$$= A \cap \Omega = A$$

Hence

$$P[(A \cap B) \cup (A \cap B^c)] = P(A)$$

or, $P(A \cap B) + P(A \cap B^c) = P(A)$ (using axiom 3)

(iii) **Theorem of Addition**

Statement: If A and B are any two events (subsets of sample space Ω) and are not disjoint, then

$$P(A \cup B) = P(A) + P(B) - P(A \cap B).$$

Proof: We can write

$$A \cup B = A \cup (A^c \cap B)$$

Again $A \cap (A^c \cap B) = \emptyset$, so that A and $A^c \cap B$ are mutually exclusive.

Hence

$$P(A \cup B) = P(A \cup (A^c \cap B))$$

$$= P(A) + P(A^c \cap B) \qquad \text{[By Axiom 3]}$$

Further, using result (ii), we have

$$P(A^c \cap B) = P(B) - P(A \cap B)$$

Hence we obtain

$$P(A \cup B) = P(A) + P(B) - P(A \cap B).$$

Example 1. A fair coin is flipped successively at random until heads is observed on two successive flips. Write down the sample space Ω.

Solution. Let x denote the number of flips of the coin that are required, then

$\Omega = \{x: x = 2, 3, 4, \ldots\}$.

Example 2. If a pair of dice is thrown, what is the event of

(i) getting a sum less than 6
(ii) getting a sum greater than 6
(iii) getting a number multiple of 2 on the first die

(iv) getting a number multiple of 3 on the first die and a multiple of 2 on the second die

(v) getting a doublet

(vi) getting sum as 10

Solution. If a die is thrown twice or a pair of dice is thrown simultaneously, then sample space is

Ω = {(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)}.

Hence, $n(\Omega) = 36$.

(i) Let A_1 be the event of getting a sum less than 6.
$\therefore A_1$= {(1, 1), (1, 2), (1, 3), (1, 4), (2, 1), (2, 2), (2, 3), (3, 1), (3, 2), (4, 1)}.

(ii) Let A_2 be the event of getting a sum greater than 6.
$\therefore A_2$= {(1, 6), (2, 5), (2, 6), (3, 4), (3, 5), (3, 6), (4, 3), (4, 4), (4, 5), (4, 6), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)}.

(iii) Let A_3 be the event of getting a number multiple of 2 on the first die.
$\therefore A_3$= {(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)}.

(iv) Let A_4 be the event of getting a number multiple of 3 on the first die and a multiple of 2 on the second die.
$\therefore A_4$= {(3, 2), (3, 4), (3, 6), (6, 2), (6, 4), (6, 6)}.

(v) Let A_5 be the event of getting a doublet
$\therefore A_5$= {(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)}.

(vi) Let A_6 be the event of getting a sum as 10
$\therefore A_6$= {(4, 6), (5, 5), (6, 4)}.

Example 3. A letter of the English alphabet is chosen at random, write the event that the letter so chosen

(i) is a vowel

(ii) precedes S (in alphabetical order)

(iii) follows K and precedes T and is a vowel

Solution. A letter of the English alphabet is chosen then the sample space is Ω is

Ω = {A, B, C, …, X, Y, Z}, $n(\Omega) = 26$

(i) Let A_1 be the event that letter chosen at random be a vowel
$\therefore A_1$= {A, E, I, O, U}

(ii) Let A_2 be the event that letter chosen at random be precedes 's'
$\therefore A_2$= {A, B, C, D, …, P, Q, R}

(iii) Let A_3 be the event that letter chosen follows K and precedes T and is a vowel
$\therefore A_3 = \{O\}$

Example 4. A card is selected at random from a pack of 52 cards. Let *A* = 'the card is a club' and *B* = 'the card is a queen'. Find *P*(*A*), *P*(*B*).

Solution. $p = \frac{n}{N} = \frac{total\ number\ of\ favourable\ cases}{total\ number\ of\ exhaustive\ cases}$.

For event *A*, *n* = 13 (there are 13 club in a pack of card), and for event *B*, *n* = 4 (there are 4 queen in a pack of card). Therefore

$P(A) = \frac{13}{52}\ and\ P(B) = \frac{4}{52} = \frac{1}{13}$.

Example 5. An urn contains 6 white, 4 red and 9 green balls. If 1 ball is drawn at random, find the probability that:

(i) it is white
(ii) it is not green
(iii) it green or red

Solution. Total number of balls in the urn is 6 + 4 + 9 = 19 (total number of exhaustive cases). Since one ball is drawn at random then

(i) Let E_1 be the event that it is a white ball
$$P(E_1) = \frac{total\ number\ of\ favourable\ cases}{total\ number\ of\ exhaustive\ cases} = \frac{6}{19}$$
(ii) Let E_2 be the event that it is not a green ball
$$P(E_2) = \frac{total\ number\ of\ favourable\ cases}{total\ number\ of\ exhaustive\ cases} = \frac{10}{19}$$
(iii) Let E_3 be the event that it is a green or a red ball
$$P(E_3) = \frac{total\ number\ of\ favourable\ cases}{total\ number\ of\ exhaustive\ cases} = \frac{13}{19}$$

Example 6. What is the probability of getting 53 Sundays in a randomly selected leap year?

Solution. We know that there are 366 days (52 complete weeks and 2 days over) in a leap year. The following are the possible outcomes for these 2 over days:

(i) Sunday and Monday
(ii) Monday and Tuesday
(iii) Tuesday and Wednesday
(iv) Wednesday and Thursday
(v) Thursday and Friday
(vi) Friday and Saturday
(vii) Saturday and Sunday

Let A be the event of getting 53 Sundays. There will be 53 Sundays in a leap year, when one of the two over days must be Sunday. Since out of 7 possibilities, only 2, *viz.*, (i) and (vii) are favorable to the event.

Therefore, $P(A) = \frac{2}{7}$.

Example 7. Two coins are tossed. Let *A* be the event 'two heads are obtained', and, *B* be the event 'one head and one tail is obtained'. Find *P*(*A*), *P*(*B*).

Solution. The sample space Ω in this case is

$$\Omega = \{\mathrm{HH, HT, TH, TT}\}$$

For event *A*, number of favorable case is 1 *i.e.*, {HH}.

$$P(A) = \frac{total\ number\ of\ favourable\ cases}{total\ number\ of\ exhaustive\ cases} = \frac{1}{4}$$

For event *B*, number of favorable case is 2 *i.e.*, {HT, TH}.

$$P(B) = \frac{total\ number\ of\ favourable\ cases}{total\ number\ of\ exhaustive\ cases} = \frac{2}{4} = \frac{1}{2}.$$

Example 8. If the letters of the word MANAGEMENT are arranged randomly then find the probability that all vowels come together.

Solution. Let A be the event that selected word contains all vowels together. There are 10 letters in 'MANAGEMENT' and in this word vowels are 4 *i.e.*, 2 A, 2 E. If we consider these vowels as a single letter then we have 7 letters i.e. $\boxed{\text{AAEE}}$, 2 M, 2 N, 1 G, 1 T.

Number of possible arrangements with 4 vowels coming together is = $\frac{7!}{2!.2!}$

Number of favorable cases for event A is = $\frac{7!}{2!.2!}$

Number of exhaustive cases = Total number of permutations of 10 letters in the word MANAGEMENT is = $\frac{10!}{4!.2!.2!}$ [out of 10 letters, 4 vowel, 2 M and 2 N]

$$P(A) = \frac{\frac{7!}{2!.2!}}{\frac{10!}{4!.2!.2!}} = \frac{1}{30}.$$

5.4 CONDITIONAL PROBABILITY

The probability of occurrence of any event may be influenced by the information about the occurrence of an event which already occured. Here we are going to introduce the concept of conditional probability. Let start with an example:

Example 1: Consider a bag containing 100 balls out of which 60 are red balls. Two balls are selected randomly (i) with replacement; (ii) without replacement. Let

A={first ball is red}

B={second ball is red}

In with replacement case P(A)=P(B)=60/100=3/5.

In without replacement case P(A)=3/5. If A has already occurred, probability of occurrence of B is 59/99. If A has not occurred, probability of occurrence of event B is 60/99. Hence the information about the occurrence of event A influence the probability of occurrence of event B.

Definition: Let A and B are two events defined on the sample space Ω. Then conditional probability of B, given A (means A already occur) and is denoted by $P(A|B)$, is defined as

$$P(A|B) = \frac{P(A \cap B)}{P(A)}, provided\ P(A) \neq 0.$$

Further, let us suppose that in the sample space of a random experiment there are N exhaustive, mutually exclusive and equally likely outcomes. Out of which N_A outcomes are favourable to event A and N_B outcomes are favourable to event B and $N_{A\cap B}$ outcomes are favourable to $A \cap B$. Then

$$P(A|B) = \frac{N_{A\cap B}}{N_A} = \frac{N_{A\cap B}/N}{N_A/N} = \frac{P(A\cap B)}{P(A)}.$$

Remark:

i. For the conditional probability $P(A|B)$, A behaves like a new sample space.
ii. The unconditional probability of an event A, P(A) may be viewed as a conditional probability of event A given Ω.

5.4.1 Theorem of Multiplication

Statement: From the definition of conditional probability, for two event A and B,

$$P(A \cap B) = P(A).P(B|A), P(A) > 0$$
$$= P(B).P(A|B), P(B) > 0$$

where, $P(B|A)$ represents conditional probability of happening of B when the event A has already occurred and $P(B|A)$ represents conditional probability of occurrence of B when the event A has already happened.

Proof: In the usual notation we have

$$P(A) = \frac{N_A}{N};\ P(B) = \frac{N_B}{N}\ and\ P(A \cap B) = \frac{N_{A\cap B}}{N} \qquad (*)$$

For the event A|B, the sample space is B and out of N_B sample points, $N_{A\cap B}$ pertain to be happen of the event A. Hence

$$P(A|B) = \frac{N_{A\cap B}}{N_B}$$

Rewriting (*), we get: $P(A \cap B) = \frac{N_B}{N} \times \frac{N_{A\cap B}}{N_B} = P(B).P(A|B)$ (**)

Similarly, we get from (*) $P(A \cap B) = \frac{N_A}{N} \times \frac{N_{A\cap B}}{N_A} = P(A).P(B|A)$ (***)

From (**) and (***), we get the result.

5.4.2 Independent Events and Baye's Theorem

***Independent Events*:**

Let us consider the concept of conditional probability with an example. Suppose from a well shuffled pack of 52 card, a card is draw at random, then the probability of drawing a club is $13/52$. If the draw was done without replacement, then for the next draw, the probability of drawing the second card 'a card of club' is $12/51$ and it is the conditional probability. Now, if the first draw was done with replacement, then the conditional probability would have been $13/52$. This implies that if it is done with replacement, then the probability of second draw and subsequent draws was remains unaltered. So, the happening or non-happening of any draw does not affected by the preceding draws. This example helps you in better understanding of the concept of independent event.

Let us now define independent event:

***Definition*:** Two events are said to be independent whenever

$$P(A \cap B) = P(A).P(B).$$

If two events are independent then

$$P(B|A) = P(B)\ and\ P(A|B) = P(A), provided\ P(A) > 0, P(B) > 0.$$

Law of Total Probability

***Statement*:** Let Ω be the sample space and $E_1, E_2, \dots, E_n$ are n exhaustive and mutually exclusive events with $P(E_i) \neq 0; i = 1,2, \dots, n$. Let A be any event which is a subset of $\cup E_i$ (means at least one of the events $E_1, E_2, \dots, E_n$) with $P(A) > 0$, then

$$P(A) = P(E_1)P(A|E_1) + P(E_2)P(A|E_2) + \cdots + P(E_n)P(A|E_n)$$

$$= \sum_{i=1}^{n} P(E_i)P(A|E_i)$$

***Proof*:** As a is a subset of $E_1 \cup E_2 \cup \dots \cup E_n$. Therefore,

$$A = A \cap (E_1 \cup E_2 \cup \dots \cup E_n) \qquad [\because if\ A\ is\ subset\ of\ B, then\ A = A \cap B]$$

$$\Rightarrow A = (A \cap E_1) \cup (A \cap E_2) \cup \dots \cup (A \cap E_n) \quad \text{[Distributive property of set theory]}$$

$$= (E_1 \cap A) \cup (E_2 \cap A) \cup \dots \cup (E_n \cap A)$$

$$\Rightarrow P(A) = P[(E_1 \cap A) \cup (E_2 \cap A) \cup \dots \cup (E_n \cap A)]$$

$$= P(E_1 \cap A) + P(E_2 \cap A) + \cdots + P(E_n \cap A)$$

[$\because E_1, E_2, \dots, E_n$ *and hence* $(E_1 \cap A), (E_2 \cap A), \dots, (E_n \cap A)$ *are mutually exclusive*]

$$= P(E_1)P(A|E_1) + P(E_2)P(A|E_2) + \cdots + P(E_n)P(A|E_n)$$

[Using multiplicative theorem for dependent events]

$$= \sum_{i=1}^{n} P(E_i)P(A|E_i).$$

***Baye's Theorem*:**

- Bayes theorem was given by Thomas Bayes (1701-1761).
- Knowing the outcome of a particular situation, Bayes theorem enables us to find the probability that the outcome occurred as a result of a particular previous event.

For example, In a certain assembly plant, three machines, B1, B2, and B3, make 30%, 45%, and 25%, respectively, of the products. It is known from past experience that 2%, 3%, and 2% of the products made by each machine, respectively, are defective. Now, suppose that a finished product is randomly selected and found to be defective, what is the probability that it was made by machine B3?

- This theorem is also known as 'Inverse probability theorem', because here moving from first stage to second stage, we again find the probabilities (revised) of the events of first stage i.e. we move inversely.

***Statement*:**

Let Ω be the sample space and $E_1, E_2, \dots, E_n$ are n exhaustive and mutually exclusive events with $P(E_i) \neq 0; i = 1,2, \dots, n$. Let A be any event which is a subset of $\bigcup E_i$ (means at least one of the events $E_1, E_2, \dots, E_n$) with $P(A) > 0$, then

$$P(E_i|A) = \frac{P(E_i)\,P(A|E_i)}{P(A)}; i = 1,2, \dots, n$$

***Proof*:** From the theorem of total probability, we have

$P(A) = P(E_1)P(A|E_1) + P(E_2)P(A|E_2) + \cdots + P(E_n)P(A|E_n)$ [you have to prove it]

Also we have

$P(A \cap E_i) = P(A)P(E_i|A)$

$$\Rightarrow P(E_i|A) = \frac{P(A \cap E_i)}{P(A)} = \frac{P(E_i)\, P(A|E_i)}{\sum_{i=1}^{n} P(E_i) P(A|E_i)}.$$

Remarks:

$P(E_i)$'s are known as "a priori (or prior) probabilities". They exist before we gain any information about A (the result of a experiment).

$P(A|E_i)$'s are known as "likelihoods". They indicate how likely event A to occur under the information that E_i occurs.

$P(E_i|A)$'s are known as 'a posteriori (or posterior) probabilities". They are determined after the results of the experiment are known.

Example 9. A fair die is thrown, what is the probability of getting either a number multiple of 3 or a prime number.

Solution. A fair die is thrown then sample space is

$\Omega = \{1, 2, 3, 4, 5, 6\}$.

Let A be the event of getting a number multiple of 3 and B be the event of getting a prime number.

∴ A = {3, 6} and B = {2, 3, 5}, A∩B = {3} [a non empty set]

Hence required probability is

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{2}{6} + \frac{3}{6} - \frac{1}{6} = \frac{4}{6} = \frac{2}{3}.$$

Example 10. A box contains three red cards and three green cards numbered as follows:

Red	***Green***
$\boxed{1}$ $\boxed{1}$ $\boxed{2}$	$\boxed{1}$ $\boxed{2}$ $\boxed{2}$

One card is picked out of the box at random. If *A* is the event 'the card is green' and *B* is the event 'the card is marked 2', are *A* and *B* independent?

Solution. $P(A) = \frac{3}{6} = \frac{1}{2}$ since 3 cards are green.

$P(B) = \frac{3}{6} = \frac{1}{2}$ since 3 cards are marked 2.

$P(A \cap B) = P(card\ is\ green\ and\ marked\ 2) = \frac{2}{6} = \frac{1}{3}$ since 2 cards satisfies this condition.

Now $\frac{1}{3} \neq \frac{1}{2} . \frac{1}{2}$, so A and B are not independent.

Example 11. Three cards are drawn at random one by one without replacement from a well shuffled pack of 52 playing cards. What is the probability that first card is ace, second is queen and the third is again a jack.

Solution. Let A_1 be the event of drawing ace in the first draw, A_2 be the event of drawing queen in the second draw and A_3 be the event of drawing jack in the third draw.

Therefore, required probability is

$$P(A_1 \cap A_2 \cap A_3) = P(A_1)P(A_2|A_1)P(A_3|A_1 \cap A_2)$$

$$= \frac{4}{52}\frac{4}{51}\frac{4}{50} = \frac{1}{13}\frac{4}{51}\frac{2}{25} = \frac{8}{33150}.$$

Example 12. Let A and B are independent events,

(i) If P(A) = 0.4 and P(A∪B) = 0.16 then find P(B).

(ii) If P(A) = 0.5 and P(B) = 0.4, then find P(A|B) and P(B|A).

(iii) If P(A) = 0.4 and P(B) = 0.2, then find $P(\bar{A} \cap B), P(A \cap \bar{B}), P(\bar{A} \cap \bar{B})$.

Solution. (i) Given that, P(A) = 0.4 and P(A∪B) = 0.16,

We know that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$= P(A) + P(B) - P(A).P(B)$$

$$0.16 = 0.4 + P(B) - 0.4.P(B)$$

$$0.16 = 0.4 + (1 - 0.4.)P(B)$$

$$0.12 = 0.6.P(B)$$

$$\Rightarrow P(B) = \frac{1}{2} = 0.5$$

(ii) Given that, P(A) = 0.5 and P(B) = 0.4

Since A and B are independent, then $P(A \cap B) = P(A).P(B) = 0.5 \times 0.4 = 0.20$

$$P(A|B) = \frac{P(A \cap B)}{P(A)} = \frac{0.20}{0.5} = \frac{2}{5} = 0.4$$

$$P(B|A) = \frac{P(A \cap B)}{P(B)} = \frac{0.20}{0.4} = \frac{2}{4} = 0.5$$

(iii) Given that, P(A) = 0.4 and P(B) = 0.2

We know that if two events A and B are independent then $\bar{A}\ and\ B$, $A\ and\ \bar{B}$ and $\bar{A}\ and\ \bar{B}$ are also independent.

$$P(\bar{A} \cap B) = P(\bar{A})P(B) = (1 - P(A))P(B) = 0.6 \times 0.2 = 0.12$$

$$P(A \cap \bar{B}) = P(A)P(\bar{B}) = P(A)\big(1 - P(B)\big) = 0.4 \times 0.8 = 0.32$$

$$P(\bar{A} \cap \bar{B}) = P(\bar{A})P(\bar{B}) = \big(1 - P(A)\big).\big(1 - P(B)\big) = 0.6 \times 0.8 = 0.48.$$

Example 13. A bag contains 4 white r and 5 black w balls. Another bag contains 2 white and 3 black balls. A ball is drawn from the first bag and is transferred to the second bag. A ball is then drawn from the second bag and is found to be white, what is the probability that white ball was transferred from first to second bag?

Solution. Let E_1 be the event that a white ball is drawn from the first bag and E_2 be the event that the drawn ball from the first bag is black. Let A be the event of drawing a white ball from the second bag after transferring the ball drawn from first bag into it.

Therefore, $P(E_1) = \frac{4}{9}, P(E_2) = \frac{5}{9}$

$P(A|E_1) = \frac{3}{6}, P(A|E_2) = \frac{2}{6}$

∴ by law of total probability,

$$P(A) = P(E_1).P(A|E_1) + P(E_2).P(A|E_2)$$

$$= \frac{4}{9} \times \frac{3}{6} + \frac{5}{9} \times \frac{2}{6} = \frac{11}{27}$$

Thus, By Bayes' theorem

$$P(E_1|A) = \frac{P(E_1).P(A|E_1)}{P(A)} = \frac{\frac{4}{9}\times\frac{3}{6}}{\frac{11}{27}} = \frac{6}{11}.$$

Example 14. In a bolt manufacturing company, three machines manufacture 20%, 30% and 50% of its total output and of these 6% and 3% and 2% are found defective respectively. A bolt is drawn at random and is found defective. Find the probability that the defective bolt is manufactured by machine 1.

Solution. Let A_1, A_2 *and* A_3 be the event that the defective bolts is manufactured by machine 1, 2 and 3 respectively. Therefore,

$$P(A_1) = \frac{20}{100} = \frac{1}{5}, P(A_2) = \frac{30}{100} = \frac{3}{10} \text{ and } P(A_3) = \frac{50}{100} = \frac{1}{2}.$$

Let A denotes the event that the bolt drawn at random is defective. Then, using conditional probability

$$P(A|A_1) = \frac{6}{100} = 0.06, P(A|A_2) = \frac{3}{100} = 0.03 \text{ and } P(A|A_3) = \frac{2}{100} = 0.02$$

∴ by law of total probability,

$$P(A) = P(A_1).P(A|A_1) + P(A_2).P(A|A_2) + P(A_3).P(A|A_3)$$

$$= \frac{1}{5} \times 0.06 + \frac{3}{10} \times 0.03 + \frac{1}{2} \times 0.02 = 0.031$$

By Bayes' theorem,

The probability that the defective bolt is from machine 1is,

$$P(A_1|A) = \frac{P(A_1)P(A|A_1)}{P(A)} = \frac{\frac{1}{5}\times 0.06}{0.031} = \frac{0.012}{0.031} = \frac{12}{31}$$

Example 15. The prior probabilities for events E_1 and E_2 are $P(E_1) = 0.60$ and $P(E_2) = 0.40$. It is also given that $P(E_1 \cap E_2) = 0, P(E|E_1) = 0.20\ and\ P(E|E_2) = 0.05$. Find the following:

(i) Are E_1 and E_2 are mutually exclusive?

(ii) Compute $P(E), P(E_1 \cap E)\ and\ P(E_2 \cap E)$.

(iii) Use Bayes' theorem to compute $P(E_1|E) and\ P(E_2|E)$.

Solution. (i) it is given that $P(E_1 \cap E_2) = 0$, the events E_1 and E_2 are mutually exclusive.

(ii) $P(E_1 \cap E) = P(E_1).P(E|E_1) = 0.60 \times 0.20 = 0.12$

$P(E_2 \cap E) = P(E_2).P(E|E_2) = 0.40 \times 0.05 = 0.02$

The event E can be define in the following mutually disjoint ways:

i.e., $E = (E \cap E_1) \cup (E \cap E_2)$

$\Rightarrow\ P(E) = P(E \cap E_1) + P\ (E \cap E_2) = 0.12 + 0.02 = 0.14$

(iii) using Bayes' theorem

$$P(E_1|E) = \frac{P(E \cap E_1)}{P(E)} = \frac{0.12}{0.14} = \frac{6}{7}$$

$$P(E_2|E) = \frac{P(E \cap E_2)}{P(E)} = \frac{0.02}{0.14} = \frac{1}{7}.$$

5.5 Random Variable: Discrete and Continuous

Often, the outcomes of random experiments are not real numbers. In such situations, we want to assign a real number to each point ω of the sample space Ω.

Example: Tossing a coin; Sample Space is Ω ={H, T}

We may assign number 1 to 'H' and number 0 to 'T'. In other words, we define a function X(.) such that X(H)=1 and X(T)=0.

Definition: Let X(ω), ω∈Ω be a real valued function defined up on the sample space Ω. Such that for each real number x, $\{\omega\colon X(\omega) \le x\} \in \mathcal{B}$. Then X is called a random variable defined upon $\{\Omega, \mathcal{B}\}$. Domain of X is Ω and range is a subset of real line, say, R_X.

Example: Let Ω={a,b,c,d}. Define X(a)=1, X(b)=X(c)=X(d)=2. Then X is a r.v.

Induced Probability Measure:

For any interval I= $(-\infty,x]$, we define

$P_X(I)=P[\omega:X(\omega)\leq x]=P[X^{-1}(I)]$.

P_X is called the probability measure induced by the r.v. X.

Cumulative Distribution Function:

The function $F_X(x)=P_X[X\leq x]$ is called the cumulative distribution function (cdf) of the r.v. X.

Note: We will drop the subscript X in P_X and F_X.

Some Properties of Cumulative Distribution Function

- $0\leq F(x)\leq 1$.
- For a<b, $P(a<X\leq b)=F(b)-F(a)$.
- If a<b, then $F(a)\leq F(b)$, i.e. cdf F(x) is monotonic non-decreasing function of x.
- F(x) is right continuous.
- We have

$$\lim_{x\to\infty} F(x) = F(\infty) = 1;\ \lim_{x\to-\infty} F(x) = F(-\infty) = 0$$

Proof:

- Obvious as probability lies between 0 and 1.
- Write $(-\infty,b]=(-\infty,a]\cup(a,b]$. Since$(-\infty,a]$ and $(a,b]$ are mutually exclusive

  $P\{X\in(-\infty,b]\}=P\{X\in(-\infty,a]\}+P\{X\in(a,b]\}$

  or $F(b)=F(a)+P[a<X\leq b]$.
- Follows from the proof of previous result.

Right Continuous

- For h>0,

  $F(x+h)-F(x)=P(x<X\leq x+h)$

So that

$$\lim_{h\to 0}[F(x+h)-F(x)] = 0$$

Result: *F(x) is left continuous at point x iff P(X=x)=0.*

Discrete Random Variable: A r.v. X is called discrete if it takes finite or countably infinite number of values. Thus R_X has countable number of points.

Discrete Distribution Function and Probability Mass Function:

Let X be a discrete r.v. with $R_X=\{x_1,\ldots,x_i,\ldots\}$. With each possible outcome x_i we associate a number $p(x_i)=P(X=x_i)$; i=1, 2,…, satisfying the following conditions:

- $p(x_i)\geq 0$ for all i=1, 2,…
- $\Sigma p(x_i)=1$.
- The function p satisfying the above conditions is called the probability mass function (pmf) of the r.v. X.

The collection of pairs $(x_i,p(x_i))$; i=1,2,…, is called the probability distribution of X.

The cdf of X is given by

$$F(x) = \sum_{i:X_i\leq x} p(x_i)$$

$x_1,x_2,\ldots$ are called mass points and $p(x_i)$ is the probability mass associated with mass point x_i.

If $x_1<x_2<\ldots$, then

$$F(x) = \begin{cases} 0 \ if \ x < x_1 \\ p(x_1), if \ x_1 \leq x < x_2 \\ p(x_1) + p(x_2), if \ x_2 \leq x < x_3 \\ \vdots \end{cases}$$

Obviously F(x) is a step function with jumps at mass points $x_1,x_2,\ldots$ The magnitude of jump at mass point x_i is $p(x_i)$.

Domain of pmf p(x) is R_X and range is interval [0,1].

Continuous Random Variable and Probability Density Function:

X is said to be a continuous random variable if there exists a function f(x), called the *probability density function (pdf)* of X, such that

(a) $f(x)\geq 0$for all x,

(b)$\int_{-\infty}^{\infty} f(x)dx = 1$

(c) For $-\infty<a<b<\infty$,$P(a \leq X < b) = \int_a^b f(x)dx$

The cdf of X is given by $F(x) = \int_{-\infty}^{x} f(x)dx$

Conversely, $f(x) = \frac{d}{dx}F(x)$

For continuous random variable X, P(X=x)=0.

Example 16. Three fair coins are tossed simultaneously then find the probability distribution of the number of heads.

Solution. Suppose X be the number of heads in the toss of three fair coins. As the random variable, "the number of heads" in a toss of three coins may be 0 or 1 or 2 or 3 associated with the sample space

Ω ={HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}

Therefore, X can take the values 0, 1, 2, 3, with

$P[X = 0] = \frac{1}{8}$ (no heads)

$P[X = 1] = \frac{3}{8}$ (one head)

$P[X = 2] = \frac{3}{8}$ (two heads)

$P[X = 3] = \frac{1}{8}$ (three heads)

Probability distribution of X, i.e. the number of heads when three coins are tossed simultaneously is

X	0	1	2	3
p(x)	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

Example 17. Check, which of the following are not probability distribution?

(i)

X	0	1	2
p(x)	¾	¾	¼

(ii)

X	0	1	2	3
p(x)	1/8	3/8	3/8	1/8

Solution.

(i) Here, $p(x_i)>1$, (i=1, 2, 3)

But $\sum_{i=1}^{3} p(x_i) = p(x_1) + p(x_2) + p(x_3) = p(0) + p(1) + p(2) = \frac{3}{4} + \frac{3}{4} + \frac{1}{4} = \frac{7}{4} > 1.$

So, the given distribution is not a probability distribution.

(ii) Here, $p(x_i)>1$, (i=1, 2, 3, 4)

And $\sum_{i=1}^{4} p(x_i) = p(x_1) + p(x_2) + p(x_3) + p(x_4) = p(0) + p(1) + p(2) + p(3)$

$= \frac{1}{8} + \frac{3}{8} + \frac{3}{8} + \frac{1}{8} = 1.$

So, the given distribution is probability distribution.

5.6 SUMMARY

- Those experiments in which we cannot predict the outcome, even we have the knowledge of all possible outcomes is called Random experiment.
- The set of all possible outcome of a random experiment is known as sample space and its subset is event.
- Different definitions of probability of occurrence of event are given.
- In classical definition of probability, the outcomes in the sample space must be exhaustive, equally likely and mutually exclusive and it's defined as the ratio of total number of favourable outcomes to the total number of outcomes.
- In axiomatic definition, it is defined as areal number lying between 0 and 1 provided all the three axioms are satisfied *i.e.*, (i) axiom of non-negativity, (ii) axiom of certainty, (iii) axiom of additivity.
- The conditional probability is defined as when occurrence of one event gets affected by certain condition and the numeric value of probability of occurrence of an event varies as per this condition.
- Baye's theorem revises the initial probabilities of occurrence of events.
- A real valued function defined over the sample space is called random variable.

5.7 SELF-ASSESSMENT QUESTIONS

1. If a die and a coin are tossed simultaneously, write the event of getting

(i) tail and an odd number
(ii) head and a multiple of 2
(iii) tail and prime number
(iv) head and a multiple of 3

2. What is the probability of drawing a club or diamond from a pack of 52 cards when one card is drawn at random?

3. Out of 52 well shuffled playing cards, two cards are drawn atrandom. Find the probability of getting.

(i) One red and one black

(ii) Both cards of the same suit
(iii) One jack and other king
(iv) One red and the other of club

4. A single letter selected at random from the word 'STATISTICS'. What is the probability that it is a vowel?

5. A Card is drawn from a well shuffled pack of 52 playing cards, find the probability that the drawn card is a jack or a black colour card.

6. If the probabilities are, respectively, 0.23,0.24 and 0.38 that a car stopped at a roadblock will have faulty brakes, badly worn tires, faulty brakes and/or badly worn tires, what is the probability that such a car will have both faulty brakes and badly worn tires.

7. A biology professor has two graduate assistants helping him with his research. The probability that the older of the two assistants will be absent on any given day is 0.08, the probability that the younger of the two will be absent on a given day is 0.05 and the probability that both of them will be absent on a given day is 0.02. Find the probabilities that

i) Either or both of the assistants will be absent on a given day;
ii) At least one of the assistants will not be absent on a given day;
iii) Only one of the assistants will be absent on a given day.

8. A box of fuses contains 20 fuses, of which 5 are defective. If three fuses are selected randomly and removed from the box randomly (without replacement), what are the probabilities that

i) All the three are defective?
ii) At most two are defective?
iii) At least two are defective?

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LESSON 6

PENDING

LESSON 7

ESTIMATION

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STRUCTURE

7.13 Suggested Readings

7.1 LEARNING OBJECTIVES

1. To **understand** the concept of estimator and estimate.
2. To **state** the various properties of a good estimator.
3. To **explore** the types of estimates: point and interval estimates.
4. To **comprehend** the concept of confidence interval and confidence level.
5. To **understand** the concept of margin of error.

7.2 INTRODUCTION

Now, you have understood that the populations are generally too large to analyze in their entirety, so we require samples to draw inferences about them. By deriving samples from a population, you can estimate the population mean with the mean of a representative sample. Hence, estimation is done based on the observations taken from the samples and used to measure the true value of a specified set of populations.

This lesson provides an overview of estimation. It discusses the concept of estimator and estimate. The next part of the lesson briefly explains the four main properties of a good estimator i.e. unbiasedness, consistency, efficiency and sufficiency. The lesson also explores the two types of estimates i.e. point and interval estimates. A point estimate employs a statistic to estimate the parameter at a single point or value whereas an interval estimate depicts the range within which the population parameter might fall. Later on, this lesson also discusses the confidence interval and confidence level for both large and small samples. There are three confidence levels commonly used with confidence intervals i.e. 90%, 95% and 99%.

This lesson will help the learners to understand various properties related to a good estimator and will assist them in estimating the population from a sample whether the population is small or large.

7.3 ESTIMATOR

7.3.1 Concept of Estimator and Estimate

A sample statistic that is utilized for estimating a population parameter is referred to as an **estimator**. In other words, an estimator can be defined as a technique of estimation namely a statistical measure that has been employed. For estimating a population mean μ, the sample mean "$\bar{x}$" can be used whereas for estimating the population proportion, the sample proportion can be used.

Whenever we perceived any specific numerical value of our estimator, we called that value an **estimate**. In simple words, we can say that an estimate is a specific observable statistical value. For example (see table 1.1):

Table 1.1: Example of Population, Population Parameter, Sample Statistic and Estimate

Population (interested)	Employees in a cosmetic factory
Population Parameter (wish to estimate)	Mean turnover per year
Sample Statistic (estimator)	Mean turnover for 1 month
Estimate	6% turnover per year

In this example, an estimator is "*the mean turnover for 1 month*" whereas the estimated value is the specific numeric value i.e. "*6%*".

7.3.2 Properties of a Good Estimator

An estimator is said to be a good estimator which is close to the parameter that is being estimated. Therefore, to determine the quality of a good estimator, there are four properties namely unbiasedness, consistency, efficiency and sufficiency. Let us understand them one by one.

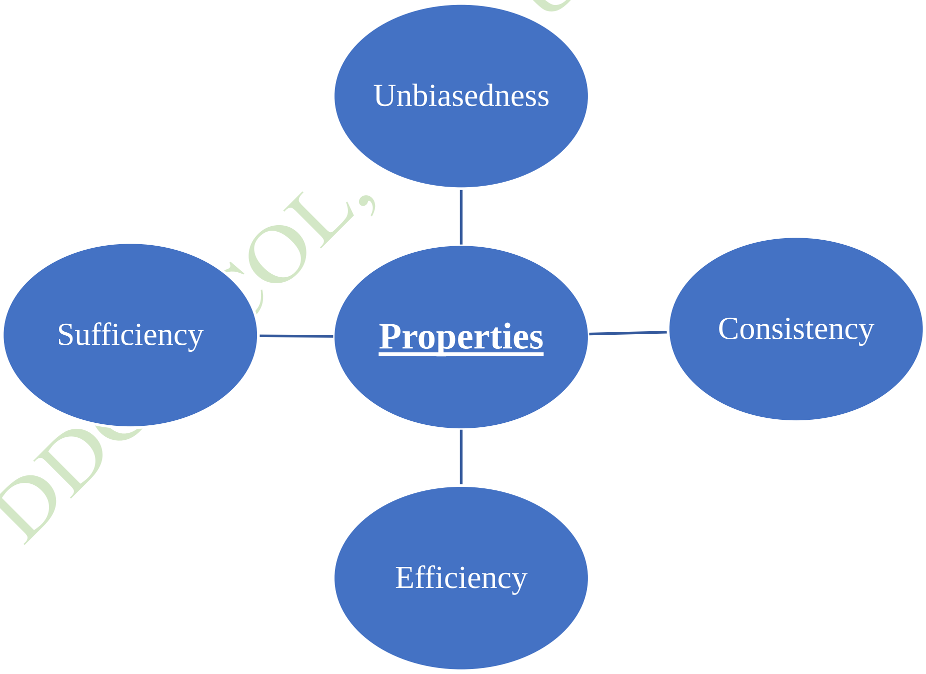

Fig 1.1: Properties of a Good Estimator

Unbiasedness: An estimator is called an unbiased estimator "*when the expected value of the estimator is the same as that of the population parameter that is being estimated*". In other words, if "θ" is an unbiased estimate of θ, then the expected value of θ must be equal to θ i.e.

E(θ) = (θ). For example, we can say that the sample mean is considered to be an unbiased estimator of a population mean. This is because the mean of the sampling distribution of a sample means taken from the same population is equal to the population mean itself. Many estimators are called "*asymptotically unbiased,*" which means that when *n* becomes sufficiently large, their biases reduce to a nearly insignificant value (i.e. zero).

Consistency: The estimator is termed as a consistent estimator of a population parameter as "*when the sample size tends to increase, an estimator approaches the population parameter closer and closer*". In other words, when an estimator is found to be consistent, it becomes more reliable with a large sample size. For example, the sample mean is considered to be an unbiased estimator of a population mean regardless of the shape of the population distribution, whereas the sample median is considered to be an unbiased estimate of a population mean only when the population distribution is symmetrical. Hence, for estimating the population mean, the sample mean, in terms of both unbiasedness and consistency, outperforms the sample median.

Efficiency: The term "efficiency" relates to a "*sampling variability of an estimator*". It is known as the size of the standard error of the statistic. Whenever there is a comparison between two unbiased estimators, the one who is having the lower standard error or standard deviation of the sampling distribution (for the given sample size) is considered to be relatively more efficient than the one who is having the higher standard error or standard deviation of the sampling distribution (for the given sample size). Hence, we can conclude that the lower the estimator's standard error, the more concentrated the distribution of an estimator around the parameter that is being estimated, and therefore, the better this estimator is.

Sufficiency: An estimator is considered to be sufficient if the estimator is able to convey as much information as possible about the parameter in the sample. The significance of sufficiency twigs from the fact that if a sufficient estimator exists, it is completely irrelevant to analyze any other estimate. More precisely, a sufficient estimator gives a guarantee that all information a sample may offer in relation to the estimation of a parameter has been gathered.

For estimating parameters, various methods might result in estimators meeting the aforesaid properties namely unbiasedness, consistency, efficiency and sufficiency. The two most significant methods that are used to estimate population are the least square method and the maximum likelihood method.

- **Least Square Method:** The least square method is used to determine the several unknown parameters that exist in the linear regression model.
- **Maximum Likelihood Estimation**: The maximum likelihood method is employed for the estimation of a parameter and is also used for fitting a statistical model using statistical data.

IN-TEXT QUESTIONS

1. Which of the following is not the property of a good estimator?
   a) Sufficiency b) Biasedness
   c) Consistency d) Efficiency
2. A sample statistic that is employed to estimate a population parameter is called:
   a) Estimator b) Estimate
   c) Parameter d) Statistics
3. When the expected value of the estimator is the same as that of the population parameter that is being estimated, the estimator has which of the following property?
   a) Sufficiency b) Unbiasedness
   c) Consistency d) Efficiency
4. The _______ the estimator's standard error, the _____ concentrated the distribution of an estimator around the parameter being estimated.
   a) smaller, more b) smaller, less
   c) larger, less d) none of the above
5. Which of the following properties does sample mean has?
   a) Efficiency b) Unbiasedness

7.4 POINT ESTIMATES

7.4.1 Concept of Point Estimate

Now, we have understood that the sample mean " $\bar{x}$ " is considered to be the best estimator of the population mean *"μ"* as it entails all four properties of a good estimator namely unbiasedness, consistency, efficiency and sufficiency.

"*A method of determining an estimated value of a population parameter such as the mean of a population from random samples of the population*" is known as **point estimation**.

Any statistic can be termed as a point estimate. A statistic is considered to be an estimator of some parameter in a population. More precisely, you can say that a point estimator is a type of estimation in which a single value or a sample statistic is utilized to derive information about the population parameter as a single value or point.

Examples of point estimates are depicted in Table 1.2.

Table 1.2: Examples of Point Estimates

Particulars	Point Estimate

Population mean (μ)	Sample mean ($\bar{x}$)
Population standard deviation (σ)	Sample standard deviation (s)
Population variance (σ^2)	Sample variance (s^2)

7.4.2 Point Estimate for the Population Mean

To estimate the population mean associated with a population, the point estimate for the population mean is simply the sample mean.

To illustrate how the sample mean is calculated, consider a medical-supplies firm that manufactures disposable needles. Each syringe is individually wrapped in sterile packaging before being haphazardly packed into a huge corrugated carton. Because of the jumbled packaging, each carton has a different quantity of syringes. The company needs to bill the syringes on a per-unit basis to know how many syringes are packed in each carton.

We have taken a sample of 35 cartons at random and recorded the number of syringes in each carton.

Results of the Sample of 35 cartons of Syringes

101	103	112	102	98	97	93
105	100	97	107	93	94	97
97	100	110	106	110	103	99
93	98	106	100	112	105	100
114	97	110	102	98	112	99

For calculating the sample mean, first we have to sum all the individual values and then we have to divide this sum by the number of samples measured.

The formula for calculating the sample mean:

$$\textbf{Sample Mean}: \ \bar{X} = \frac{\sum x}{n}$$

Using this formula, we get 3570/35= 102 syringes. Hence, by employing the sample mean as our estimator, the point estimate of the population mean is found to be **102** syringes per carton.

7.4.3 Point Estimate for the Population Variance and Standard Deviation

Now, after estimating the population mean, we are required to estimate the variance or standard deviation associated with a population. The point estimate of the population variance and standard deviation is nothing but the sample variance and sample standard deviation respectively.

The formula for estimating the sample variance is:

$$\text{Sample Variance: } s^2 = \frac{\sum(x_i - \bar{x})^2}{n-1}$$

The formula for estimating the sample standard deviation is:

$$\text{Sample Standard Deviation: } s = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n-1}}$$

Now, taking the previous example, let us calculate the sample variance and sample standard deviation using the above formulas (Table 1.3)

Table 1.3: Calculation of Sample Variance and Sample Standard Deviation for Syringes per Carton

Values of x (Needles per Carton) (1)	x^2 (2)	Sample Mean x (3)	$(x - \bar{x})$ (4) = (1) – (3)	$(x - \bar{x})^2$ (5) = $(4)^2$
101	10,201	102	–1	1
105	11,025	102	3	9
97	9,409	102	–5	25
93	8,649	102	–9	81
114	12,996	102	12	144
103	10,609	102	1	1
100	10,000	102	–2	4
100	10,000	102	–2	4
98	9,604	102	–4	16
97	9,409	102	–5	25
112	12,544	102	10	100
97	9,409	102	–5	25

Table 1.3: Calculation of Sample Variance and Sample Standard Deviation for Syringes Per Carton (Cont.)

110	12,100	102	8	64
106	11,236	102	4	16
110	12,100	102	8	64
102	10,404	102	0	0
107	11,449	102	5	25
106	11,236	102	4	16
100	10,000	102	–2	4
102	10,404	102	0	0
98	9,604	102	–4	16
93	8,649	102	–9	81
110	12,100	102	8	64
112	12,544	102	10	100
98	9,604	102	–4	16
97	9,409	102	–5	25
94	8,836	102	–8	64
103	10,609	102	1	1
105	11,025	102	3	9
112	12,544	102	10	100
93	8,649	102	–9	81
97	9,409	102	–5	25
99	9,801	102	–3	9
100	10,000	102	–2	4
99	9,801	102	–3	9
3,570	**365,368**	Sum of all the squared differences	$\Sigma(x-\overline{x})^2 \quad \rightarrow$	**1,228**

$$s^2 = \frac{\Sigma x^2}{n-1} - \frac{n\overline{x}^2}{n-1}$$

$$= \frac{365{,}368}{34} - \frac{35(102)^2}{34}$$

$$= \frac{1{,}228}{34}$$

$$= 36.12$$

$\leftarrow$ or $\rightarrow$

Sum of the squared differences divided by 34, the number of items in the sample – 1 (sample variance) $\quad \dfrac{\Sigma(x-\overline{x})^2}{n-1} \rightarrow 36.12$

$$s = \sqrt{s^2}$$

$$= \sqrt{36.12}$$

$$= 6.01 \text{ syringes}$$

Sample standard deviation s $\quad \sqrt{\dfrac{\Sigma(x-\overline{x})^2}{n-1}} \rightarrow 6.01$ syringes

Hence, the sample standard deviation is **6.01** syringes and the sample variance is **36.12**.

IN-TEXT QUESTIONS

6. $Z_{\alpha/2}$ is known as ______.
   a) Interval Estimate b) Point Estimate
   c) Confidence Level d) Confidence Coefficient
7. Population mean is denoted by which symbol?
   a) $\bar{x}$ b) $\sigma_{\bar{x}}$
   c) s^2 d) μ
8. If there are five samples say 110, 105, 125, 140, 120, what will be the sample mean?
   a) 110 b) 120
   c) 130 d) 140
9. Point estimate for a population variance is:
   a) Sample standard deviation b) Sample mean
   c) Sample variance d) Sample median
10. A type of estimation in which a single value or a sample statistic is used to infer information about the population parameter as a single value or point.
    a) Interval Estimate b) Point Estimate
    c) Confidence Level d) Margin of Error

7.5 INTERVAL ESTIMATES AND CONFIDENCE INTERVAL

7.5.1 Concept of Interval Estimate

A set of values between which a population parameter falls is referred to as an interval estimate.

For instance, the interval estimate for the population mean is $a < \bar{x} < b$. It means that the population mean will fall between "*a*" and "*b*" i.e. population mean will be greater than "*a*" and will be less than "*a*". In simple words, you can say the lower value is "*a*" and the upper value is "*b*".

For calculating the interval estimate, the confidence level is important. With the help of confidence interval, you can find out the lower as well as the upper value of the estimate.

The formula for the interval estimate is:

$$\mu = \bar{x} \pm Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$$

Where,

$\bar{x}$ is the sample mean

α is the confidence level

$Z_{\alpha/2}$ is the confidence coefficient

σ is the standard deviation

n is the sample size

The above formula will be used for deriving the interval within which a population parameter will fall. We will now be discussing the confidence interval and confidence level so as to derive the interval ranges.

7.5.2 Concept of Confidence Interval

A confidence interval is defined as a range in which the true population mean lies. There are three important parts of confidence interval namely confidence level, a margin of error and statistics. The confidence level is referred to as the uncertainty level in the process of sampling. Both the margin of error and statistics depicts the accuracy of the method and forms the interval estimate of a confidence interval.

For example, we might say that we have a 95% confidence level that the true population mean lies within a given range of values. This is termed a **confidence interval**. More precisely, we can say that for choosing different samples, if we are employing the same sampling procedure and determining numerous interval estimates, then, in such a case, we can say that 95% of the time the true population mean would fall within the range value as indicated by the sample statistic and margin of error.

The confidence interval, for say, a 95% confidence level can be shown as:

$\bar{x} - 1.96\sigma_{\bar{x}}$ = lower limit of the confidence interval

$\bar{x} + 1.96\sigma_{\bar{x}}$ = upper limit of the confidence interval

Therefore, the confidence limits are basically denoted as the lower and upper limits of the confidence interval.

Now, we have understood both the point estimates as well as confidence intervals. In comparison to point estimates, confidence intervals are considered to be preferable as they lay emphasis on both the precision and uncertainty of the estimate.

7.5.3 Concept of Confidence Level

A confidence level is referred to as "*the probability element of a confidence interval*". Confidence level echoes how confident we are that a specific sampling process will offer a confidence interval that will contain the true population parameter.

For instance, assume that we have gathered numerous samples and produced confidence intervals for each. While certain confidence intervals may represent the population parameter accurately and precisely whereas others may not. Let us take an example to understand this point. For example, when there is a 95% confidence level, it reflects that 95% of the intervals will have the true population parameter whereas when a confidence level is 99%, it means that 99% of the intervals will have the true population parameter.

7.5.4 Association between Confidence Interval and Confidence Level

There is a need to understand the association between the two important concepts i.e. confidence interval and confidence level. One may think that using a high confidence level say 99% in all the estimator problems will be better as a high confidence level might seem to reflect a high degree of precision in the estimate.

But in reality, a high confidence level will produce large confidence intervals. These large confidence intervals are not precise and accurate as they might provide you with fuzzy estimates which are not good.

Therefore, one should take judicious decisions while choosing the confidence level.

7.5.5 Confidence Intervals for the Population Mean for Large Samples

Large sample means when the sample size is more than and equal to 30. The level of confidence can be any number between 0 and 100% but the most common values employed in statistics are probably: 90% (α=0.10), 95% (α=0.05), and 99% (α=0.01).

For 95% confidence, see fig 1.2.

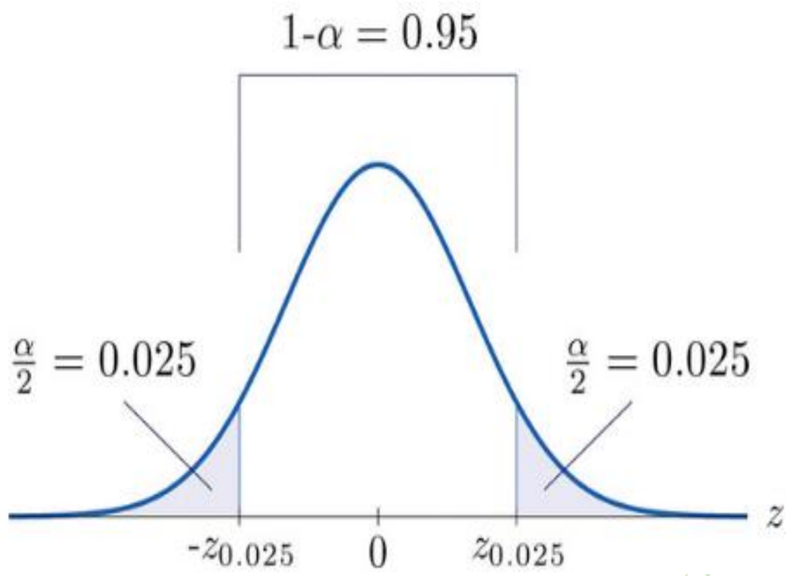

Fig 1.2: For 95% confidence, the area in each tail is α/2 = 0.025.

The formula for the confidence intervals for the population mean for large samples:

Large Sample $100(1-\alpha)\%$ Confidence Interval for a Population Mean

- If σ is known:

$$\bar{x} \pm z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

- If σ is unknown:

$$\bar{x} \pm z_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$$

A sample is considered large when $n \geq 30$.

When the population standard deviation (σ) is unknown, in that case, we will make use of the sample standard deviation to estimate the population standard deviation. So, in this case, σ will be replaced by s. We can also symbolize this estimated value by $\hat{\sigma}$, which is known as a sigma hat.

Estimate of the Population Standard Deviation (When the population is Infinite)

Estimate of the population standard deviation $\longrightarrow \hat{\sigma} = s = \sqrt{\dfrac{\Sigma(x-\bar{x})^2}{n-1}}$

Example 1.1: (Population standard deviation is known)

Calculate the confidence interval for the population mean when the sample size is 100, the sample mean is 35,500 and the population standard deviation is 7,200 (The confidence level given is 95%).

Solution: n = 100, $\bar{x}$ = 35,500, σ = 7,200, $Z_{\alpha/2}$ = 1.96

Using the below formula,

$$\mu = \bar{x} \pm Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$$

$$\mu = 35{,}500 \pm (1.96) \frac{7{,}200}{\sqrt{100}}$$

$$\mathbf{= 34{,}088.80 \leq \mu \leq 36{,}911.20}$$

Example 1.2: **(Population standard deviation is known)**
Calculate the confidence interval for the population mean when the sample size is 50, the sample mean is 146.75 and the population standard deviation is 35.2 (The confidence level given is 95%).

Solution: n = 50, $\bar{x}$ = 146.75, σ = 35.2, $Z_{\alpha/2}$ = 1.96

Using the below formula,

$$\mu = \bar{x} \pm Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$$

$$\mu = 46.75 \pm (1.96) \frac{35.2}{\sqrt{50}}$$

$$\mathbf{= 136.99 \leq \mu \leq 156.51}$$

Example 1.3: (Population standard deviation is not known)
Calculate the confidence interval for the population mean when the sample size is 50, the sample mean is 652.68 and the sample standard deviation is 217.43 (The confidence level given is 99%).

Solution: n = 50, $\bar{x}$ = 652.68, s = 217.43, $Z_{\alpha/2}$ = 2.58

Using the below formula,

$$\mu = \bar{x} \pm Z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}}$$

$$\mu = 652.68 \pm (2.58) \frac{217.43}{\sqrt{50}}$$

$$\mathbf{= 573.35 \leq \mu \leq 732.01}$$

Estimate of the Population Standard Deviation (When the population is Finite)

When the population is finite and a sample is more than 5% of the population, we will use the formula:

Symbol that indicates an estimated value

Estimate of the population standard deviation

$$\hat{\sigma}_{\bar{x}} = \frac{\hat{\sigma}}{\sqrt{n}} \times \sqrt{\frac{N-n}{N-1}}$$

Example 1.4: Calculate the confidence interval for the population mean when the sample size is 60 from a population of 540, the sample mean is 6.2 and the sample standard deviation is 1.368 (The confidence level given is 99%).

Solution: n = 60, N= 540, n/N= 0.50, $\bar{x}$ = 652.68, s = 1.368, $Z_{\alpha/2}$ = 2.58

Using the below formula,

$$\hat{\sigma}_{\bar{x}} = \frac{\hat{\sigma}}{\sqrt{n}} \times \sqrt{\frac{N-n}{N-1}}$$

We get the sample standard deviation as 0.167.

Now, we have to calculate the confidence interval,

$$\mu = 6.2 \pm (2.05)\,(0.167)$$

$$\mathbf{= 5.86 \leq \mu \leq 6.54}$$

7.5.6 Concept of Margin of Error

The margin of error is defined as *"the range of values above and below the sample statistic"*.

For example, let us assume that the local newspaper wants to conduct an election poll. For this, he finds that the independent candidate will receive 35% of the vote. As per the newspaper, the survey had a 5% margin of error and a 90% confidence level. On the basis of these observations, we can say that the confidence interval is:

"We are 95% confident that the independent candidate will receive between 25% and 45% of the vote".

The formula for the margin of error

a) **When the population standard deviation is known**

$$E = z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

b) **When the population standard deviation is unknown**

$$E = z_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$$

Example 1.5: (Population standard deviation is known)
You are required to find out the margin of error (E) when the sample size is 62 and the population standard deviation is σ = 4000 and you are needed to establish a 95% confidence interval for μ.

Solution: 95% Confidence level means that $\alpha = 1 - 0.95 = 0.05$,

So, $\alpha/2 = 0.025$, we obtain $Z_{0.025} = 1.960$.

Using the below formula,

$$E = z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

$$= (1.960)\,\frac{(4000)}{\sqrt{62}}$$

$$= \mathbf{996.19}$$

Hence, the margin of error in this question is 996 (approx.).

Example 1.6: (Population standard deviation is known)
You are required to find out the margin of error (E) when the sample size is 150 and the population standard deviation is σ = 6500 and you are needed to establish a 95% confidence interval for μ.

Solution: 95% Confidence level means that $\alpha = 1 - 0.95 = 0.05$, So, $\alpha/2=0.025$, we obtain $Z_{0.025} = 1.960$.

Using the below formula,

$$E = z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

$$= (1.960)\frac{(6500)}{\sqrt{150}}$$

$$= \mathbf{1040}$$

Hence, the margin of error in this question is 1040.

Example 1.7: (Population standard deviation is unknown)
You are required to find out the margin of error (E) when the sample size is 90 and the sample standard deviation is $\sigma = 2000$ and you are needed to establish a 95% confidence interval for μ.

Solution: 95% Confidence level means that $\alpha = 1-0.95 = 0.05$,

So, $\alpha/2=0.025$, we obtain $Z_{0.025} = 1.960$.

Using the below formula,

$$E = z_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$$

$$= (1.960)\frac{(2000)}{\sqrt{90}}$$

$$= \mathbf{130.666}$$

Hence, the margin of error in this question is 131 (approx.).

7.5.7 Confidence Intervals for the Population Mean from Small Samples

When the population standard deviation is unknown and the sample size n is small, then when we replace the sample standard deviation s for σ, the normal approximation is no longer applicable. In this scenario, we select a different distribution known as the **Student's t -distribution with *n-1* degrees of freedom**.

The Student's t-distribution is similar to the standard normal distribution. Student's t-distribution is also centered at 0 and has the same qualitative bell shape, but it does not have the heavier tails as that of the standard normal distribution. You can see from Fig. 1.2 that the first curve (in brown color) is the t-distribution with two degrees of freedom which meets the dashed vertical line at the lowest point. The second curve (in blue color) is the t-distribution with five degrees of freedom, and the third curve (in red color) is the standard normal distribution.

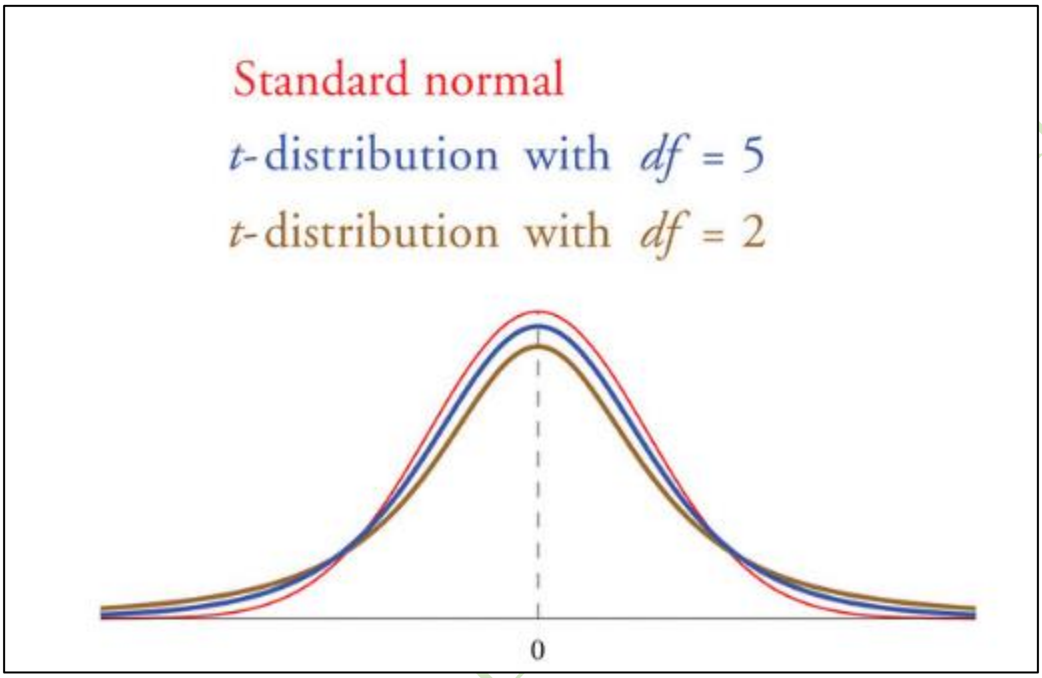

Fig 1.2: Student's t- distribution

From Fig 1.2, you can see that as the sample size n increases, the student's t-distribution tends to approach the standard normal distribution. Though there is a separate t-distribution for each value of n, if the sample size is 30 or more, it is usually appropriate to use the standard normal distribution.

The formula for the confidence intervals for the population mean for small samples:

Small Sample $100(1-\alpha)\%$ Confidence Interval for a Population Mean

If σ is known:

$$\bar{x} = \pm z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

If σ is unknown:

$$\bar{x} = \pm t_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$$

with the degrees of freedom $df = n - 1$.

The population must be normally distributed and a sample is considered small when $n < 30$.

Example 1.8: (Population standard deviation is not known)
On the basis of a random sample of 100 people working in a company, the average travel time to reach the office is 20 minutes with a standard deviation of 5 minutes. You are required to design the working hours by establishing a 95% confidence interval for the average travel time of everyone in the company.

Solution: $\bar{x}$ = 20, s = 5, n = 100, $t_{\alpha/2}$ = 2.262

Using the below formula,

$$\overline{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$$

$$\mu = 20 \pm (2.262) \frac{5}{\sqrt{100}}$$

$$= \mathbf{18.87 \leq \mu \leq 21.13}$$

Example 1.9: (Population standard deviation is not known)
On the basis of a random sample of 20 people working in a company, the average travel time to reach the office is 102 minutes with a standard deviation of 8.5 minutes. You are required to design the working hours by establishing a 95% confidence interval for the average travel time of everyone in the company.

Solution: $\bar{x}$ = 102, s = 8.5, n = 10, $t_{\alpha/2}$ = 1.729

Using the below formula,

$$\overline{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$$

$$\mu = 102 \pm (1.729) \frac{8.5}{\sqrt{20}}$$

$$= \mathbf{98.71 \leq \mu \leq 105.29}$$

7.5.8 Determining the Sample Size in Estimation:

To estimate a population mean μ within a margin of error (E) units at 100 (1−α) % confidence, the formula for the estimated minimum sample size n needed is:

$$n = \frac{(z_{\alpha/2})^2 \sigma^2}{E^2} \text{ (rounded up)}$$

Example 1.10: You are required to find out the minimum sample size needed to establish a 95% confidence interval for μ with a margin of error (E) = 1000. Assume that the population standard deviation is σ = 4000.

Solution: 95% Confidence level means that α = 1− 0.95 = 0.05,

So, α/2=0.025, we obtain $Z_{0.025}$ = 1.960.

$$n = \frac{(z_{\alpha/2})^2\sigma^2}{E^2} = \frac{(1.960)^2(4000)^2}{(1000)^2} = 61.4656$$

The final answer is rounded up to **61** as it is not possible to take a fractional observation.

7.7.9 Summary of Confidence Limits:

Now, we have understood the concept of the confidence interval and confidence level and also understood what will be the upper and lower limit when the population is finite or infinite. Table 1.4 depicts the summary of the confidence limits:

Table 1.4: Summary of the confidence limits

	When the Population Is Finite (and $n/N > 0.05$)	When the Population Is Infinite (or $n/N < 0.05$)
Estimating μ (the population mean): When σ (the population standard deviation) is known	Upper limit $\bar{x} + z\frac{\sigma}{\sqrt{n}} \times \sqrt{\frac{N-n}{N-1}}$ Lower limit $\bar{x} - z\frac{\sigma}{\sqrt{n}} \times \sqrt{\frac{N-n}{N-1}}$	$\bar{x} + z\frac{\sigma}{\sqrt{n}}$ $\bar{x} - z\frac{\sigma}{\sqrt{n}}$
When σ (the population standard deviation) is not known ($\hat{\sigma} = s$) When n (the sample size) is larger than 30	Upper limit $\bar{x} + z\frac{\hat{\sigma}}{\sqrt{n}} \times \sqrt{\frac{N-n}{N-1}}$ Lower limit $\bar{x} - z\frac{\hat{\sigma}}{\sqrt{n}} \times \sqrt{\frac{N-n}{N-1}}$	$\bar{x} + z\frac{\hat{\sigma}}{\sqrt{n}}$ $\bar{x} - z\frac{\hat{\sigma}}{\sqrt{n}}$
When σ (the population standard deviation) is not known ($\hat{\sigma} = s$) When n (the sample size) is 30 or less and the population is normal or approximately normal*	This case is beyond the scope of the text; consult a professional statistician.	$\bar{x} + t\frac{\hat{\sigma}}{\sqrt{n}}$ $\bar{x} - t\frac{\hat{\sigma}}{\sqrt{n}}$

IN-TEXT QUESTIONS

11. If the population standard deviation is unknown and the sample size n is small, then we use ______ distribution?
    a) Normal Distribution b) Student t–distribution
    c) Non-normal Distribution d) Polynomial Distribution
12. A sample of 45 individuals is taken from a population of 650. From this sample, the mean and the standard deviation is found to be 3.6 and 2.52 respectively. What is the estimated standard error of the mean?
    a) 0.176 b) 0.276
    c) 0.376 d) 0.476
13. You are required to find out the minimum sample size needed to establish a 99% confidence interval for μ with a margin of error (E) = 0.2 Assume that the population standard deviation is $\sigma = 1.3$.
    a) 251 b) 271
    c) 261 d) 281
14. When n/N > 0.05, the population is:
    a) Finite b) Infinite
    c) Balanced d) Unbalanced
15. A sample is considered small when n is
    a) Less than 30 b) Less than 50
    c) Less than 100 d) Less than 150

7.6 SUMMARY

- A sample statistic that is utilized for estimating a population parameter is referred to as an estimator.
- Whenever we perceived any specific numerical value of our estimator, we called that value an estimate.
- The four properties of a good estimator are unbiasedness, efficiency, consistency and sufficiency.
- An estimator is called an unbiased estimator when the expected value of the estimator is the same as that of the population parameter that is being estimated.
- The term "efficiency" relates to a sampling variability of an estimator. Whenever there is a comparison between two unbiased estimators, the one who is having the lower standard error or standard deviation of the sampling distribution (for the given sample size) is considered to be relatively more efficient than the one who is having

the higher standard error or standard deviation of the sampling distribution (for the given sample size).

- An estimator is termed a consistent estimator of a population parameter as "*when the sample size tends to increase, an estimator approaches the population parameter closer and closer*". In other words, if an estimator is considered to be consistent, it becomes more reliable with large samples.
- An estimator is considered to be sufficient if the estimator is able to convey as much information as possible about the parameter in the sample.
- The two most essential methods are the least square method and the maximum likelihood method.
- The sample mean " $\bar{x}$ " is considered to be the best estimator of the population mean "μ" as it entails all four properties of a good estimator namely unbiasedness, consistency, efficiency and sufficiency.
- Point estimation is described as the method of determining an estimated value of a population parameter such as the mean of a population from random samples of the population.
- A set of values between which a population parameter falls is referred to as an interval estimate.
- There are three important parts of confidence interval namely confidence level, a margin of error and statistics. A confidence level is the probability element of a confidence interval.
- In reality, a high confidence level will produce large confidence intervals. These large confidence intervals are not precise and accurate as they might provide you with fuzzy estimates which are not good.
- A margin of error is defined as *"the range of values above and below the sample statistic"*.
- When the population standard deviation is unknown and the sample size n is small, then when we replace the sample standard deviation s for σ, the normal approximation is no longer applicable. In this scenario, we select a different distribution known as the Student's t -distribution with *n-1* degrees of freedom.

7.7 GLOSSARY

Confidence Interval: A range of values that has some designated probability of including the true population parameter value.

Confidence Level: Echoes the degree of uncertainty in a process of sampling.

Confidence Limits: The lower and upper values of a confidence interval.

Consistent Estimator: A statistic is termed as a consistent estimator of a population parameter as when the sample size increases, an estimator approaches the population parameter closer and closer.

Degrees of Freedom: The number of values in a sample we can specify freely once we know something about that sample.

Efficient Estimator: Sampling variability of an estimator.

Estimate: A specific observable statistical value.

Estimator: A sample statistic that is utilized to estimate a population parameter.

Finite Population: A population having a stated or limited size.

Infinite Population: A population in which it is theoretically impossible to observe all the elements.

Interval Estimate: A set of values between which a population parameter falls.

Point Estimation: A method of determining an estimated value of a population parameter such as the mean of a population from random samples of the population.

Sufficient Estimator: An estimator is considered to be sufficient if the estimator is able to convey as much information as possible about the parameter in the sample.

Unbiased Estimator: An estimator is called an unbiased estimator when the expected value of the estimator is the same as that of the population parameter that is being estimated.

7.8 ANSWERS TO IN-TEXT QUESTIONS

1. Biasedness	9. Sample variance
2. Estimator	10. Point estimate
3. Unbiasedness	11. Student t–distribution
4. smaller, more	12. 0.376
5. All of the above	13. 281
6. Confidence Coefficient	14. Finite
7. μ	15. Less than 30
8. 120	

7.9 SELF-ASSESSMENT QUESTIONS

18. What are the four properties of a good estimator? Briefly explain each one of them.
19. On the basis of the random sample of 200 people working in a company, the average travel time to reach the office is 60 minutes with a standard deviation of 20 minutes.

You are required to design the working hours by establishing a 95% confidence interval for the average travel time of everyone in the company.

20. You are required to find out the minimum sample size needed to establish a 95% confidence interval for μ with a margin of error (E) = 2. Assume that the population standard deviation is $\sigma = 6$.
21. Distinguish between a point estimate and an interval estimate.
22. Calculate the confidence interval for the population mean when the sample size is 100, the sample mean is 24,000 and the population standard deviation is 6,500 (The confidence level given is 95%).
23. Calculate the confidence interval for the population mean when the sample size is 36, the sample mean is 25.6 and the sample standard deviation is 3.5 (The confidence level given is 99%).

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LESSON 8

Hypothesis testing and Sampling error I & II

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STRUCTURE

8.1 LEARNING OBJECTIVES

- To explore the Hypothesis idea
- To construct the hypothesis
- To get knowledge of hypothesis testing
- To examine the notion of Error – I and II
- To describe hypothesis testing using mean and percentage
- To do hypothesis testing using confidence interval
- To explain the Variance Analysis (ANOVA)

8.2 INTRODUCTION

Students need to know about average mean, standard deviation, standard error, sampling methods, sample size, etc., in order to understand hypothesis in research. In this lesson, students and researchers will learn what a hypothesis is, how to write one, and how to test it with the help of the t-test and the Anova. Students will also learn about error I and error II, which are the basics of sampling error.

Researchers and students are always interested in what the expected results of research are. The testing of hypotheses tells us how to make a research hypothesis and how to know with a certain level of confidence that something is true in the whole population based on just one sample. This lesson will help students understand the risk of testing a hypothesis in terms of sampling errors I and II. This will help us minimise the risk of making a decision to reject or fail to reject the hypothesis. This lesson will also explain how to design a hypothesis and the different types of hypothesis methods. The confidence interval will give us more confidence that research hasn't made any mistakes when testing hypotheses. T-test and the extension of t-test in terms of analysis of variance will be used to test the hypothesis (ANOVA).

Research is all about making predictions, forecasts, and figuring out how one thing affects another. For example, students can test the idea that a student's intelligence is related to how well they do in school. In the same way, students can gather and analyze data to test any business problem or situation using a sample of data. This lesson is interesting because it helps students figure out what might happen. Fig. 1.1 shows the different topics we've talked about in the lesson.

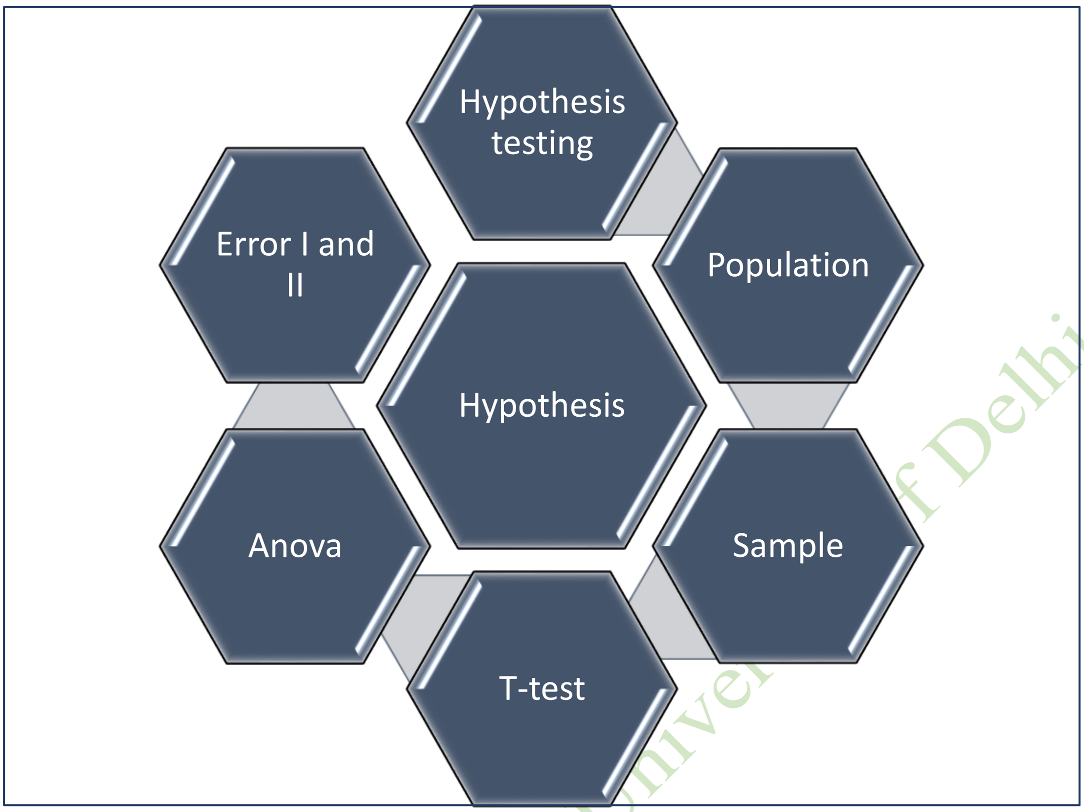


Fig 1.1: Hypothesis testing types and steps

8.3 Population and Sample

We frequently work with specific datasets, and we usually use the appropriate statistical and mathematical methods to uncover hidden knowledge in the data. Scientists, mathematicians, and statisticians have devised numerous methods for dealing with data from various sources. The true origins of inferential statistics can be found in the testing of hypotheses, which is central to sampling theory. However, real-life situations are not always predictable. They usually have random details that are difficult to deal with. A related method that can be used in these situations is hypothesis testing. Hypothesis testing, also known as statistical hypothesis testing, is a technique for comparing two datasets or a sample from a dataset. It's a statistical method for drawing conclusions, so you can draw some conclusions about the things you matched at the end of the test.

In this lesson, we will cover the fundamentals of sampling, population, sample, standard error, and sampling error, as well as why this area of analytics is important. Then we'll go over the fundamentals of hypothesis testing.

8.3.1 Population:

The goal of a statistical investigation is usually to figure out how big something is in general and to study how people in a group differ in one or more ways. The people being studied are referred to as the population or the universe. As such, in statistics, the population is a group of things that are being studied, whether they are living or not. This population could be small or large depending on the circumstances. Most of the time, obtaining an entire population total is either impossible or impractical. It is possible that the population is so large that it cannot be counted. Furthermore, during a full examination, the population units could be destroyed or disturbed, making it impossible. All of these issues lead us to the concept of sampling, which means we must first define the term sample. The population's characteristics are described with the population, e.g.the population mean (μ), variance (σ^2) etc., referred to as *parameters.*

8.3.2 Sample:

- A sample is a small group of people from a population that can be counted. The number of participants in a sample is called the sample size. Instead of counting all of the people in the population, only the participants in the trial are observed to find out what their characteristics are. Then, the characteristics of the sample are used to make an approximation or estimate of the population. However, sampling has a lot of benefits, especially when it comes to saving time and money. Sampling is used quite often in our everyday lives. For example, A housewife usually tastes small quantity of food she has cooked to see if it is done right and has the right amount of salt. The characteristics of sample is described in terms of the sample of the respective population, e.g., the sample mean ($\bar{x}$), sample variance (s^2), etc., were termed as *statistics.*

ACTIVITY

A student working on their doctoral degree is interested in conducting research on students at the University of Delhi to understand about their experiences with online classroom learning while during Covid – 19. In this scenario, the population that he is supposed to research is going to consist of all of the students at the University of Delhi, but it is not possible to gain an accurate count of the total number of students at any given moment in time. The question now is how to make this research or study a reality.

Do you require a sample to be taken? Determine the criteria you will use and the procedure you will follow to pick a sample for this investigation. Make an informed prediction regarding the research.

8.3.3 Standard Error (S.E) :

The basic idea behind standard error is to justify how you can make decisions and interpret results based on just one sample drawn from the population. Standard deviation calculates deviation within the observation of one set of data, allowing you to determine whether or not the output will remain the same if you take another sample. To address this issue, the standard error is calculated, which allows us to demonstrate that if the sample is taken again and again, the same outcome or result will be obtained. As a result, standard error is the average of the standard deviation of the sampling distribution.

S.E. stands for "standard error" which is the sampling distribution of the standard deviation of a statistic. The standard errors of some well-known statistics are given below for large samples, where n is the sample size, 2 is the population variance, P is the population proportion, and Q = 1 – P, n 1 and n 2 are the sizes of two independent random samples drawn from the given population (s).

Statistics	Standard Error
Sample mean ($\bar{x}$)	$\frac{\sigma}{\sqrt{n}}$

S.D. is calculated from a single distribution, but S.E. is calculated across all distributions. The standard deviation of a sampling distribution is referred to as the standard error. Standard error refers to the average variation from sample to sample. It provides consistency, also known as the reliability coefficient.

IN-TEXT QUESTIONS

1. The standard deviation of a sampling distribution is referred to as------- .
2. Standard deviation and standard error are the same thing. True or false?
3. The sample's characteristics are as follows:

   a) sample mean b) Variance

   c) population mean d) all of the above
4. Error – I is representing alpha or byta ____________________.
5. I-you-me-mode is a ____________________ style of writing.

8.4 Hypothesis

8.4.1 Why hypothesis: In research, it is exceedingly difficult to access the entire population because it is time-consuming and expensive, hence a sample is used to infer the population. In other words, we cannot access the population, or it is unknown, so we pick a sample and extrapolate to the population (hypothesis). For instance, Tata automobiles make EV - Tiago and a new, better version of the old one, claiming that the new mileage is greater than 26 kilometers. It's a population assumption. Therefore, the population parameter is 26. Can you test every vehicle to determine whether the mileage exceeds 26 or not? No, because it is impossible to test every car, hence we test the hypothesis using a sample (subset of the population).

8.4.2 What hypothesis: The hypothesis is a claimable assumption. Managers, supervisors, and experts base their claims in enterprises and sectors on their experience, practises, and hunches. For instance:

- Apple claims that the performance of the i-phone 14 is superior than that of the i-phone 13. It is an assertion based on assumptions made by an Apple representative.
- Mahindra and Mahindra introduced the Thar vehicle model and asserted that the new Thar version will provide improved fuel economy. This is also a claim based on their intuition, experience, etc.
- Micro-lab, a pharmaceutical business that manufactures Dolo – 650, asserts that it is distinct from other salts in the market.

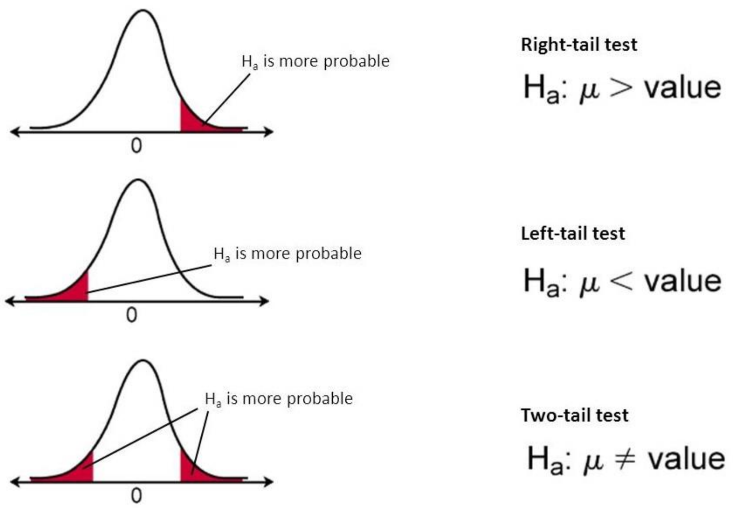
In academic research, hypothesis is designed on the basis of review of literature. For example:

- According to new research published in the American Economic Review, there is a clear correlation between Facebook use and rising anxiety and despair.
- Advertising that is humorous is more effective than advertising that is emotive or rational.
- There is a difference between the General Fertility Rate (GRF) of illiterate and literate women, with literate women having a lower GFR on a national scale. (GFR referes to the number of children born per 100 women in a year in the reproductive age group of 15 - 49 years) (GFR referes to the number of children born per 100 women in a year in the reproductive age group of 15 - 49 years.)
- Frequent daytime breaks reduce stress and avoid weariness.
- Exercise enhances immunity by increasing the circulation of immune cells in the blood, which aids in the fight against harmful germs and viruses.

8.4.3 Types of hypothesis:

- **Alternative hypothesis**: Your population claim is an alternative hypothesis based on your experience, practise, intuition, and assessment of available literature or reports or research. typically represented by H_1 or H_a For instance:

- It is a claim and alternate hypothesis that Mahindra asserts that the improved version of the Thar will achieve greater than 25 miles per gallon. In this instance, something is greater than something else, hence $H_1: \mu > \mu_0$, is a right-tailed alternative hypothesis. This is also known as the directional hypothesis because it provides direction for more than one object.
- The manufacturers of Dolo paracetamol assert that the likelihood of Dolo being ineffective is less than 2%. In this instance, one thing is lesser to another. $H_1: \mu < \mu_0$, is therefore a left-tailed alternative hypothesis. This is also known as the directional hypothesis because the direction of something less than is specified.
- During Covid – 19, Bharat Biotech asserts that co-vaccine and covi-shield are not equally effective. In this scenario, neither more nor less applies. This is referred to be a non-directional hypothesis because you have no idea which is greater or lesser. $H_1: \mu \neq \mu_0\ (\mu > \mu0\ or\ \mu < \mu0)$ also known as a two-tailed alternative hypothesis.
-



Null Hypothesis: the complimentary of alternative is called null hypothesis. The null hypothesis is an assumption made when figuring out a test statistic that says there can't be any difference from how things are in the whole population. It is written as H_0. Under the assumption that it is true, the null hypothesis is the hypothesis that is tested to see if it can be rejected. For example:

- The null hypothesis for the preceding alternative (Mahindra cliam about Thar that now improved version will give mileage greater than 25 is a claim and alternative hypothesis. In this case, something is more important than another) will be:

Thar's newly enhanced version will provide mileage of less than or equivalent to 25.

So null hypothesis is : $H_0 \leq 25.(\ \mu \leq\ \mu_1)$

- The null hypothesis for the aforementioned alternative is (that there is a less than 2% chance that Dolo will not work as intended. In this instance, something that is inferior to another) will be:
  That now Dolo ineffectiveness will be more than or equal to 2%.
  So null hypothesis is $H_0 \geq 2\%$. ($\mu \geq \mu_1$).
- The null hypothesis for above alternative hypothesis (During Covid – 19, Bharat Biotech claim that efficacy of co-vacine and covi-shild is not same.) will be:
  That efficacy of Co-vacine and Covi-shield vaccine is same.
  So null hypothesis is: $\mu = \mu_1$.

8.4.3.1How to decide right talied or left tailed:

On the basis of alternative hypothesis.

(i) > right tailed
(ii) < Left tailed.
(iii) $\mu 1 \neq \mu 2$ two tailed.

Caveat: never use equal sign in alternative. always use in null hypothesis.(≥, or ≤, =)

ACTIVITY

A directed hypothesis and a non-directional hypothesis are two types of alternative hypotheses that can be represented by making a variety of statements. You can also develop hypotheses based on a review of the relevant literature as well as on the basis of hunches and experiences, and then define those hypotheses in terms of right-tailed, left-tailed, and two-tailed test hypotheses..

8.4.4 Hypothesis testing:

- If you can figure out something about the whole population based on a sample, this is called hypothesis testing. For example, if Mahindra and Mahindra says (Hypothesis) that the new Thar will get better gas mileage than the old Thar, then 10 sample from the Thar population (10000) will be tested. You can test and make a claim about whether or not claim is true. Hypothesis testing is the process of seeing if a sample is representative of the whole population. Here, we'll talk about the steps of testing a hypothesis.

- **Setting up the hypotheses**: In this step, we set up alternative hypotheses based on claims and information in the literature, etc., and then we set up the complementary null hypothesis H_0 by assuming that the sample statistical value is the same as the population value. Also, the alternative is said to be in line with the null hypothesis. The most important thing is to choose the type of alternative (two-tailed or single-tailed) based on the test conditions and requirements.
- **Choosing the level of significance:** In this step, we choose the right level of Significance (α) based on how accurate the estimates are and how much risk we are willing to take. This will be decided before the sample is chosen, which means that α will be set earlier in the process. Common significance levels are 0.10 (1 chance in 10), 0.05 (1 chance in 20), and 0.01 (1 chance in 100).
- **Test criterion or test statistic:** In this step, we choose the best test statistic and figure out its value(s) based on the null hypothesis.
- **Conclusion:** Lastly, we compare the statistic value to the standard value at the given level of significance and decide whether or not to accept the null ypothesis..

8.4.5 Hypothesis testing with mean - Student's t-Test (t-Test):

In some cases, researchers want to test hypotheses about population means with sample sizes that aren't large enough for the normal distribution to provide a rough estimate. When the sample size is small and the population's standard deviation is unknown, the t-distribution is used. The t-distribution, like the standardised normal curve, has a bell-shaped distribution with a mean of zero and a standard deviation of one. When there are more than 30 samples, the distribution and the Z-distribution may be nearly identical.

- A t-test is an inferential statistic that is used to determine whether the sample mean (x) differs significantly from the hypothetical population mean ((μ)) value.
- only the significance of the difference between two sample means
- There are significant differences between the two data sets.
- The t-statistic, t-distribution values, and degrees of freedom all contribute to statistical significance.
- To run a test with three or more means, an analysis of variance is required..

T-test assumptions:

- **Normal Distribution:** A plot of the data should show a bell-shaped distribution curve, often known as a normal distribution. This is the first assumption that needs to be made.
- **Continuous dependent variable**The size of the measurement scale is the subject of the t-test's underlying assumption. A t-test makes the assumption that the scale that was used to measure the data that was collected was a continuous scale. An example of this would be the scores that one receives on an intelligence construct.

- **Equality of variance:** The final assumption is that the variance is constant throughout. When the standard deviations of samples are nearly the same, this is referred to as homogeneous or equal variance..
- **Random sample**: The final assumption is that the data comes from a simple random sample, which means that it comes from a random selection of people who are representative of the entire population.
- **Sample size is less then 30**: A hypothesis test that uses the t-distribution rather than the z- distribution. It is used when testing a hypothesis with a small sample size and unknown σ.

8.4.6 Univariate hypothesis test using the t – test:

$$t = \frac{\bar{x} - \mu}{\frac{S}{\sqrt{n}}},$$

where

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \quad \text{and} \quad S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$$

follows student's $t -$ distribution with $(n-1)$ d.f. In symbolic form

$$t = \frac{\bar{x} - \mu}{\frac{S}{\sqrt{n}}} \sim t_{n-1}.$$

We now compare the calculated value of t with the tabulated value of a certain level of significance. If the calculated value $|t| >$ tabulated value of t, null hypothesis is rejected and if the value of $|t| <$ tabulated of t, null hypothesis may be accepted at that level of significance. The tabulated values of t as given below:

d_f	Level of Significance for Directional Test (t_{crit})					
	∝=0.10	∝=0.05	∝=0.025	∝=0.01	∝=0.005	∝=0.0005
	Level of Significance for Non-directional Test (t_{crit})					
	∝=0.20	∝=0.10	∝=0.05	∝=0.02	∝=0.01	∝=0.001
1	3.0780	6.3140	12.7100	31.8200	63.6600	636.6000
2	1.8860	2.9200	4.3030	6.9650	9.9250	31.6000
3	1.6380	2.3530	3.1820	4.5410	5.8410	12.9200
4	1.5330	2.1320	2.7760	3.7470	4.6040	8.6100
5	1.4760	2.0150	2.5710	3.3650	4.0320	6.8690
6	1.4400	1.9430	2.4470	3.1430	3.7070	5.9590
7	1.4150	1.8950	2.3650	2.9980	3.4990	5.4080
8	1.3970	1.8600	2.3060	2.8960	3.3550	5.0410
9	1.3830	1.8330	2.2620	2.8210	3.2500	4.7810
10	1.3720	1.8120	2.2280	2.7640	3.1690	4.5870
11	1.3630	1.7960	2.2010	2.7180	3.1060	4.4370
12	1.3560	1.7820	2.1790	2.6810	3.0550	4.3180
13	1.3500	1.7710	2.1600	2.6500	3.0120	4.2210
14	1.3450	1.7610	2.1450	2.6240	2.9770	4.1400
15	1.3410	1.7530	2.1310	2.6020	2.9470	4.0730

Example: Let's say a teacher believe that the average grade a student gets in each class is 50. The grades of 11 students are collected, and they are as follows::

Marks	56	54	44	57	55	57	58	51	61	51	54

Do the grades support the teacher's belief??

The first step is to design the null the alternative and null hypothesis:

$H_0: \mu = 50$

$H_1: \mu \neq 50.$

Next, calculate a sample mean, $\bar{x}$ = 54.36 and a sample standard deviation, S = 4.5, and estmates the standard error of the mean (SEM).

$\bar{x} = \frac{598}{11} = 54.36$

Standard error of mean; **SEM = SD/√N**.

4.5/√11 =1.35

Next, finds the t value associated with the desired level of statistical significance. If a 95 percent confidence level is required, the significance level is .05.

So

$$t = 3.20 \sim t_{10}.$$

The value of t at $\alpha = 0.05$ and 10 d.f. is 2.228. As $t = 3.20 > 2.228$, therefore H_0 is rejected. It means that averge marks is more then 50 marks at a 5% level of significance.For confidence interval

$$CI = \bar{X} \pm Z \times \frac{\sigma}{\sqrt{n}}$$

$$= 54.36 \pm 1.9600 \times \frac{1.35}{\sqrt{11}}$$

$$= 54.36 \pm 0.798$$

a 95% confidence interval of the mean [53.56 55.15] suggests that we are 95% confident that the population mean is between 53.56 and and 11.

8.4.7 Hypothesis test of a proportion:

The proportional hypothesis test is conceptually similar to the univariate hypothesis test, but there is a difference in the mathematical formulation of the proportional standard error..

Researchers frequently test univariate statistical hypotheses about the size and distribution of a population. You can guess the population proportion based on the sample proportion. Testing a hypothesis about a proportion is conceptually the same as testing a hypothesis about the mean. The proportion's standard error is calculated in a different way mathematically..

Example: The MIT Sloan School of Management published a report on the relationship between Facebook presence and a decline in mental health among college students. The negative mental health effects were significant: "Facebook access resulted in a 20% increase in severe anxiety disorder."
In other words, the null hypothesis to be tested is that the proportion of severe enxiety disorder among college students is .2. The researcher formulates the statistical null hypothesis that the population proportion (π) equls 20 percent (.2).

$$H_0: \pi = .2$$
$$H_1: \pi \neq .2$$

If a researcher conduct a survey with a sample of 200 studetns and calculates p = .7. though the population proportion is not known. Here we willuse Z test rather than t -test as sample size is large. If the decision will be taken at the ,01 level of significance, the critical Z value of 2.57 is used for the hypothesis test. Using the following formula

$$z = \frac{p - \pi}{Sp},$$

The formula for Sp = **√p(1-p)/n**
Sp = estimate of the standard error of the proportion
P = proportion of successes

So

Sp = **√(.2)(.2)/200 = .028**

Z = p – π/Sp = .2 - .8/.028 = 21.42

Here Z value of 21.42 is more than the critical value of 2.57 so the null hypothesis is rejected.

8.4.8 hypothesis testing for two population mean:

In this case, two independent samples $(x_1, x_2, \cdots, x_{n_1})$ and $(y_1, y_2, \cdots, y_{n_2})$ of sizes n_1 and n_2 have been drawn from the normal populations with mean μ_X and μ_Y respectively under the assumption that the population variance is equal and equal to σ^2.

$$= \frac{(\bar{x} - \bar{y})}{S\sqrt{\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \sim t_{n_1+n_2-2}$$

The null hypothesis about difference between group is stastes as:

$\mu_1 = \mu_2$ or $\mu_1 - \mu_2$

The comparisions are between two sample means $(\bar{x} - \bar{y})$

Example: Null hypothesis: There is no difference between perception of students towards online learning between male and female students.

Male students	Female students
$\bar{x}_1 = 11.2$	$\bar{x}_2 = 14.5$
$S_1 = 2.6$	$S_2 = 2.1$
$n_1 = 14$	$n_2 = 21$

$$S^2 = \frac{1}{n_1 + n_2 - 2}\left(\sum_{i=1}^{n_1}(x_i - \bar{x})^2 + \sum_{i=1}^{n_2}(y_i - \bar{y})^2\right)$$

S = .797

The t – value is = (11.2 – 14.5)/ .797 = 4.14

Here calculated value of t, 4.14 exceed the critical t value of 2.75. at the .01 level. In other words, research shows that female students have more positive perception towards online learning.

8.4.9 Test of Significance:

The application of significance tests is an essential component of the sampling process. These tests provide assistance in drawing inferences from the results of a sample when the following conditions are met:

- The difference in value between the sample statistic that was observed and the parameter that was hypothetical value, or
- The difference between two statistics based on separate samples, which may or may not be significant as a result of random events or variations in the sampling process.

8.4.10 Level of Significance and critical region:

- A region (corresponding to a statistic) in the sample space which amounts to a rejection of is termed as the critical region or region of rejection. If is the critical region and if is the value of the statistic based on a random sample of size , then where is the complementary set of in sample space and is called the acceptance region.
- The degree of significance is defined as the probability that a random value of the statistic falls within the crucial region. This probability is expressed as a percentage. To put it another way, the degree of significance is equal to the size of the type I mistake, which is also known as the maximal producer's risk. In the process of putting hypotheses to the test, the levels of significance that are typically used are 5% and 1%.

8.5 Analysis of Variance

The t test compares two means or populations for each group. For example, compare male and female perceptions or attitudes of online learning. We only have two groups or levels of the independent variable, gender, in this case (male and female). The dependent variable, on the other hand, is one (attitude). If we want to compare more than two groups, the t-test will fail. For example, we want to examine the attitudes of primary, middle, as well as high school students. We have three student groups (independent variable) but only one dependent variable (attitude). ANOVA (one-way analysis of variance) is the appropriate statistical tool in this case. The t - test cannot be used to test hypotheses in this case. So null hypothesis and alternative hypothesis is:

H_o: $\mu_1 = \mu_2 = \mu_3$

Ha: $\mu_1 \neq \mu_2 \neq \mu_3$

The null hypothesis states that all means are equal, while the alternative hypothesis states that at least two groups differ.Assumptions:

(i) Data is normally distributed

(ii) Groups are independent.

(iii) Equality of Variance

Difference between groups: The difference between μ_1 and μ_2 and μ_3 is called difference between group.

Differnce within groups: The difference within μ_1 or μ_2 or μ_3 is called difference within groups.

ANOVA is the statistical term for making simultaneous comparisons of means when there are more than two levels..

$$f = \frac{Variance\ between\ groups}{Variance\ within\ groups},$$

Example:

Using the following data, perform analysis of variance (ANOVA) using α = .05

Groups I	Group II	Group III
67	45	74
45	43	76
33	23	87
53	23	56
43	43	56

Sol:

$$f = \frac{Variance\ between\ groups}{Variance\ within\ groups},$$

Source of Variance	Degree of Freedom (df)	Sum Square (SS)	Mean Square (MS)	F-ratio
Between Groups (Treatment)	k-1	$SSB = \sum_{j=1}^{k}\left(\frac{T_j^2}{n_j}\right) - \frac{T^2}{n}$ $SSB = \sum_{j=1}^{k} n_j(\bar{X}_j - \bar{X}_t)^2$	$MSB = \frac{SSB}{k-1}$	$F = \frac{MSB}{MSW}$
Within Groups (Error)	n-k	$SSW = \sum_{j=1}^{K}\sum_{i=1}^{n} X_{ij}^2 - \sum_{j=1}^{K}\left(\frac{T_j^2}{n_j}\right)$ $SSW = \sum_{j=1}^{k}\sum_{i=1}^{n}(x_{ij} - \bar{X}_j)^2$	$MSW = \frac{SSW}{n-k}$	
Total	n-1	$SST = \sum_{j=1}^{K}\sum_{i=1}^{n} X_{ij}^2 - \frac{T^2}{n}$ $SST = \sum_{j=1}^{k}\sum_{i=1}^{n}(x_{ij} - \bar{X}_t)^2$		

- SST = SSB + SSW

k: number of groups n: number of samples

df: degree of freedom

SSwithin: is computed by taking the square root of the difference between each score and the mean of the group, then adding up all of these scores.

Where X_{ij} = individual score.

$\bar{x}_j$ = group mean for the j_{th} group

k = number of observations in a group

n = number of j_{th} groups.

SS between is the variance of the group means relative to the grand mean can be computed by squarring the amount by which each group mean deviates from the grand mean, multiplying that result by the total number of items in the group, and then adding up all of these individual scores.

Where $\bar{x}_j$ = group mean for the j_{th} group

$\bar{x}_t$ = grand mean

n_j = number of items in the jth group.

SS_{within} = $(67 – 48.2)^2 + (45-48.2)^2 + (33-48.2)^2 + (53-48,2)^2 + (43-48.2)^2 + (45-35.4)^2 + (43-35.4)^2 + (23-35.4)^2 + (23-35.4)^2 + (74-69.8)^2 + (76-69.8)^2 + (87-69.8)^2 + (56-69.8)^2 + (56-69.8)^2$

= 1892.8

$SS_{between} = 5(48.2-51.13)^2 + 5(35.4 – 51.13)^2 + 5(69.5 – 51.13)^2$

= 3185.23

$MS_{between}$ = 3185.23/(3-1) = 1592.5

MS_{within} = 1892/(15-3) = 157.6

F = 1592.5/157.6 = 10.10

$F_{critical}(2,12)$=3.89

Decision = Reject H_0

The critical value of f at the .05 level for 2 and 12 degrees of freedom indicated that an F of 3,89 would be required to reject the null hypothesis.

The conclusion that we reach from this particular illustration is that the null hypothesis should not be accepted. It would appear that every group has its own characteristics..

8.6 Error – I and II

Sampling error or risk in testing hypothesis: (Error – I and II)

In the event that the test is performed again, how confident are you that you would obtain the same result? because the validity of the hypothesis is determined by the sample. During the process of picking the sample, there is a possibility of making a mistake. Therefore, there is an element of risk involved in the testing of the hypothesis. When testing a hypothesis, there are essentially two different kinds of risk involved. In this section, we will determine which danger poses the greater threat. The risk is caused by a variety of different circumstances.

Situation 01: According to Mahindra & Mahindra, the new Thar will have a mileage that is greater than 25 miles per gallon thanks to the updated engine.

In this particular scenario, if the null hypothesis is disproved despite the fact that it was correct. If the corporation sends the wrong message regarding Thar's mileage, the image of the company will suffer in the long run.

Situation 02: The micro-lab pharmaceutical company claims that the percentage of ineffectiveness of the dolo paracetamol drug is less than 2%.

In this particular scenario, the cost of risk would be borne by people if the null hypothesis is rejected despite the fact that it was correct. Consequently, we will go over the two categories of errors that can occur while testing the hypothesis in Error I and Error II. The primary objective of sampling theory is to develop the capability of drawing reliable inferences about the characteristics of the entire population on the basis of the findings obtained from a sample. In actual operations, we examine an observation of a huge amount before deciding whether to accept or reject it. As a result of this, we run the risk of making the two types of errors listed below.:

- **Type I Error:** Rejecting the Null Hypothesis H_0, when it is true.
- **Type II Error:** Accepting H_0 when it is wrong, i.e., when H_1, is true.

In terms of probability, we can write,

$$P[Reject\ H_0\ when\ it\ is\ true\ ] = P[\ Reject\ H_0 \mid H_0\ ] = \boldsymbol{\alpha}$$

$$P[Accept\ H_0\ when\ it\ is\ wrong\ ] = P[Accept\ H_0 | H_1] = \boldsymbol{\beta}$$

The α and β are called the sizes of type I error and type II error, respectively. **α** is called the *producer's Risk,* and **β** is called the *consumer's Risk.*

	H_0 is true	H_0 is false
Accept H_0	No error	β
Reject H_0	α	No error

CASE STUDY

US Study: Research conducted in the United States found that social media addiction is associated with increased levels of anxiety and depression.

According to new research published in the American Economic Review, Facebook use is strongly associated with increased anxiety and depression. However, social networks disagree and assert that the evidence is unclear. The MIT Sloan School of Management published a paper on how the mental health of college students appears to deteriorate when they use Facebook.A new study is significant because it compares two distinct sets of data from the early days of Facebook, between February 2004 and September 2006. Facebook was introduced gradually to college campuses in the United States. It started at Harvard. The researchers compared the responses of students when Facebook arrived on campus. When the researchers examined the 4,300,000 survey responses from that time, they discovered "a substantial correlation between college students' Facebook use and their deteriorating mental health."

The negative consequences on mental health were significant: "Access to Facebook linked to a 7% increase in severe depression and a 20% increase in anxiety disorders." According to researchers, using Facebook is around 20% as detrimental to mental health as losing a job. And this was before Facebook included the "like" button. It was also observed that Facebook's effects on mental health worsened over time.

IN-TEXT QUESTIONS

15. The t-test requires normally distributed data. True / False
16. Rejecting the Null Hypothesis H_0, when it is true is called ________________.
17. Your claim is:
    a) Alternative hypothesis b) Null hypothesis
    c) Both of the above d) none of the above
18. Full form of ANOVA ____________________
19. Standard error is ____________________.
20. Complementary to your claim is
    a) Alternative hypothesis b) Null hypothesis
    c) Both of the above d) none of the above
21. Is there any error in accepting a hypothesis when it is true?.(T/F)
22. Accepting H_0 when it is wrong, i.e., when H_1, is true is:
    (a) Error – I (c) Both a and b
    (b) Error - II (d) none of the above
23. Risk in Hypothesis testing is known as
    (a)Error – I (c) Both a and b
    (b)Error - II (d) none of the above
24. Hypothesis testing is the process of matching the mean of a sample to the mean of a population.. true/false
25. Which among the followings representing assumptions of hypothesis testing.
    (i) Data is normally distributed (iii) Equality of variance
    (ii) Groups are independent. (iv) All of the above.
26. μ represent sample parameter (True/False)
27. You can use .($\geq$, or $\leq$, =) in alternative hypothesis.True/False.
28. We use Sample size less then 30 in ------------------------ test.
29. In case of sample size is more then 30 we use ---------------- test.

8.7 SUMMARY

When doing a statistical investigation, the primary focus is typically on determining the overall scale of a phenomenon and conducting research into the variance of one or more traits that are associated with individuals who are members of a group. The persons who are the subject of this research are referred to as the population or the universe.

The number of persons that make up a given sample is referred to as the sample size. A sample is defined as a discrete subset of the statistical individuals that make up a population.

It's possible that the two groups of people—the population and the sample, with the latter being a subset of the former—could have different statistical constants depending on the circumstances. To clear up any misunderstandings that may have arisen, these constants connected with the population, e.g., the population mean (μ), variance (σ^2) etc., referred to as parameters. Similarly, the constants associated with the sample of the respective population, e.g., the sample mean ($\bar{x}$), sample variance (s^2),

The application of significance tests is an essential component of the sampling process. These tests provide assistance in drawing inferences from the results of a sample when the following conditions are met:

the difference between the value of the hypothetical parameter and the observed value of the sample statistic, or

a statistically significant difference exists between two independent sample statistics; yet, this difference may also be explained by random variation or the effects of sampling.

An assumption that is made during the process of estimating any test statistic is known as the null hypothesis. This assumption states that there is no possibility of any variation from the situation that is currently occurring in the actual population as a whole. The null hypothesis is represented by the symbol H_0. The hypothesis that is assumed to be correct and then subjected to scrutiny to see whether or not it can be rejected is known as the null hypothesis.

The term "alternative hypothesis" refers to a hypothesis that is distinct from the "null hypothesis" and is typically represented by the letters "H_1" or "Ha." As a consequence of this, we are likely to make the two types of errors listed below.:

Type I Error: Rejecting the Null Hypothesis H_0, when it is true.

Type II Error: Accepting H_0 when it is wrong, i.e., when H_1, is true.

A region (corresponding to a statistic t) in the sample space S which amounts to a rejection of H0 is termed as the critical region or region of rejection.

.

A t-test is a form of inferential statistic that is used to evaluate whether or not the mean of the sample ($\bar{x}$) substantially deviates from the value of the population mean μ that is assumed to exist. the importance of the difference in mean between two samples. a noteworthy variance can be seen between the two sets of data.

8.8 GLOSSARY

- **Hypothesis** A hypothesis is an assumption that can be proven or disproved.
- **Standard Error**. Standard Error. stands for "standard error," which refers to the sample distribution of the standard deviation of a statistic.
- **Normal Distribution:** The first assumption is that a plot of the data would show a bell-shaped distribution curve, sometimes known as a normal distribution.
- **Continuous dependent variable**: t-tests are based on the assumption of a continuous dependent variable, and the second assumption concerns the size of the measurement scale. A t-test makes the assumption that the scale that was used to measure the data that was collected was a continuous scale. An example of this would be the scores that one receives on an intelligence test.

- **Equality of variance:** The third assumption is that the variance is the same in all locations, which is known as the equality of the variance. When the standard deviations of different samples are very close to being the same, we have what's known as homogeneous variance.
- **Random sample**: The last supposition is that the information was obtained from a sample that was chosen at random and was intended to be representative of the entire population. This type of sample is known as a simple random sample.

8.9 ANSWERS TO IN-TEXT QUESTIONS

1. standard error	11. b
2. False	12. True
3. a	13. b
4. a	14. c
5. Conversational style	15 true
6. True	16. (iv)
7. Error - I	17. False
8. a	18. False
9. Analysis of Variatnce	19. t-test
10. which is the sampling distribution of a statistic's standard deviation	20. z test

8.10 SELF-ASSESSMENT QUESTIONS

1. Explain why it is necessary to test the hypothesis. Examine the procedures involved in evaluating a hypothesis.
2. What is hypothesis? What different kinds of hypotheses are you familiar with? Talk about each of them individually.
3. Discuss two different sorts of errors that can occur while testing hypotheses. Discuss the part they play in the testing.?
4. Define the following terms:

i) Type II error.

ii) Type I error

iii) Anova

5. Write the assumptions of the following tests:

i) t −test

ii) F −test

6. The average lifetime of a sample of 200 batteries manufactured by a business was determined to be 1540 hours, with a standard deviation of 42 hours. Is it conceivable that a sample was taken from a population whose life time mean age was 1500 hours? You are free to use a significance threshold of 5%. (Given Tabular value is 13.47) (D.U 2021)

7. According to the findings of a survey administered to students, a group of seventy students scored an average of eighty points on their business research paper, with a standard variation of twelve points. Consider the null hypothesis that the marks of the

population mean are 100 with the alternative result that is fewer than 100 marks. Use 5% level of significance. (Critical value of statistic is 1.64).

8. Using the following data, perform analysis of variance (ANOVA) using $\alpha = .05$

Groups I	Group II	Group III
84	131	99
87	120	96
118	143	129
130	145	153

8.11 SUGGESTED READINGS

Surya, P.K., Sharma, S.K. (2020) Business research methods and analytics, Taxmann publication, New Delhi

William G. Zikmund (2003), Exploring marketing research. Thomson press.

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