ENGINEERING MANAGEMENT

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  - SLE: subcontract Management

TextBook:

Banga and Sharma, "Industrial Organization and Management", Khanna Publishers, New Delhi, 2007

UNIT - 1

Management

- **History of scientific management:**

– Introduction:

Industrial Engineering: It is concerned with design, improvement and installation of integrated systems of people, materials, equipment and energy. It requires knowledge and skill in mathematics, physics and social sciences together with the principles and methods of engineering analysis and design to specify, predict and evaluate the results to be obtained from such systems.

An Industrial engineer is responsible to design a system and manage it such that there is efficient use of resources (less waste/unit : higher outputs for given inputs). The inputs include human efforts, energy, materials, capital etc

– History:

During the industrial revolution, there was a lot of pressure on industries to produce to fill the demand gaps left after the ruins of world war II. Industries like textile, steam engine, metal cutting/casting/forging increased production inturn needing human workers. Hence analysis and experimentation in production became a complex process as Most of the human workers were replaced by machines.

- F.W Taylor: Concept of Productivity

The main objective was improving economic efficiency, labor productivity by analyzing and establishing workflow processes. It was influenced by Adam Smith's "The wealth of Nations (1776). Taylor published "Principles of Scientific Management which aims at determining the best way for a job to be done.

• Charles W Babbage's "On the Economy of Machinary and Manufacturers:

His scientific inventions included an analytical calculating machine. He believed in the benefits of division of labour and was an advocate of profit sharing.

• Henry L Gantt

Gantt designed graphic aids for management called Gantt charts using horizontal bars to plan and control work

• Pennsylvania state University: Founded the first industrial engineering program in 1908. It was described as the fusion of engineering and business disciplines.

• World War II: Operational Research

Operational Reseach is a disciple that deals with application of analytical methods to improve decision making. Statistical and advanced mathematical techniques are used to solve real-world problems. It lead to new developments like system analysis and design, application of mathematical tools, network planning, behavioral science and human factors etc.

• Roles of an industrial Engineer:

Adviser/consultant	Advocate/activist	Analyst
Motivator	Decision Maker	Designer/Planner
Expert	Coordinator/Integrator	Innovator/Investigator
Project Manager	Trainer/Educator	Data Gather
Negotiator.		

• Industrial Management:

It started as an application to manufacturing industry. Later it spread to construction, transportation, farming, airline, public utilities, government and military operations.
Some aspects within manufacturing are: marketing, finance, purchasing (inventory), industrial relations, etc.

- Product Management:
  The four parts of product management are:
  - Design: product, process, plant
  - Development: inventories, quality, scheduling, productivity
  - Operations
  - Decisions:
    a. Strategic - They are major choices of action and influence whole or a major part of business.
    b. tactical - They concern the more detailed implementation of the director's general strategy and usually has a medium-term impact on the company
- Management science:
  A problem solving process used by an interdisciplinary team to develop mathematical models that represent simple-to-complex functional relationships and provide management with a basis for decision making and a means of uncovering new problems for quality analysis.
  FW Taylor's management techniques:
  - Research, standardization, control and cooperation (cost accounting, time study, inventory / production control, planning output scheduling, fuctional operation, standardized procedures, system classification and quality)

  Management science describes an integrated approach to operational control based on the application of scientific research methods to business problems.
  - It examines functional relationships from a systems overview
  - Use of interdisciplinary approach
  - Uncover new problems for study

  There is an interdependency of activities. Interdisciplinary approach helps to look at a problem from different approaches. solutions to problems brings in new problems

- Tools:
  - Decision matrices and trees
  - Mathematical programming (linear programming)
  - Branch and bound
  - Network Models (PERT: Program Evaluation and Review Technique, CPM: Critical Path Method)
  - Dynamic Programming
  - Markov chains
  - Game theory
  - Inventory models
  - Queuing models
  - Simulation models (AI, heuristic, management games, system simulation, MonteCarlo simulation)

- **Business Organization:**

- Characteristics:

Business activities are directly or indirectly concerned with the transfer or exchange of goods and services for values. It involves dealing with goods and services.

Business is a human activity directed towards acquisition of wealth. The element of risk involves possibility of loss.

- Classification:

Industry can be based on production, processing or fabrication of products:

  - Extractive: Fishing, mining, agriculture
  - Generic: breading farms, poultry, horticulture plants
  - Construction: Buildings, bridges, dams, roads
  - Manufacturing: Analytical, synthetic, assembly line

- Objectives:

1. Organic Objective: survival, growth, prestige and recognition from society

2. Economic Objective: Earning as much as profit possible
3. Social Objective: Benefit of society - quality products, no profiteering, no antisocial practices, provide employment
4. Human Objective: Fair deal to employee, develop human resources, job satisfactions
5. National Objective: social justice, development of small enterprises, production as per national priorities, self sufficiency / export development, skill development.

- **Types of Ownership:**

1. **Individual Ownership:**

A business owned by one man is called single ownership. Here an individual enjoys and exercises all the rights in his own interest

Advantages:

- Easy to establish due to less legal restriction
- Simplicity of organization
- Expenses in starting the business are minimal
- Owner is free to make all decisions
- Easy to operate and extremely flexible
- The owner enjoys all the profits

Disadvantages:

- The owner is liable for all obligations and debts.
- Business may not be successful if the owner has limited capital, lacks ability and necessary experience to run the business.
- Difficult to raise capital for expanding the business
- Cannot take big risks to start a big company

2. **Partnership:**

It is a type of business entity in which partners (owners) share all the profits and losses of the business with each other

Advantages:
- Less legal formalities, good freedom as less government supervision.
- Greater capital can be raised and larger resources
- People with different skills can take up respective responsibilities.
- Risks are shared.

Disadvantages:
- Profits have to be shared
- conflicts of personality between partners may disrupt the continuity of existance of the business.
- Mistake by one partner may cause a big loss to all the partners.

Types of partners:
1. Active Partners: Takes active part in the management of the firm.
2. Sleeping / silent Partners: Doesnot take part in the management but he invests money and shares the profit and losses of the firm.
3. Nominal Partners: They do not invest or take part in management, but they lend their reputed name and goodwill to the firm.
4. Secret Partners: They participate in business secretly without disclosing their association with the firm to general public.
5. Minor Partners (below 18 years): They can share the profits of business but in case of loss, his liability is limited to the extent of his capital contribution to the business.

3 Joint Stock Companies:

A joint stock company is a type of business entity involving two or more legal persons. In a joint stock company the shareholders are free to transfer their ownership interest at any time by selling their stockholding to others.

Types of joint stock companies:

a. Private Limited Companies

The capital is collected from private partners. It restricts the right to transfer shares, avoid public to take up shares or debentures. The numbers of members is limited to 50 excluding the employees and ex-employees shareholders.

b. Public Limited Companies

The capital is collected from the public by issuing shares having small face value. Government also has control and supervision. Shares are transferable. The affairs are managed by board of directors which is an elected body.

Liquidation: company can be dissolved if liability becomes more than the assets (under the supervision of court). Assets of the company can be sold to generate money as well.

Amalgamation: It can be merged with two or more companies in the need of some adjustment if necessary.

Advantages:

- A huge amount of capital can be raised
- It associates limited liability with it
- Shares are transferable
- Risk of loss is divided among many shareholders
- Companies life is not affected by death/retirement of shareholders.
- It associates with stability, efficiency and flexibility of management.
- Great potential for expansion.

Disadvantages:

- It is difficult to preserve secrecy
- Directors and members of management can manipulate share values
- No relation between efforts and income, this could lead to lack of personal interest inturn causing inefficiency
- Large number of legal formalities

4. Co-operative Societies:

The main aim of cooperative is to provide goods and services to the members of the cooperative at cost. Members pay fees or buy shares of the cooperative and profits are periodically redistributed to them. It helps to protect the interest of members and fights against monopolists and capitalists.

To start a co-operative society:

- Submit application to the registar of co-op society
- Officials will attend first general body meeting, by-laws are framed and directors are elected by share holders.
- Licence will be issued if requirements are met.

Objectives:

- Voluntary organization: Members can withdraw giving a notice and withdraw his capital
- No limit to membership: Small share values attracts larger people.
- Management is based on democratic basis.

Types:

- Consumers cooperatives
- Producers/Manufacturers cooperatives
- cooperative farming
- cooperative housing
- cooperative credit society

Advantages:
- Daily necessities of life can be made available at lower rates
- No person can make huge profits as there is no blackmarketeering or profiteering and middleman is eliminated
- Less spending on advertisement and publicity
- Promotes sense of cooperation among the members.
- Large loan amount can be sanctioned by government.

Disadvantages:
- Members are from working class thus capacity to raise capital is limited.
- Mismanagement can be caused due to management by inexperienced people. someone can take undue advantage.
- Requires better and strict supervision.

5. Public Sector:

The public sector is a part of the state that deals with the delivery of goods and services by and for the government, whether national, regional or local /municipal. Government starts or acquires certain industries to avoid monopolistic tendencies.

Objectives:
- to provide basic infrastructure facilities for the growth of economy.
- to promote rapid economic development
- to avoid concentration of economic power in a few hands
- to look after well-being and welfare of public

Advantages:
- Profits earned by public sector may be used for the general welfare of the community.
- Public enterprise encourages industrial growth of

the under-developed regions in the country.

- capital, raw material, fuel, power and transport are easily made available to them.
- Public sector offers equitable opportunities to all.

Disadvantages

- Delay in decisions.
- Incompetent persons may occupy high levels.
- Too much interference by the government and politicians in the internal affairs.

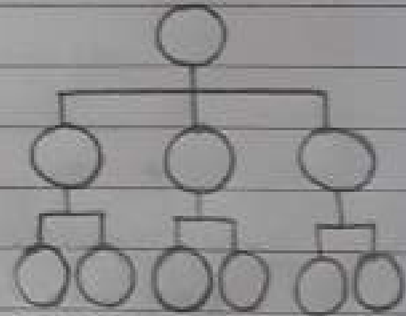
- **Organization structures:**

Types of organization structures:

1. Hierarchical Organization Structures:

Hierarchical organizational structure is also known as pyramid-shaped organizational structure.

It is the most common type of organizational structure: the chain of command goes from the top (Ex: CEO or manager) down (Ex: Entry-level and low level employees) and each employee has a supervisor.



Hierarchical Organisation Structure

Advantages:

- Better definition for levels of authority and responsibility.
- shows who each person reports to.
- Motivates employees with clear career paths and chances of promotion.
- gives each employee a speciality
- creates camaraderie between employees within the same department

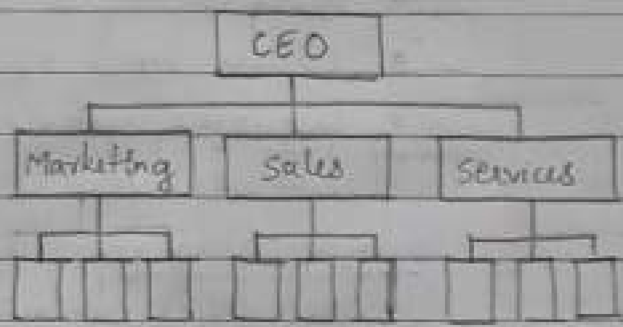
Disadvantages:

- can slow down innovation or important changes due to increased bureaucracy.

- Can cause employees to act in interest of the department instead of the company as a whole.
- can make lower-level employees feel like they have less ownership and can't express their ideas for the company.

2. Functional Organizational Structures:

Functional Organizational structure is similar to a hierarchical organizational structure with positions with the highest levels of responsibility at the top and goes down from there.



Functional Organizational Structure

Though employees are organized according to their specific skills and their corresponding fuction in the company, each separate department is managed independently.

Advantages:

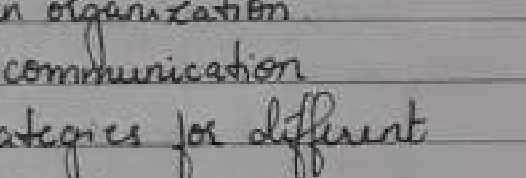
- Allows employees to focus on their role
- Encourages specialization
- Help teams and departments feel self-determined
- Easily scalable in any sized company

Disadvantages:

- can create isolation within an organization
- Hampers interdepartmental communication
- Obscures processes and strategies for different markets or products in a company

3. Horizontal or Flat Organizational Structure:

A horizontal or flat organizational structure fits companies with few levels between upper management and staff-level employees.


Horizontal / Flat Organizational structure

Many start-up businesses use a horizontal organizational structure before they grow large enough to build out different departments, but some organizations maintain this structure since it encourages less supervision and more involvement from all employees.

Advantages:

- Gives employees more responsibility.
- Fosters more open communication.
- Improves coordination and speed of implementing new ideas.

Disadvantages:

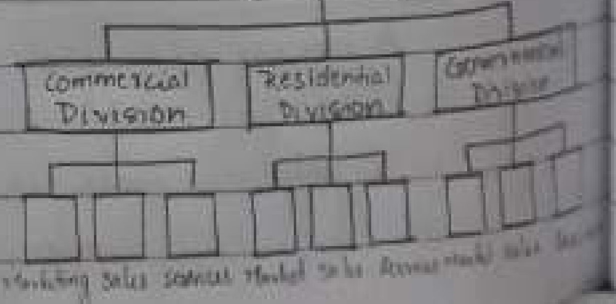
- can create confusion since employees do not have a clear supervisor to report to.
- can produce employees with more generalized skills and knowledge.
- can be difficult to maintain once company grows beyond start-up status.

4. Divisional Organizational Structure:

In divisional organizational structures, a company's divisions have control over their own resources, essentially operating like their own company within the larger organization. Each division can have its own marketing team, sales team, IT team etc. This structure works well for large companies as it empowers the various divisions to make decisions without everyone having to report to just a few executives.

Market-based Divisional Organizational Structure:

Divisions are separated by market, industry or customer type. A large consumer goods company like Target or Walmart might separate its durable



goods (clothing, electronics, furniture, etc) from its food or logistics divisions.

Product-based Divisional Organizational Structure:

Divisions are separated by product line. For example: a tech company might have a division dedicated to its cloud offerings, while the rest of the divisions focus on the different software offerings: Adobe and its creative suite of Illustrator, Photoshop, InDesign, etc.

Geographical-Divisional Organizational Structure:

Divisions are separated by region, territories or districts, offering more effective localization and logistics. companies might establish satellite offices across the country or globe in order to stay close to their customers

Advantages:

- Helps large companies to stay flexible
- Allows for a quicker response to industry changes or customer needs.
- Promotes independence, autonomy and a customized approach.

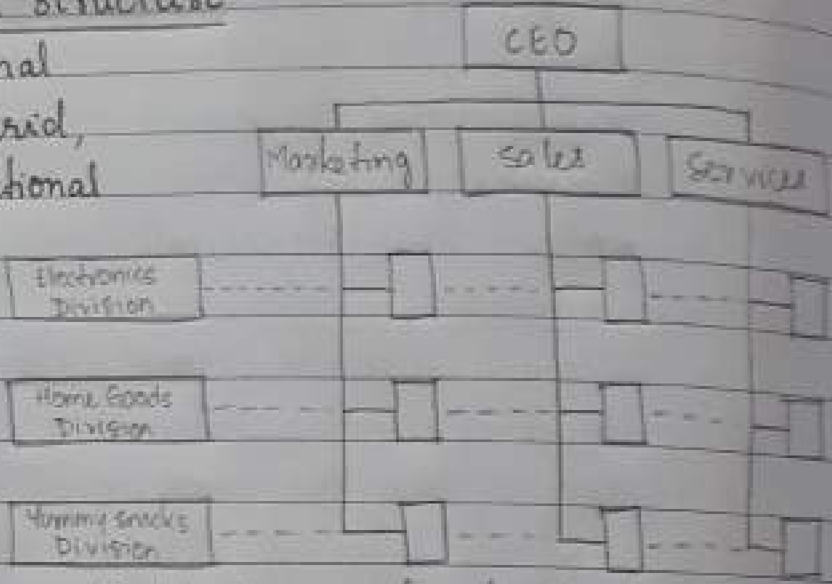
Disadvantages:

- Can easily lead to duplicate resources
- can mean muddled or insufficient communication between the headquarters and its divisions
- can result in a company competing with itself.

5. Matrix Organizational structure:

A matrix organizational structure looks like a grid, and it shows cross functional teams that form for special projects.

All employees have dual responsibilities.



Matrix Organizational Structure

Advantages:

- Allows supervisor to easily choose individuals by the needs of a project.
- Gives a more dynamic view of the organization
- Encourages employees to use their skills in various capacities aside from their original roles.

Disadvantages:

- Presents a conflict between department managers and project managers.
- Can change more frequently than other organizational structure types.

6. Team-based Organizational Structure:

A team based Organizational structure groups the employees according to teams. It is meant to disrupt the traditional hierarchy, focusing more on problem solving, cooperation and giving employees more control.

Advantages:

- Increases productivity, performance and transparency by breaking down isolation.
- Promotes growth mindset.
- Changes the traditional career models by getting people to move laterally

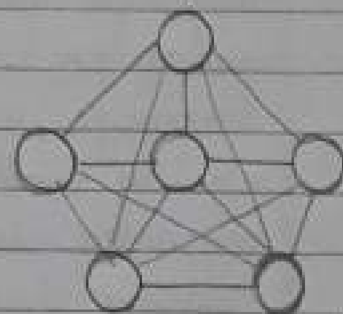
- Values experience rather than seniority
- Requires minimal management
- Fits well with agile companies with scrum or tiger teams

Disadvantages:

- Goes against many companies natural inclination of a purely hierarchical structure
- Might make promotional paths less clear for employees.

7. Network Organizational Structure:

A network organizational structure makes sense of the spread of resources. It can also describe an informal structure that focuses more on open communication and relationships rather than hierarchy



Network Organizational Structure

Advantages:

- Visualizes the complex web of onsite and offsite relationships in companies.
- Allows companies to become more flexible and agile.
- Gives more power to all employees to collaborate, take initiative and make decisions.
- Helps employees and stakeholders understand workflows and processes.

Disadvantages

- Can quickly become overly complex when dealing with lots of offsite processes
- Can make it more difficult for employees to know who has the final say

- **SLE: Types of Planning:**

Organizational planning is the process of defining a company's reason for existing, setting goals aimed at realizing full potential and creating increasingly discrete tasks to meet those goals.

1. Strategic Planning

A strategic plan is the company's big picture. It defines the company's goals for a set period of time, whether that's one year or ten and ensures that those goals align with the company's vision, mission and values. Strategic planning usually involves the top managers, although some smaller companies choose to bring all of their employees along when defining their mission, vision and values.

The strategic plan must be forward looking, effective and flexible with a focus on accommodating future growth. These plans provide the framework and direction for lower level planning.

2. Tactical Planning

The tactical strategy describes how a company will implement its strategic plan. A tactical plan is composed of several short-term goals, typically carried out within one year, that support the strategic plan. Generally it's the responsibility of middle managers to set and oversee tactical strategies like planning and executing a marketing campaign.

Tactical plans entail detailing resource and work allocation among the subunits within each division.

3. Operational Planning

Operational plans encompass what needs to happen continually on a day-to-basis, inorder to execute tactical plans. Operational plans could include work schedules, policies, rules or regulations that set standards for

employees, as well as specific task assignments that relate to goals within the tactical strategy such as a protocol for documenting and addressing work absences
operational plans can be
- standing plans: drawn to cover issues that manager faces repeatedly. Ex: policies, procedures, rules.
- Ongoing plans: prepared for single or exceptional situations or problems and are normally discarded or replaced after one use. Ex: programs, projects and budgets

4. Contingency Planning

contingency plans wait in the wings in case of a crisis or unforeseen event. contingency plans cover a range of possible scenarios and appropriate responses for issues varying from personnel planning to advanced preparations for outside occurrences that could negatively impact the business.

companies may have plans for things like how to respond to a natural disaster, malfunctioning software or the sudden departure of a c-level executive.

UNIT - 02

Engineering Economics and Financial Management

- **Law of Demand and Supply:**

The law of supply and demand is a theory that explains the interaction between the sellers of a resource and the buyers for that resource. Demand varies with the price though there are many other factors that has influence over demand. Generally, as price increases, people are willing to supply more and demand less and vice versa when the price falls.

- Law of Demand:

The higher the price of a good, the less the people will demand that good and vice versa

Elasticity of demand: degree of responsiveness of quantity demanded to a change in price.

$$E_p = \frac{[(Q_2 - Q_1)/Q_1]}{[(P_2 - P_1)/P_1]}$$

where E_p: Elasticity of demand

Q_1 and Q_2: Quantity demanded before and after price rise

P_1 and P_2: Price before and after price rise.

- Perfect Elastic Demand

Increase in demand without reducing price (horizontal curve)

- Perfect Inelastic Demand

No change in demand even with change in price (vertical curve)

- Demand with Unit Elasticity

Proportionate change in price leads to equal change in demand (rectangular hyperbola).

- Relative Inelastic Demand

More change in the price of the goods but less change in demand for the goods.

- Relative Elastic Demand:

Relatively small changes in the price cause relatively large changes in quantity

- Law of Supply:

As the price of a commodity rises, its supply increases and when price falls the supply declines. A higher price will induce producers to supply a higher quantity to the market

- **Market Equilibrium:**

A market is said to have reach equilibrium price when the supply of goods matches demand. A market in equilibrium demonstrates three characteristics:

- the behavior of agents is consistent
- there are no incentives for agents to change behavior
- a dynamic process governs equilibrium outcome

Disequilibrium is the opposite of equilibrium and it is characterized by changes in conditions that affect market equilibrium.

NOTE:

PRICE DETERMINATION

- cost factor
- Nature of the market
- competitor's price
- Channel distribution
- Warranty and after-sale service
- Margin for rebate and concession
- Government policies
- Buying habits of customers
- Natural/season of sale
- Demand and supply

- ## Interest Rates

1. ### Simple Interest

It is directly proportional to time and the total interest is payable at the end of the specified period usually one year.

$$I = P n i$$

where I = Simple Interest amount
P = Principal amount
i = Rate of Interest
n = Number of years in the period.

Entire amount (principal + interest)

$$S = P + I = P(1 + ni)$$

where $1 + ni$ = interest factor

- Ordinary Simple Interest

It uses 360 days as the equivalent number of days in a year.

- Exact Simple Interest

It uses exact number of days in a year which is 365 or 366 for a leap year.

2. ### Compound Interest

When the interest at the end of the period becomes a part of the principal and itself earns interest along with the principal, it is compound interest.

$$S = P(1+i)^n$$

where $(1+i)^n$ = compound amount factor (CAF)

If the interest is paid more than once in a year (semiannually, quaterly, monthly etc) then:

$$CAF = (1 + i/m)^{nm}$$

where m = periods per year.

- NPV Analysis of Alternatives:

Net Present Value (NPV) is the difference between the present value of cash inflows and the present value of cash outflows over a period of time. NPV is used in capital budgeting and investment planning to analyze the profitability of a projected investment of a project.

$$NPV = \sum_{t=1}^{n} \frac{R_t}{(1+i)^t}$$

where R_t : Net cash inflow - outflow during a single period t
i : discount rate or return that could be earned in alternative investments
t : Number of times periods

- Internal Rate of Return (IRR):

The IRR is a metric used in financial analysis to estimate the probability of potential investments. It is a discount rate that makes NPV of all cash inflows equal to zero in a discounted cash flow analysis, i.e., it is the annual return that makes the NPV equal to zero.

$$0 = NPV = \sum_{t=1}^{T} \frac{C_t}{(1+IRR)^t} - C_0$$

where: C_t : Net cash inflow during the period t
C_0 : Total initial investment costs
IRR : The internal rate of return
t : The number of time periods

Under the NPV approach, the present value can be calculated by discounting a project's future cash flow at predefined rates known as cut off rates.

Under the IRR approach, cash flow is discounted at suitable rates using a trial and error method that equates to a present value. The present value is calculated to an amount equal to the investment made.

- ## Depreciation Concepts:

Depreciation is an accounting method of allocating the cost of a tangible or physical asset over it's life expectancy. It represents how much of an asset's value has been used up. Depreciating assets helps companies earn revenue from an asset while expensing a portion of its cost each year the asset is in use. If not taken into account, it can greatly affect profits.

Types of depreciation:

1. **Straight line:**

An equal amount is charged for depreciation of every fixed asset in each of the accounting periods. This uniform amount is charged until the asset gets reduced to nil or its salvage value (scrap value) at the end of its estimated useful life.

$$\text{Depreciation Expense} = \frac{\text{Cost} - \text{Salvage value}}{\text{Useful Life}}$$

2. **Declining Balance Method:**

A fixed percentage of depreciation is charged in each accounting period to the net balance of the fixed asset. This net balance is the value of asset that remains after deducting accumulated depreciation. Thus, the depreciation rate is charged on the reducing balance of the asset.

$$\text{Depreciation Expense} = \frac{\text{Value of asset at the beginning of the year} \times \text{Rate of depreciation}}{100}$$

3. **Sum of the Years Method:**

The remaining life of an asset is divided by the sum of the years and then multiplied by the depreciating base to determine the depreciation expense.

$$\text{Depreciation Expense} = \frac{\text{Depreciation cost} \times \text{Useful life of asset}}{\text{Sum of years' digits}}$$

where sum of the years' digits $= \frac{n(n+1)}{2}$ (n: useful life)

4. Units of Production Method:

It depreciates assets based on the total number of hours used or the number of units produced by using the asset, over its useful life.

$$\text{Depreciation Expense} = \frac{\text{Number of units produced}}{\text{Life in number of units}} (\text{cost} - \text{Salvage value})$$

- Elements of cost:

Cost of manufacturing decides the selling price. It has to consider all the elements such as materials, labor and expenses.

– Material Cost:

Direct materials: Materials that are operated or that are processed form of the final product. They may be part of the final product.

Indirect materials: Essentially needed in various departments helping the direct materials.

Calculation:

- Calculate the volume of each component
- Add volume of all components to get the total volume of the product.
- Multiply the volume with the density to get the weight of the material.
- Multiply cost/weight with the weight of the material to obtain cost of the material.

– Labor Cost:

Direct Labor: who work directly, ex: productive labors

Indirect Labor: who contribute to the company's performance outside of production and services, ex: supervisors, securities etc.

Labor cost depends on set up time, operation time (handling time, machine time), tear down time, miscellaneous allowance (personal, fatigue, tool changing and finding allowances, cleaning oiling etc)

- Expenses:

Direct Expenses: Expenses which can be charged directly to a particular/specific job.

Indirect Expenses: Overhead charges such as factory expenses, administrative expenses and distribution expenses.

- Factory Expenses: indirect material, labor
- Administrative Expenses: salaries, telephone and internet charges, depreciation of office building and furnitures etc.
- Selling Expenses: Advertising, agency expenses / commission
- Distribution Expenses: Dispatching, packing etc.

- **Fixed Cost:**

A fixed cost is a cost that does not change with an increase or decrease in the amount of goods or services produced or sold. They are expenses that have to be paid by a company, independent of any specific business activities.

Ex: Salaries of staff, depreciation of machine and equipment, interest on capital invested, rent of building and insurance.

- **Variable cost:**

A variable cost is an expense that changes in proportion to how much a company produces or sells. It increases or decreases depending on a company's production or sale's volume - they rise as production increases and falls as production decreases.

Ex: Power or fuel consumed, consumable store supplies, repairs and maintenance, expenditure on tools.

Production Cost:

Production costs refer to all the costs incurred by a business from manufacturing a product or providing a service. It can include a variety of expenses such as labor, raw materials, consumable manufacturing supplies etc.

- **Marginal Cost:**

The marginal cost of production is the change in total production cost that comes from making or producing one additional unit. If the marginal cost of producing one additional unit is lower than the per-unit price, the producer has the potential to gain a profit.

Ex: 100 units production → \$200
101 units production → \$204
Average cost for producing 100 units: $\$200/100 = \$2$
Marginal cost for producing 101 units is $\frac{\$204 - \$200}{101 - 100} = \$4$

Therefore,

$$\text{Marginal cost} = \frac{\text{Change in production costs}}{\text{Change in quantity}}$$

Marginal revenue increases whenever the revenue received from producing one additional unit of a good grows faster.

- **Sunk Cost:**

A sunk cost refers to money that has already been spent and which cannot be recovered. (spent money to make money). It is excluded from future business decisions because the cost will remain the same regardless of the outcome of a decision.

- **Break-even Analysis:**

Break-even analysis entails calculating and examining the margin of safety for an entity based on the revenues collected and associated costs. The analysis shows how many sales it takes to pay for the cost of doing business. Analyzing different price levels relating to various levels of demand, the break even analysis determines what level of sales are necessary to cover the company's total fixed costs. A demand-side analysis would give a seller significant insight into selling capabilities

- **Break-even Point:**

The break-even point means the level of output or sales at which no profit or loss is achieved. It indicates the position at which marginal profit or contribution is just sufficient to cover fixed overheads.

When a business has production that exceeds the break-even point it makes profit and when it is below the break-even point it makes loss.

Break-even Point Theory:

The break-even point of any two variable situations is the point or the value at which they become equal as the result of a common variable.

There are two methods to obtain break-even point:

1. **Mathematical Method:**

Let cost be the common variable in two situations 1 and 2, the cost equation will be:

$$C_1 = f_1(x) \quad \text{——— (1)}$$

$$C_2 = f_2(x) \quad \text{——— (2)}$$

where C_1: cost in situation 1

C_2: cost in situation 2

x: variable effecting C_1 and C_2

To solve for the value of x, let

$$C_1 = C_2$$

$$\Rightarrow f_1(x) = f_2(x) \quad \text{——— (3)}$$

Solving eq (3) gives the value of x, which makes the cost equal in both the situations, called "Break-even Value".

Q1: A 25 HP unit is required to drive a pump to remove water from a tunnel. The number of hours for which the power unit will run per year is dependent on weather conditions. The power unit is to be used for 4 years.

For the supply of power following two plans are under consideration.

PLAN I: This plan requires the construction of power line and purchase of electric motor at a total cost of Rs 16000. The salvage value of which is Rs 4000 after 4 years of working. cost of electricity per hour of operation is Rs 6.8. Equipment being automatic, no attendent is needed. Maintenance is estimated to Rs 2400 per annum.

PLAN II: This plan needs a gasoline engine, which costs Rs 11000. The engine will be condemned at the end of 4 years. The cost of fuel and oil per hour of operation is estimated as Rs 8.4. Hourly wages of operator is Rs 2.0. Maintenance is estimated at Rs 3 per hour of operation.

solution: Let, N be the number of hours of operation per year.

PLAN I: Total annual cost

$$= \frac{16000 - 4000}{4} + 6.8N + 2400$$

$$= 3000 + 6.8N + 2400$$

$$= 5400 + 6.8N \quad \text{---} \quad (1)$$

PLAN II: Total annual cost

$$= \frac{11000}{4} + 8.4N + 2N + 3N$$

$$= 2750 + 13.4N \quad \text{---} \quad (2)$$

Equating eq (1) and eq (2), we get

$$5400 + 6.8N = 2750 + 13.4N$$

$$N(13.4 - 6.8) = 5400 - 2750$$

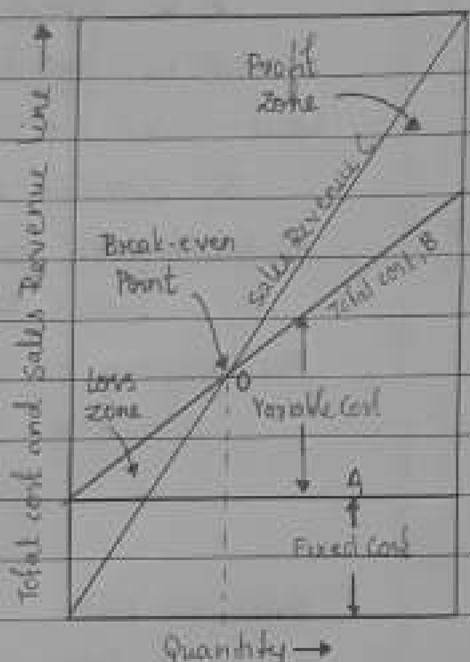
$$N = \frac{2650}{6.6} = \underline{401 \text{ hours}}$$

Annual costs of the two alternatives are calculated to be equal for 401 hours of usage per annum. If usage comes to be less than 401 hours per annum, selection of plan II is economical.

For more than 401 hours, the selection for automatic equipment, i.e., Plan 1 will be more economical.

2. Graphical Method:

A break even chart is used to determine break-even point and amount of profit or loss under varying conditions of output and costs.



Vertical axis: Sales/Expenditure
Horizontal axis: Output
Line A: fixed cost
Line B: total cost / total expenses
Line C: sales revenue
Point O: Intersection of lines B and C
Break-even point.

Potential Profit: Space between lines B and C to the right of O
Potential Loss: Space between lines B and C to the left of O

- Angle of Incidence: Angle at which income line or sales line cuts the total cost line.
  Larger: profits are made at a high rate.
  Smaller: less profits.
- Margin of Safety: It is the output at full capacity minus the output at Break Even Point. It is expressed as percentage of output at full capacity.
  Small: a small drop in production capacity will reduce the profit greatly.

$$\text{Margin of Safety} = \frac{\text{Sales at full capacity} - \text{Sales at BEP}}{\text{Sales at full capacity}} \times 100$$

- Contribution: It is the difference between sales and variable cost. It provides the contribution towards fixed cost and profit.

(also called as marginal profit or gross marginal)

Contribution = Sales − Variable cost = Fixed cost + Profit

- Break-Even Point Calculations:

Let S be sales price
V be variable cost
F be fixed cost
P be profit

Now $S = F + V + P$

$\Rightarrow S - V = F + P$ ——— (1)

At break even point $P = 0$

$S - V = F$ ——— (2)

Multiplying eq (2) by S on both sides

$S(S-V) = F \times S$

$$S = \frac{F \times S}{S-V} = \frac{F}{\left(\frac{S-V}{S}\right)} = \frac{\text{Fixed cost}}{\text{Contribution per unit}}$$

Sales at BEP

$$= \frac{F \times S}{S-V} \quad \text{——— (3)}$$

Number of units at BEP

$$= \frac{\text{Fixed cost}}{\text{contribution/unit}} = \frac{\text{Fixed cost}}{\text{Marginal profit unit}} \quad \text{——— (4)}$$

Q2: The fixed costs for the year 1979-80 are Rs 500000 variable cost per unit is Rs 25. The estimated sales for the period are valued at Rs 1500000. Each unit sells at Rs 150. Determine:

i. Break even point.

ii. Rs 1200000 will be the likely sales turnover for the next budget period, calculate the estimated contribution and profit.

iii. If a profit target of Rs 650000 has been budgeted, compute the turnover required.

solution: i) Break-even point:

$$BEP = \frac{F}{1 - V/S}$$

where : F = Fixed cost = Rs 500000
V = Variable cost = Rs 25 / unit
S = Selling cost = Rs 150 / unit

Therefore,

$$BEP = \frac{500000}{1 - \frac{25}{150}} = \underline{\underline{Rs\ 600000}}$$

ii) $$Sales = \frac{\text{Fixed cost} + \text{Profit}}{1 - V/S}$$

$$1200000 = \frac{500000 + \text{Profit}}{1 - \frac{25}{150}}$$

Therefore,

Profit = Rs 500000

Estimated contribution

= Fixed cost + Profit

= 500000 + 500000

= $\underline{\underline{\text{Rs } 1000000}}$

iii) Profit : Rs 650000

$$Sales = \frac{\text{Fixed cost} + \text{Profit}}{1 - V/S}$$

$$= \frac{500000 + 650000}{1 - \frac{25}{150}}$$

$$= \underline{\underline{Rs\ 1380000}}$$

NOTE:

Functions of break-even chart is to
- Represent economical position of the production on graph
- Estimate likely profits or losses at various levels of output
- Help the management to decide the production level
- Indicate margin of safety

Q3. The fixed costs for the financial year 1980-81 are Rs 40000. The sales for this period are of Rs 100000. The variable cost per unit is Rs 2. Selling price of each product is Rs 10 and the number of units involved coincides with the expected volume of output. Construct the break-even chart and determine:

i. break-even point
ii. How many minimum product should be sold to earn profit?
iii. Profit earned at a turnover of Rs 80000
iv. Margin of safety
v. Angle of incidence.

Solution: Given:

Fixed cost: F = Rs 40000
Variable cost: V = Rs 2 / unit
Selling price: S = Rs 10 / unit
Total sales: Sales = Rs 100000

$$\text{Number of products sold} = \frac{\text{Total Sales}}{\text{Selling price / unit}} = \frac{100000}{10} = \underline{\underline{10000 \text{ units}}}$$

To draw break even chart:

a) Draw fixed cost line AB at Rs 40000.

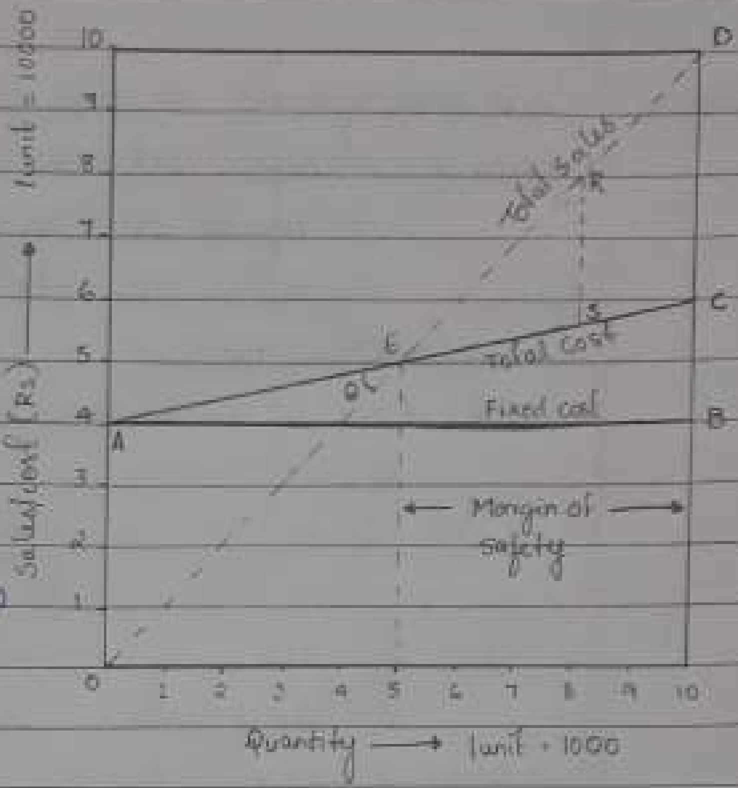
b) Variable cost = Number of products x Variable cost/product
= 10000 x 2 = Rs 20000

c) Variable cost varies from ~~Rs~~ 0 at 0 unit sale to Rs 20000 at 10000 units sale. Thus draw the variable cost line AC above the fixed cost line.

Total cost
= Fixed cost + profit

d) Sales is zero at 0 unit and Rs 100000 at 10000 units sale. Draw the sales line OD

e) Total cost line and total sales line intersect at point E, which is known as Break-even point on the break-even chart.



i. Break even point
E is at 5000 units or Rs 50000 sales

ii. The firm must sell more than 5000 units to receive profit.

iii. Profit at sales of Rs 80000 → Line RS = Rs 24000

iv. Margin of safety
= Total Sales − Sales at BEP
= 100000 − 50000 = Rs 50000
in percentage : $\frac{50000}{100000} \times 100 = 50\%$

v. Angle of incidence : $\theta = 34°$

Q4. A company is planning to launch a new product. For any volume of production below 400 unit, the fixed cost is Rs 6000 and the variable cost is Rs 20 per unit. If the volume is to be more than 400, larger equipment will be needed and the fixed cost will be Rs 10000. However, the variable cost will reduce to Rs 10 per unit. At any volume the selling price is Rs 30 per unit.

i. What is the break-even point?

ii. What is the profit or loss if the volume is fixed at 500 units?

iii. What are the assumptions made in your analysis?

solution: Let Q be quanity at break even point

Given: F: Fixed cost = Rs 6000

V: Variable cost = Rs 20/unit

S: selling Price = Rs 30/unit

i. $Q(S-V) = F + P$

wkt $P=0$ at break even point

$\therefore Q(S-V) = F$

$$\Rightarrow Q = \frac{F}{S-V} = \frac{6000}{30-20} = \underline{\underline{600 \text{ units}}}$$: Break even point

ii. here $Q_1 = 500$ units $F_1 = Rs\ 10000$

$V_1 = Rs\ 10/unit$ $S_1 = S = Rs\ 30/unit$

Now $Q_1(S_1 - V_1) = F_1 + P$

$500(30-10) = 10000 + P$

$\therefore \underline{P = 0}$ thus at 500 units production, ~~there~~ there is neither profit nor loss. That means with the above changes in conditions, the break-even point has shifted to 500 units which was initally at 600 units

iii. Assumptions

a) The selling price in both the situations is assumed to be same

b) The volume of sales and the volume of production is assumed to be equal.

Q5: In the past two years it is observed in metal working industry that the material cost has risen by 20% whereas other costs have risen by 10%. Assuming that the selling prices have advanced by 10% and that material cost represents 33.33% of the total cost. Indicate the effect on the break-even point of typical break-even chart

solution: Let initial total variable cost be Rs 300

Material cost = Rs 100 others costs = Rs 200

New material cost = 1.2×100 = Rs 120

New other costs = 1.1×200 = Rs 220

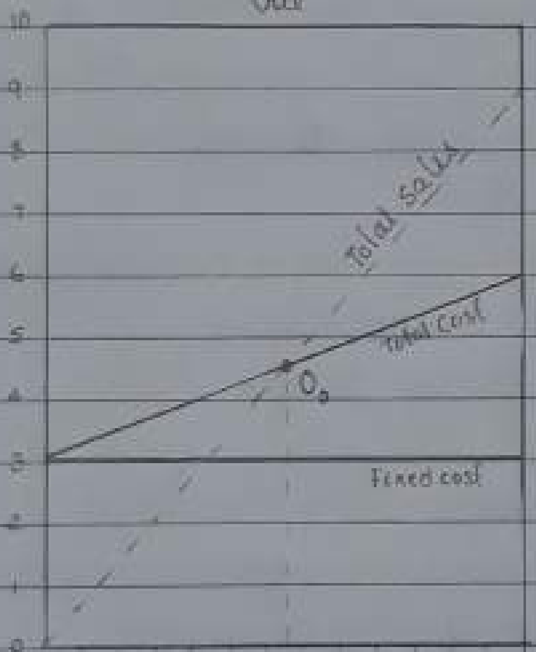
∴ Total new variable cost = Rs 120 + Rs 220 = Rs 340

Let initial selling price be Rs 900 (assume any value)

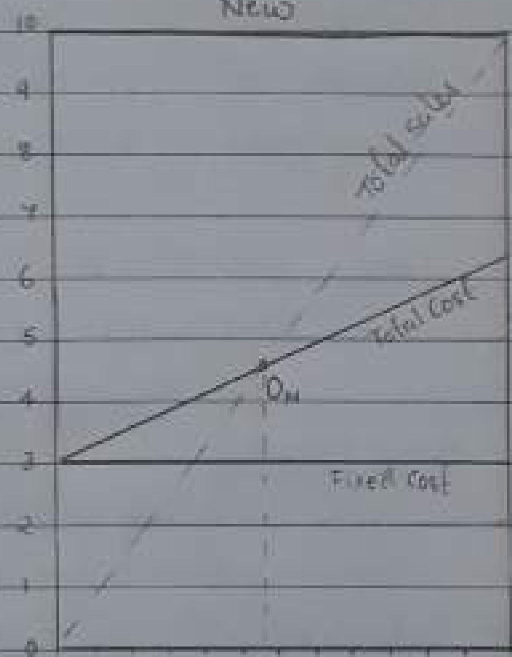
After 2 years, new selling price is

= 900 × 1.1 = Rs 990

Old



New



The output in both the situations is assumed to be any fixed quantity. It is found that the break-even point has shifted from right to left. It means new break-even point will be at lower output and angle of incidence also large, which shows that profit margin is also more in the changed situation.

Q6: A plant is manufacturing 3000 heavy duty lathes per year and is operating at 75% of its capacity. The annual sales return is Rs 10500000. The fixed cost of the plant is Rs 4000000 and variable cost Rs 4150 per unit. There is a proposal to utilize spare capacity by manufacturing precision lathes which would increase the fixed cost by Rs 800000 but reduce the variable cost by Rs 750 per unit.

i. If the proposal economical?

ii. If the reduction in selling price by Rs 500 per unit requires the plant to be run at 90% of its capacity to breakeven, would this be a better proposal than the earlier one?

Solution: Plant output : $Q = 3000$ lathes / year

capacity of plant : $\frac{3000}{0.75} = 4000$ lathes / year

Annual sales : Rs 10500000

Fixed cost : $F = $ Rs 4000000

Variable cost : $V = $ Rs 4150 / unit

Selling price : $S = \text{Rs } \frac{10500000}{3000} = \text{Rs } 3500$

Now, $Q(S-V) = F + P$

$3000(3500 - 4150) = 4000000 + P$

$\therefore P = -5950000$ Rs (loss)

First Proposal

Spare capacity : 1000 lathes

Fixed cost : $F_1 = 4000000 + 800000 = \text{Rs } 4800000$

Variable cost : $V_1 = 4150 - 750 = \text{Rs } 3400$

$Q_1 = 3000 + 1000 = 4000$ units

Assuming same sales price

$Q_1(S_1 - V_1) = F_1 + P$

$4000(3500 - 3400) = 4800000 + P$

$\therefore P = -4400000$ Rs (loss)

There is loss but it is less than the initial loss and can be recovered by increasing the price of precision lathes. Here we have assumed Rs 3500 per unit as selling price but it can be much higher.

Second Proposal

90% capacity of break-even point

$$Q \text{ at BEP} = \frac{F}{S-V} = \frac{4000000}{(3500-500)-4150} = 3478 \text{ units}$$

90% of 3478 = 3130 units.

Here loss is extremely high. Therefore it is not possible to accept this proposal. Hence first proposal is accepted and loss may be keeping higher selling price of 1000 units of precision lathes.

NOTE:

BEP in terms of physical units: convenient for single product firm. It is the number of units to be sold to earn revenue just to cover all expenses.

BEP in terms of sales value: convenient for multiproduct firms.

- Applications of Break-even Point:
  - Safety margin
  - Volume needed to attain target profit
  - Change in price and its effect
  - To expand production capacity or not.
  - To add new product or drop existing product
  - Selection of production machinary so as to get maximum profit for a particular volume of the product out of the available machinary
  - Improving margin of profit by:
    - Increasing volume or selling price
    - Reducing variable expenses per unit
    - Reducing fixed costs.

- SLE: Replacement Analysis:

Replacement analysis is the method used in capital budgeting, it helps management to decide whether the existing assets need to be replaced or not. An entity needs to analyze in order to execute the effective replacement of the assets such as machinary, the roof of building or group assets.

As time passes, assets depreciate and they reach the end of their useful life. They may lose their capacity and some of them even break down before the useful life. If these assets break down in the middle of the operation, it will impact the production and has a negative impact on the profit. In order to prevent such events, management needs to prepare the budget plan to replace these assets before they break.

Moreover, assets may require to replace due to economic requirements, change in technology and physical damage. Assets which are in good condition but may need to be replaced due to technological change. If we do not make a change, our products cannot compete in the market.

Factors for replacement:

a. Physical factors: deficiency, shutdown, failure
b. Financial effects: wasteful spending, inefficiency
c. Legal effects: Litigations, fines, penalties, accidents, injuries
d. Operational effects: stress, nuisance

UNIT - 03

Financial Management

- **Evolution of Financial Management:**

Financial management refers to how a company manages its capital in order to fulfil the goals of the company. It is the area of finance which deals with the management of all the financial resources of the organization for its smooth functioning.

It focuses on decisions that are related to how much and what type of assets has to acquired, how to raise the capital needed to purchase assets, how to run the firm so as to maximize its value

- Goals of financial management:

1. Profit Maximization:

This goal considers actions that increase profits should be undertaken and those that decrease profits are to be avoided. The goal is to select assets, projects and decisions that are profitable and reject which are not.

Those who follow profit maximization believe that profit leads to effective utilization of scarce economic resources and also that profit leads to total economic welfare since it increases the economic efficiency of every individual firm.

Disadvantages:

- Ambiguity
- Ignores the time value of the benefits
- Ignores quality of benefits
- Unsuitable in a modern business environment.

2. Value Maximization / shareholder wealth Maximization:

This goal takes decisions that maximize the value of the firm. Maximizing the firm's value is consistent with maximizing

stock price or maximizing shareholder wealth.
Advantages:
- considers the timing of cash inflows
- considers the quality of benefits
- Reduces the conflict of interest among the stakeholders.
- Assures long survival and growth of the firm.

- Financial Decisions:

Decision making helps to utilize the available resources for achieving the objectives of the organization, unless minimum financial performance levels are achieved, it is impossible for a business enterprise to survive over time. Therefore financial management basically provides a conceptual and analytical framework for financial decision making.

Types of financial decisions.

1. Investment Decisions:

It relates to how the firms funds are invested in different assets. The composition of these assets and business risks of the firm are perceived by its investors. Since funds involve cost and are available in limited quantity, its proper utilization is very necessary to achieve the goal of wealth maximization.

Investment Decisions may be:

a. Long term investment / capital budgeting decisions
 - involving huge amount of long term investment.
b. Short term investment / working capital decisions
 - involving day to day working of business.

Investing proposals should evaluate in terms of expecting profitability, costs involving and the risks associated with the project.

Long-term
Investment decisions are important for:
- Setting up of new units
- Expansion of present units
- Replacement of permanent assets
- Research and development costs
- Reallocation of funds

A short term investment decision or working capital management policy is one which ensures higher profitability, proper liquidity and sound structural health of the organization.

2. Financing decision:

It concerns with the amount of finance to be raised from various long term sources of funds like, equity shares, preference shares, debentures, bank loans etc.

Factors affecting financial decision:

a. Cost: The cost of equity is more than the cost of debts.

b. Risk: More risk is associated with borrowed funds as compared to owner's funds as interest is paid on it and also has to be repaid after a fixed period.

c. Cash flow: The cash flow position of a company is good enough that it can borrow funds easily.

d. State of capital markets: During boom, finance can easily be raised by issuing shares but during depression, raising finance by means of debt should be easy.

3. Dividend Decision:

It concerns on deciding how much of the profit earned by the company should be distributed among shareholders and how much should be retained for future contingencies.

Factors affecting dividend decision:

a. Earnings: Company having high and stable earning could declare high dividends.

b. Growth prospects: In case of company's growth prospects in the near future, no or less dividend will be declared by retaining its earnings.

c. Cash flow: Availability of adequate cash is foremost requirement for declaration of dividends.

d. Taxation Policy: A company is required to pay tax on dividend declared by it. If tax on divident is higher, company will prefer to pay less by way of dividends whereas if tax rates are lower, then more dividends can be declared.

4. Liquidity Decisions:

It concerns with the management of the current assets, convertibility of assets and obligations.

- Risk-Return Tradeoff:

The risk return tradeoff states that the potential return rises with an increase in risk. There is low levels of uncertainity with low potential returns and high levels of uncertainity or risk with high potential returns.

According to the risk return tradeoff, invested money can render higher profits only if the investor will accept a higher possibility of losses.

- Financial Statements:

Financial statement are written records that convey the business activities and the financial performance of a company. They are often audited by government agencies, accountants, firms etc, in order to ensure accuracy and for tax, financing or investing purposes.

- Balance Sheet:

The balance sheet provides an overview of a company's assets, liabilities and stockholders equity as a snapshot in time

The balance sheet formula:

Assets = Liabilities + Shareholders' Equity

Assets: Any resource owned or controlled by an economic entity. It is anything that can be used to produce positive economic value.

Liabilities: Anything a person or company owes, usually a sum of money such as debt, payable wages, dividend payable.

Equity: It is amount of money that would be returned to shareholders if all of the assets were liquidated and all of the company's debt was paid off.

- Income Statement:

It is an important financial statement of a company that shows its financial performance over a specific accounting period. It is also known as the profit and loss statement or the statement of revenue and expenses.

The profit or loss is determined by taking all revenues and subtracting all expenses from both operating and non-operating activities.

The income statement focuses on four key items: revenue, expenses, gains and losses. It starts with the details of sales and then works down to compute the net income and eventually the earnings per share.

- **Long term Sources of Finance:**

Long term sources of finances are those which remain with the business for a longer duration of time. The main advantage is that it is not been paid immediately or within shorter time duration are they are usually paid back during the lifetime of an organization. It is required to finance long term investment projects and capital expenditures in fixed assets like plant and machinery, land and building. Part of working capital which permanently stays with the business is also financed with long-term sources of funds.

Long-term financing sources can be in the form of:

- Share capital or equity shares
- Preference capital or preference shares
- Debenture / Bonds
- Term loans from financial institute, government and commercial banks
- Venture funding.

NOTE:

- Medium-term finance:

Medium term financing means financing for a period of 3 to 5 years. It is usually used for two reasons: when long term capital is not available for the time being and when deferred revenue expenditures like advertisement are to be written off over a period to 3 to 5 years.

Medium term financing sources can be in the form of:

- Preference capital or Preference shares
- Debenture / bonds
- Medium term loans from financial institute, government and commercial banks.
- Lease finance
- Hire purchase finance

- Short-term finance:

Short term financing is for a period of less than 1 year. The need for short-term finance arises to finance the current assets of a business like an inventory of raw material and finished goods, debtors, minimum cash and bank balance.

Short-term finances are available in the form of:

- Trade credit.
- Short-term loans like working capital loans from commercial banks.

- Advances received from customers
- Fixed deposits for a period of 1 year or less.
- Creditors and payables.
- Factoring services
- Bill discounting

- Shares:

Shares are units of equity ownership interest in a corporation that exist as a financial asset providing for an equal distribution in any residual profits in the form of dividends.

Equity: The amount of money that would be returned to a company's shareholders if all of the assets were liquidated.

Dividend: The distribution of some of a company's earnings to a class of its shareholders.

Shareholders may also enjoy capital gains if the value of the company rises.

- Debentures:

A debenture is a type of bond or other debt instrument that is unsecured by collateral. The term collateral refers to an asset that a lender accepts as security for a loan. Since debentures have no collateral backing, they must rely on the credit worthiness and reputation of the issuer for support. Some debentures can convert to equity shares while others cannot.

- Loans:

. A personal loan can be used for many different purposes whereas a car loan is strictly for the purpose of purchasing a vehicle. A personal loan can be secured against something of value or more commonly unsecured. A car loan is secured against the vehicle you intend to purchase, which means the vehicle serves as collateral for the loan.

In either case good credit typically means it's easier to get approved and to be offered better loan terms.

commercial and industrial (C&I) loans are loans for businesses. They are usually short term, secured loans, but they do not need to be provided for either working capital or finance capital expenditures such as machinery or a piece of equipment.

- Primary and Secondary Market:

The primary market is where securities are created, while the secondary market is where those securities are traded by investors.

In primary market, companies sell new stocks and bonds to the public for the first time, such as with an Initial Public Offering (IPO).

The secondary market is basically the stock market and refers to the New York Stock Exchange, the Nasdaq and other worldwide exchanges.

- Venture Capital:

Venture capital is a form of private equity and a type of financing that investors provide to startup companies and small businesses that are believed to have long-term growth potential. It is typically allocated to small companies with exceptional growth potential or to companies that have grown quickly and appear poised to continue to expand.

However it doesn't always have a monetary form, It can also be provided in the form of technical or managerial expertise.

Though it can be risky for investors who put up funds, the potential for above-average returns is an attractive payoff. The main downside is that the investors usually get equity in the company and thus, a say in company decisions.

Ex: Zoom car: In 2013, Bangalore with 7 cars.
In 2015: 1500 cars, 6 cities
In 2019: 9000 cars, 745 cities.

Investors: Ford motor company, Mahindra & Mahindra, Sequoia capital, Nokia growth partners, Former Infosys CEO Mohandas Pai.

NOTE:

→ Why startups fail?
- Lack of funds and poor financial planning
- Highly anticipated model not in sync with the nature and lifestyle of targeted audience.
- Poor customer service and sub-par quality of the products offered.
- Lack of focus and legal disputes.

→ How to bounce back from startup failure?
- Talk to friends and family and share your feelings
- Find different sources of income to recover your loss
- Prepare and plan with consciousness
- Wait for the right time to get the right opportunity.
- Don't give up and take actions for your next venture.

- Dividends:

A dividend is the distribution of some of a company's earnings to a class of its shareholders as determined by the company's board of directors. They are payments made by publicly-listed companies as a reward to investors for putting their money into the venture.

Announcements of dividend payouts are generally accompanied by a proportional increase or decrease in a company's stock price. Dividends may be paid out as cash or in the form of additional stock.

A dividend is a token reward paid to the shareholders for their investment in a company's equity and it usually originates from the company's profits. But at times companies may still make dividend payments even when they do not make suitable profits. They may do so to maintain their established track record of making regular dividend payments. Dividends can be paid at a scheduled frequency.

Dividends must be approved by the shareholders through their voting rights. The board of directors can choose to issue dividends over various time frames and with different payout rates.

- **Mergers and Acquisitions:**

The terms mergers and acquisitions are often used inter-changeably but they differ in meaning.

In an acquisition, one company purchases the other outright. A merger is the combination of two firms which subsequently form a new legal entity under the banner of one corporate name.

Merger Example:

Exxon and Mobil were the top two oil producers in the industry prior to the merger in Nov 1999 following approval from the Federal Trade Commission (FTC).

The merger resulted in a major restructuring of the combined entity which included selling more than 2400 gas stations across the US. The joint entity continues to trade under the name Exxon Mobil corp (XOM) on the New York Stock Exchange (NYSE).

Acquisition Example:

On June 15, 2018, AT&T Inc completed its acquisition of Time Warner Inc according to AT&T's website. However due to intervention of the US government to block the deal, the acquisition went to the courts. But in Feb 2019, an appeals court cleared AT&T's take over of Time Warner Inc.

- **SLE: Budget**

A budget is an estimation of revenue and expenses over a specified future period of time and is utilized by governments, businesses and individuals. It is basically a financial plan for a defined period, usually a year that is known to greatly enhance the success of any financial undertaking.

corporate budgets are essential for operating at peak frequency. A budget can also aid in setting goals, measuring outcomes and planning for contingencies.

Corporate budgets:

Static Budget: Remains unchanged over the life of the budget. Regardless of changes that occur during the budgeting period, all accounts and figures orginally calculated remain the same.

Flexible Budget: Relational value to certain variables. It may change based on sales levels, production levels or other external economic factors.

UNIT - 4

New Product Development and Marketing

- **Product Life Cycle:**

A product life cycle is the cycle that a product goes through, from development to decline. It is the stages through which the individual product develops over a period of time. Life cycle is the representative fact of the existence of every product.

Business owners and marketers use the product life cycle to make important decisions and strategies on advertising, budgets, product prices and packaging.

Products have a limited life. sales passes different stages, each with opportunity, challenges and problems to the seller.

Profits vary at different stages of product life cycle, hence product require different functional strategies and marketing strategies (advertising strategies).

Product life cycle represents a bell shaped or S shaped curve.
Product life cycle is typically broken up into six stages:

1. **Development:**

The development stage or the product life cycle is the research phase before a product is introduced to the market place. This is when companies develop prototypes, test product effectiveness and strategize their launch. Due to this nature of the stage, companies spend a lot of money without bringing in any revenue because the product isn't being sold yet.

This stage can last for a long time depending on the complexity of the product, how new it is and the competition. For a completely new product the development stage is hard because the first pioneer of a product is usually not as successful as later iterations.

2. Introduction:

The introduction stage is when a product is first launched in the market place. This is when marketing teams begin building product awareness and reaching out to potential customers. Typically, when a product is introduced, sales are low and demand builds slowly.

Usually in this phase it is focused on advertising and marketing campaigns. companies build their brand, work on testing distribution channels, and try to educate potential customers about the product. If those tactics are successful, the product goes into the next stage.

3. Growth:

During the growth stage, customers have accepted the product in the market and customers are beginning to truly buy-in. This means demand and profits are growing, hopefully at a steadily rapid pace. Since market for the product is expanding and competition begins developing, potential competitors see success and want in.

During this phase, marketing campaigns often shift to establishing a brand presence so consumers choose them over competitors. Additionally as companies grow they will begin to open new distribution channels and add more features and support services.

4. Maturity:

The maturity stage is when the sales begin to level off from the rapid growth period. At this point, companies begin to reduce their prices so that they can stay competitive amongst growing competition.

This is the phase where a company begins to become more efficient and learns from the mistakes made in the introduction and growth stages.

Marketing campaigns are typically focused on differentiation rather than awareness. This means that product features might be enhanced, prices might be lowered and distribution becomes more intensive. During the maturity stage, products begin to enter the most profitable stage. The cost of production declines while the sales are increasing.

5. <u>Saturation:</u>

During the product saturation stage, competitors have begun to take a portion of the market and products will experience neither growth nor decline in sales.

Typically, this is the point where most consumers are using a product but there are many competing companies. At this point, you want your product to become the brand reference so that you don't enter the decline stage.

The marketers need to focus on differentiation in features brand awareness, price and customer service as the competition reaches its apex at this stage.

6. <u>Decline:</u>

Unfortunately, if the product doesnot become the preferred brand in a market place, it will typically experience a decline. Sales will decrease during the heightened competition and are hard to overcome. Additionally, consumers might lose interest in your product as time passes.

If a company is at this stage, they will either discontinue their product, sell their company or innovate and iterate on their product in some way.

To extend the product life cycle, successful companies can implement new advertising strategies, reduce their price, add new features to their increase value proposition, explore new markets or adjust brand packaging.

The best companies will usually have products at several points in the product life cycle at any given time.

NOTE:

Important aspects of products are:

- Quality
- Features
- Brand name
- Marketing
- Style and packaging
- Availability
- Customer support
- Safety
- Pricing
- Promotion
- Place

- Product Development Life Cycle:

1. CASE STUDY: Nokia:

Introduction:

Nokia is a Finland based multinational company which was introduced during the year 1865 by Fredrik Idestam. Nokia started by producing cables, pulp and rubber. In 1992, Nokia launched it's digi-Handheld GSM phone, Nokia 1011. It did not provide ~~or~~ launch a variety of models due to it's less demand and sale. It sold both GSM as well as CDMA phones.

Growth:

After a lot of research Nokia then launched its first phone without an antenna, Nokia 3210 on March 18, 1999. With more than 160 million units sold, this model is one of the most popular and successful phones in history.

When Iphone and Samsung came in competition, Nokia then launched phones like N95 to compete with them.

Maturity and Decline:

During this stage, Nokia launched a lot of touch screen models one of which was N97 (querty + touch) which was huge success and the most profit was gained.

Nokia's poor product design and having its main focus on window's as its OS, lead to its decline.

2. CASE STUDY : Sony

- 3D televisions: 3D may have been around for a couple of decades, however after impressive speculation from telecasters and innovation organizations made 3D TVs accessible for home.
- Blue Ray Players: With cutting edge innovation conveying the absolute best review involvement, Blue Ray gear is as of now appreciating the unfaltering increments.
- DVD Players: Have built up a solid piece of the overall industry. Despite everything, they need to manage the difficulties from different innovations that are normal for the Maturity phase.
- Video Recorders: This is a product that is certainly in the Decline stage as it turns out to be less demanding and less demanding and less expensive for shoppers to change to the next, more current configuration.

Sony's strategy:

Like most other super brands, SONY too has indicated substantial spotlight on advertising and has substantiated itself more quick-witted than others around there.

While computerized showcasing is at the focal point of this methodology, the brand has additionally utilized alternate channels for fruitful advertising and the advancement of its image and products.

Sony's emphasis is on plan, quality and innovation

- its products are superior to most as far as quantity
- its evaluating and advancements methodology are the other two vital components in its promoting technique.
- an exceptional evaluating procedure compares to the topnotch picture of SONY and its products

Sony's consumption of publicizing and advancements is high.

The substantial promoting spending plan likewise mirrors the overwhelming rivalry in the hardware business. At the point when the opposition in the business is high, you have to demonstrate to some degree ~~with~~ more profound spotlight on showcasing and advancement. SONY's marketing methodology to a substantial degree has assumed a solid part at helping it conquer the focused weight.

SONY's system has constantly centred around client agreeableness and more profound lucidity. Innovation execution has been so effective at drawing in its adherents through online networking channels.

While SONY has utilized an excellent valuing technique like Apple, it still has its own particular vast fan section with high brand dedication.

This top-notch evaluating system passes ~~on~~ an excellent brand picture and a top-notch client encounter. Generally, SONY's advertising methodology is exceptional in many perspectives.

- **Marketing Strategy:**

A marketing strategy is a business's game plan for reaching prospective customers and turning them into customers of their products or services.

Marketing strategies should revolve around a company's value proposition. The ultimate goal of a marketing strategy is to achieve and communicate a sustainable competitive advantage over rival companies.

" The sole purpose of marketing is to sell more to more people, more often and at higher prices"

– Sergio Zyman, marketing executive and former Coca-Cola and JC Penney marketer.

" Marketing is no longer about the stuff you make, but about the story you make."

– Seth Godin, former business executive and entrepreneur.

"The aim of marketing is to know and understand the customers so well the product or service fits him and sells itself"
- Peter Drucker, credited as the founder of modern management

"Marketing's job is never done. It is about perpetual motion. We must continue to innovate every day"
- Beth Comstock, former vice chair and chief marketing officer, GE.

"Take two ideas and put them together to make one new idea. After all, what is a Snuggie but the mutation of a blanket and a robe?"
- Jim Kukral, speaker and author of Attention!

The ultimate goal of a marketing strategy is to achieve and communicate a sustainable competitive advantage over rival companies by understanding the needs and wants of its customers.

Marketing assets can be judged based on how effectively it communicates a company's core value proposition, whether it is a print ad design, mass customization, or a social media campaign.

Marketing strategies

1. Use social media
2. create video tutorials
3. Start blogging
4. Understand search engine optimization
5. Leverage influencers
6. Build a great lead magnet
7. Use linkedin / Facebook ads with retargeting
8. create an affiliate program
9. Use email marketing sequences.

Marketing:

- Customer statisfaction
  - specifications, reliability, value, timely delivery

- Environment variables:
  - Customer: number, location, buying behaviour, lifestyle, purchasing power, habits and attitudes, quality and brand awareness.
  - Competition variables: structure of industry, intensity, number of products/services offered, nature and strength/weakness of competition.
  - Trade variables: structure, services provided and trade practices.
  - Other variables: government regulations, climatic/political variables, technology, social, cultural and economical.
- Market planning
  - Gather essential facts
  - Analyze own resources and capabilities
  - Provide framework for decisions on markets, products, manufacturing, investment and organizational structures.
  - Achieve desired marketing objectives.
- Study buyers' behavior and influence their behavior
  - economics
  - sociology
  - psychology
- Factors influencing pricing
  - corporate/marketing objectives, characteristics of product, stage in the product life cycle, image sought by firm through pricing, cost of manufacturing and marketing
  - Buyers behavior, market type, bargaining, power of customer, competitor's price, government regulation, pricing, social consideration.
- Pricing methods:
  - cost based

- Demand based
- Competition based
- Product line based
- Tender based
- Rebate and discount based

- **Concept of Sales:**

A sale is a transaction between two or more parties, typically a buyer and a seller, in which goods or services are exchanged for money or other assets.

In the financial market, a sale is an agreement between a buyer and seller regarding the price of a security and delivery of the security to the buyer in exchange for the agreed upon compensation.

If the item or service in question is transferred by one party to the other party with no compensation, then the transaction is not considered to be a sale but rather a gift or a donation, particularly from an income tax perspective.

Despite their relatedness, many people mistakenly think that selling and marketing are pretty much the same, but it is just not true. Marketing includes:

1. Discovering what product or service customers want or need
2. Producing a product or service with the desired features and quality.
3. Pricing the product or service in correct and attractive ways.
4. Promoting the product or service
5. Selling and delivering the product or service to the customer or end consumer.

Selling is confined to only the last of these. Both functions therefore need to be performed separately but in combination; in a coordinated fashion to be successful.

- **SLE: New Product Failures:**

  A new product is declared a failure when
  - It is withdrawn from the market for any reason
  - The required market share in a desired time period is not realised
  - The anticipated life cycle as defined by the organization is not achieved.
  - The desired profitability is not realised.

Why do new products fail?
- The product was not new to the customer/market.
- The product offered no tangible benefit
- The product was not positioned properly
- Poor support from channel partners
- High forecast variance
- Strong response from competitors
- Change in customers preferences.
- Environmental constraints
- Poor after sales service.
- Inadequate return on investment.
- Lack of coordination among various departments
- Poor diffusion of innovation
- Conflict of personalities at higher echelons.
- Not meeting the claims made
- Lack of product distinctiveness