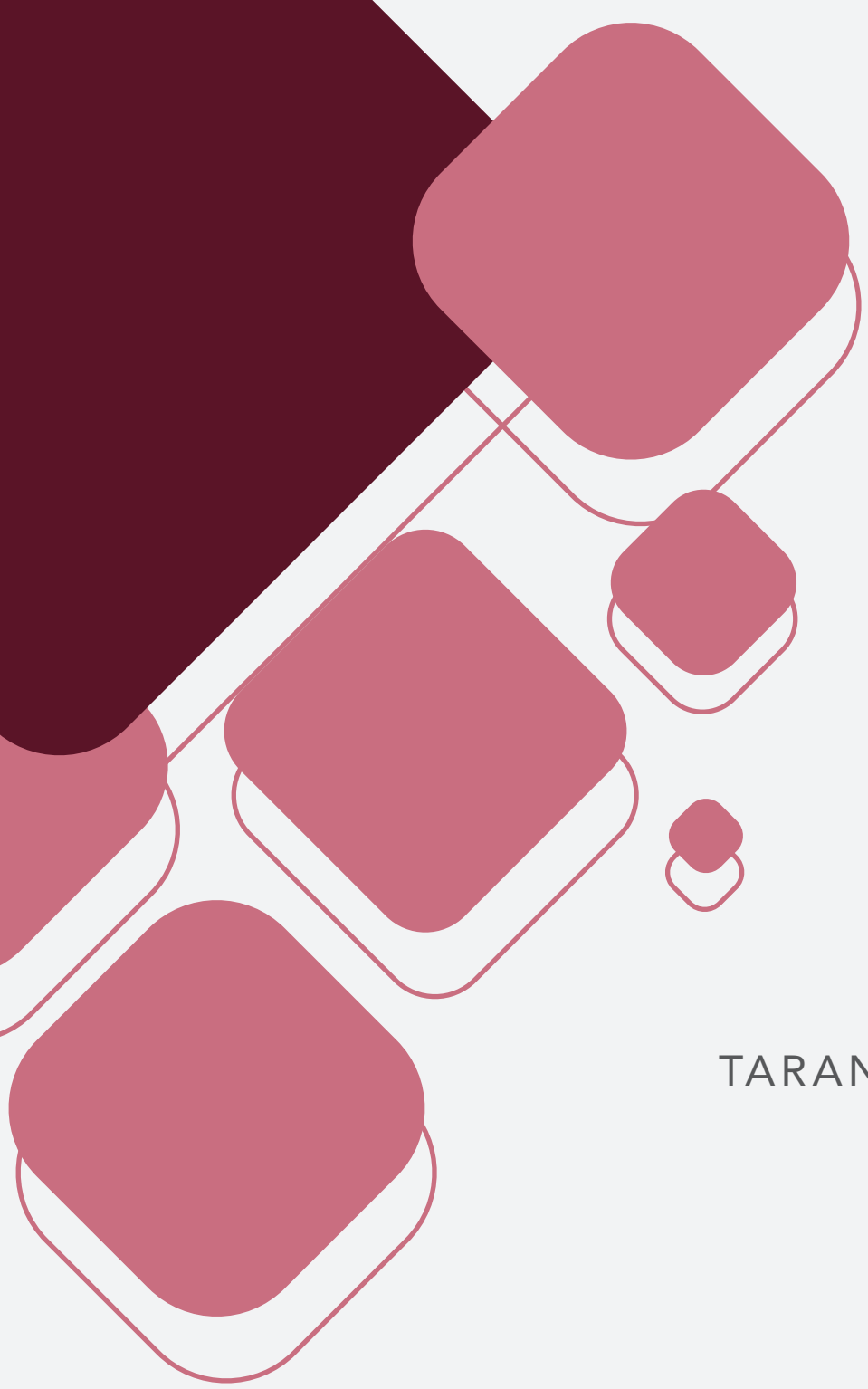

TARAN KHANNA

FINANCIAL AND ECONOMIC ANALYSIS FOR ENGINEERING AND TECHNOLOGY MANAGEMENT

Financial and Economic Analysis for Engineering and Technology Management

Financial and Economic Analysis for Engineering and Technology Management

Taran Khanna

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Taran Khanna
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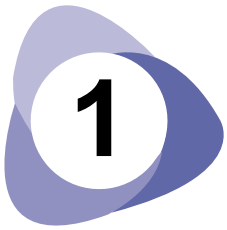


INTRODUCTION

Managerial Economics – Relationship with other disciplines – Firms: Types, objectives and goals – Managerial decisions – Decision analysis.

1.1 Managerial Economics

The economics is the study of the production and consumption of goods and the transfer of wealth to produce and obtain those goods. This explains how people interact within the markets to get what they want or accomplish certain goals because the economics is a driving force of human interaction, studying it often reveals why the people and governments behave in particular ways.

They are classified int two types :

1. Microeconomics

2. Macroeconomics

Microeconomics will focus on the actions of the individuals and the industries like the dynamics between buyers and sellers, borrowers and lenders.

Macroeconomics takes a much broader view by analyzing the economic activity of an entire country or the international marketplace.

Definition of Managerial Economics:

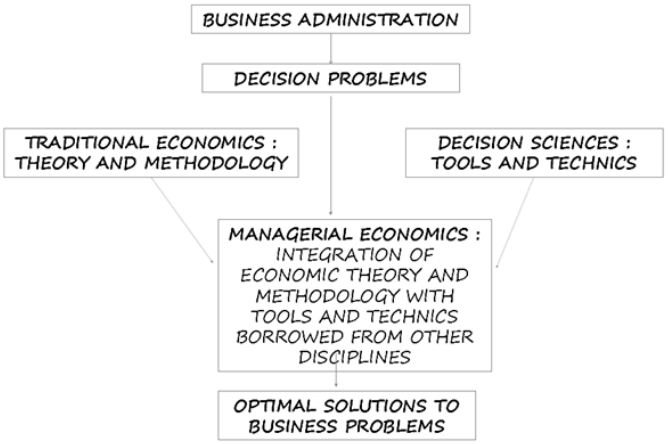
The definition of managerial economics is explained by many persons are as follows:

Mansfield states that “the managerial economics is concerned with application of economic concepts and economic analysis to the problems of formulating rational managerial decision.”

McNair and Meriam states that the "Business Economics consists of the use of economic modes of thought to analyze business situations."

Spencer and Seegelman states that the"Business Economics is the integration of economic theory with business practice for the purpose of facilitating the decision making and forward planning by management."

Haynes, Mote and Paul states that the "Managerial Economics is economics applied in decision making. It is a special branch of economics bridging the gap between abstract theory and managerial practice."



Managerial Economics

Managerial decision areas include:

- Assessment of investable funds
- Choice of product
- Selecting business area
- Sales promotion
- Determining optimum output
- Determining price of product
- Determining input-combination and technology
- Risk analysis
- Production analysis

• Pricing analysis

• Capital budgeting - Investment theory which is used to examine a firm's capital purchasing decision.

Characteristics of Managerial Economics

Managerial Economics is a discipline that deals with the application of economic theories in business management.

The characteristics of managerial economics are as follows:

1. It involves application of economic principles to the problems of the firm.

2. It is micro economic in character.

3. Though micro economic in character, it has nothing to do with an individual's economic problems.

4. The scope is narrow, i.e., it deals with mainly project theory.

5. Management economics modifies and enlarges economic theory to suit specific conditions.

Nature of Managerial Economics:

• In a business organization, two main primary function of management executive is decision making and forward planning.

• These functions go hand in hand with each other. A process of selecting one action from two or more alternative courses of action is known as decision making. Establishing plans for the future to carry out the decision is known as forward planning.

• The problem of choice arises since the resources at the disposal of a business unit like land, labour, capital and managerial capacity are limited . Hence, the firm has to make the most profitable use of these resources.

• The decision making function is carried by a business executive where he takes the decision that will ensure the most efficient means of attaining a desired objective say profit maximization. When this decision is taken then about the particular capital,output pricing, raw-materials and power etc. can be prepared. Thus, the forward planning and decision-making takes place at same time same time.

• Due to the uncertainty which surrounds business decision-making, the task made difficult for a business executive to complete. Since, nobody can predict the future course of business conditions. Only best possible plans will be prepared by him for the future depending on past experience and future outlook and yet he has to go on revising his plans in the light of new experience to minimize

the failure. Thus, the managers are engaged in a continuous process of decision-making through an uncertain future and the overall problem confronting them is one of adjusting to uncertainty.

• By fulfilling the function of decision-making in an uncertainty framework the economic theory can be pressed into service with a considerable advantage as it deals with a number of concepts and the principles which can be used to solve or at least throw some light upon the problems of business management. For example, cost, profit, pricing,national income, production, demand,competition, business cycles etc. The subject-matter of Managerial Economics constitutes in which way the economic analysis can be used towards solving the business problems.

• Hence, the Managerial Economics is both a science and an art.

Scope of Managerial Economics:

Since it is developing science,the scope of managerial economics is not yet clearly laid out. Though these fields are involved in managerial economics:

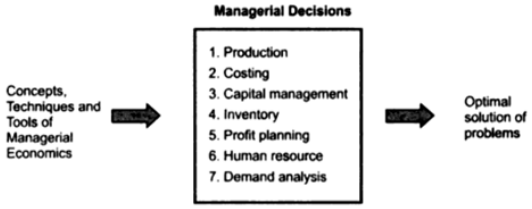
1. Cost and Production Analysis

2. Capital Management.

3. Profit Management.

4. Pricing Decisions, Policies and Practices.

5. Demand Analysis and Forecasting.



Scope of managerial economics

The above divisions of business economics will constitute its subject matter. Recently, the usage of Operation Research methods like Linear programming, inventory models, Games theory, queuing up theory etc., have increased by the managerial economists. Hence, it has also come to be regarded as part of Managerial Economics.

Cost and production analysis:

Every firm's profitability depends much on its cost of production. The cost estimation with a range of output which identify the factors that causes variations in the cost estimates and choose the cost-minimising output level and also taking into consideration the degree of uncertainty in

production and the cost calculations will be prepared by a wise manager. The production processes are under the charge of engineers. Thus, the business manager is supposed to carry out the production function analysis to avoid wastages of materials and time. The sound pricing practices depend much on cost control.

Capital management:

A firm's problems that are relate to the capital investments are perhaps the most complex and troublesome. The capital management implies planning and control of capital expenditure since it involves a large sum and also the problems in disposing the capital assets off are very complex that they require considerable time and labour.

Profit management:

Generally all business firms will be organized for the earning profit and in the long period it is profit that provides the chief measure of success of a firm. The economics tells us that profits are the reward for the uncertainty bearing and risk taking. Business manager who is successful is the one who can form more or less correct estimates of the costs and revenues likely to accrue to the firm at different levels of output. Therefore the more successful a manager is in reducing uncertainty, the higher are the profits earned by him. Hence, the profit-planning and profit measurement will constitute the most challenging area of Managerial Economics.

Pricing decisions, policies and practices:

In managerial economics, pricing plays an important role. In fact price is the genesis of the revenue of a firm. The success of a business firm largely depends on the correctness of the price decisions taken by it.

Demand Analysis and Forecasting:

A business firm is an economic organisation that is engaged in transforming the productive resources into goods which are to be sold in the market. A major part of managerial decision making will depend on accurate estimates of demand. The forecast of future sales serves as a guide to management for preparing production schedules and employing resources. This will help management to maintain or strengthen its market position and profit base. The demand analysis also identifies a number of other factors influencing the demand for a product. Hence, demand analysis and forecasting occupies a strategic place in Managerial Economics.

Uses of Managerial Economics

1. It presents those aspects of traditional economics which are relevant for business decision making in real life. For the purpose, it calls from economic theory of concepts, principles and techniques of analysis which leave a bearing on the decision making process. If necessary, they are adapted or modified with a view to enable the manager take better decisions. Thus, managerial economics accomplishes the objective of building that are suitable on kit from traditional

economies. The usefulness of managerial economics lies in incorporating relevant ideas from other disciplines to achieve better business decisions.

2. It also incorporates useful ideas from other disciplines such as psychology, sociology, etc. If they are found relevant for decision making.

3. Managerial economics helps in reaching a variety of business decisions in a complicated environment.

4. Managerial economics makes a manager a more competent model builder. Thus he can capture the essential relationships that characterizes a situation, while leaving out the cluttering details and peripheral relationships.

5. At the level of the firm, where for various functional areas, functional specialists or functional departments exist, e.g., finance, personnel, marketing, production, etc., managerial economics serves as an integrating agent by department or specialist where the implications pertaining to other functional areas.

6. Managerial economics takes cognizance of the interaction in between the firm and society.

1.2 Relationship with other disciplines

Relationship of managerial economics with other disciplines:

It is closely related to other subjects like mathematics, statistics, accounting, operations research, micro economic theory and macro economic theory . The logic of managerial economics is used in mathematics and statistics for providing effective ways of thinking about business decision problems.

Managerial economics and mathematics:

It becomes increasingly mathematical in character. The businessmen deal with different concepts that are measurable. The use of mathematical logic gives clarity of concepts. This also gives a systematic frame-work within where the quantitative relationship might be analyzed. Therefore, mathematics is of great help to managerial economics but the major problem confronting businessmen is to minimize the cost or maximize th profit or optimize sales. In order to find out the solution for the overall problems, the mathematical concepts and techniques are widely used. The mathematical techniques like linear programming, games theory etc help managerial economists to solve many of their problems.

Managerial economics and accounting:

Accounting in managerial economics is concerned with recording the financial operations of a business firm. The accounting information is one of the primary sources of data that is required for

managerial economists for the decision-making purpose. The information which is available can be used by the managerial economist to throw some light on the future course of action.

Managerial economics and statistics:

Statistics in managerial economics is a science which is concerned with the classification, collection, tabulation and analysis of the data for some specified purpose. The managerial economics and statistics are closely related as businessmen deal mainly with concepts that are quantifiable.

Example: demand, price, cost of operation.

It is useful to managerial economics in many ways are as follows:

a. Managerial economics requires marshalling of quantitative data for finding out functional relationship involved in decision-making. This is done with the help of statistics.

b. These methods are used for empirical testing in managerial economics.

c. The business executives must work and take decisions in an uncertainty frame-work. The theory of probability evolved by statistics helps managerial economists for taking a logical decision.

Hence, the statistical methods gives sound base for decision-making and help the businessmen to achieve the objective without much difficulty. The statistical tools are extensively used in the solution of managerial problems. The managerial economists make use of different statistical techniques like the theory of probability, regression analysis, co-relation techniques etc. in various business situations.

Managerial economics and operations research:

Managerial economics with Operations research is the, application of mathematical techniques in solving the business problems. It deals with model building where the construction of theoretical-models that help the decision-making process. Although the roots of operations research lies on military studies, it is now largely used in business administration, planning and control. The linear programming and allied concepts of operations research are used in managerial economics.

Managerial economics and micro economics:

Managerial economics is mainly micro economic in character, making use of several of the concepts and tools provided by micro-economic theory. The concept of elasticity of demand, market structures, marginal cost, the theory of the firm and the theory of pricing of micro-economics are fully made use of by managerial economics. Thus, the study of micro economics is necessary for the better understanding of managerial economics. All micro economic theories that can be applied in business are made use of in managerial economics.

Managerial economics and macro economics:

Managerial economics with macro economics is concerned which aggregates and macro economics concepts are used in managerial economics in the area of forecasting the general business conditions. The theory of the firm, pricing policies etc have to be viewed in a broad frame work of the economic system and it is essential that the business executives should have some knowledge of the whole economic system. Macro economic concepts like national income, business cycles, social accounting, managerial efficiency of capital, multiplier, fiscal policies etc have to be studied in managerial economics for forecasting the business conditions.

Both the micro and macro economics are closely related to the managerial economics. The managerial economics draws from the micro and macro economics, so that it can apply these principles to solve the day-to-day problems faced by businessmen.

1.3 Firms

The concept of **firm** consists of a number of economic theories that describe the nature of the firm, company or corporation, including its existence, behaviour, structure and relationship to the market.

A firm is a collection of resources that is transformed into products demanded by consumers.A firm is an organization which buys factors of production and puts them to use producing goods or services.

1.3.1 Types

Three types of firms are as follows:

1. Sole Proprietorship

2. Partnership

3. Corporation

Sole Proprietorship

It has one owner. There is no formal process to establish a sole proprietorship. It has unlimited liability i.e All the assets of the owner, including a home or personal stereo set can be claimed to pay off debts incurred in operating the firm.

In this type ,profits are taxed as the personal income of the owner.

Partnership

It has more than one owner. It can be established informally. In this type wise partners enter into a legal agreement.There is an unlimited liability for each owner. Profits are taxed as the personal income of the owner.

Corporation

The firm is considered a legal person that can be sued in court and taxed. Here one or more owners are called stock or share holders. It must be established through a legal process and the profits of the corporation may be paid out in dividends or may be reinvested in the firm as retained earnings.

The most the owners can lose is the funds they invested in purchasing the shares of the firm is said to limited liability.

The profits are taxed first as the income of the corporation. When they are paid out as dividends on shares of the company they are taxed again as the personal income of the owners.

Sole Proprietorships

The sole proprietorship is the easiest form of business for starting because it involves almost no more requirements except for occasional business licenses and fees.

Advantages of a sole proprietorship :

1. Ease of starting up.

2. No separate business income taxes.

3. Relative ease of management.

4. Ease of getting out of business.

5. Psychological satisfaction.

6. Owner enjoys the profits of successful management.

Disadvantages of a sole proprietorship:

1. Owner has unlimited liability.

2. Full and personal responsibility for all losses and debts of the business.

3. Difficulty in raising financial capital.

4. Size and efficiency.

5. Firm ceases to exist when owner dies, quits or sells the business.

6. Limited managerial experience.

7. Difficulty of attracting qualified employees

8. Limited life.

9. The business may have to carry a large inventory or stock of finished goods and parts in reserve.

Partnerships

When a business is jointly owned by two or more persons is known as partnerships.

They are the least numerous form of business organization, which accounts for the smallest proportion of sales and net income.

Types of Partnerships

In partnership, the most common type is a general partnership, the one in which all partners are responsible for the management and financial obligations of the business.

Second is the limited partnership, where at least one partner is not active in the daily running of the business, even though they may have contributed funds to finance the operation.

Since there is more than one owner is involved, the formal legal papers called articles of partnership are usually drawn up to specify arrangements between partners.

Advantages of a partnership :

1. Ease of establishment

2. Ease of management.

3. Lack of special taxes.

4. Attract financial capital easily.

5. Slightly larger size, increased efficiency.

Disadvantages of a partnership:

1. A business might have to file for bankruptcy, a court-granted permission to an individual or business in order to cease or delay debt payments.

2. Each partner is fully responsible for the acts of all other partners.

3. Potential for conflict between partners.

4. Limited partners have limited liability.

5. Limited life.

6. Offer increased access to financial capital, but do not always work out.

Types of partnership:

The different kinds of Partners in Partnership Firms are as follows:

1. Active or managing partner:

A active or managing partner is defined as a person who takes active interest in the conduct and management of the business of the firm.

He carries on business on behalf of the other partners. When he wish to retire, he has to give a public notice of his retirement. In case if he did not he will continue to be liable for the acts of the firm.

2. Nominal or ostensible partner:

The one who does not have any real interest in the business but will lends his name to the firm, without any capital contributions and also doesn't share the profits of the business is called as a nominal partner. He also does not usually have a voice in the management of the business of the firm, but he will be liable to outsiders as an actual partner.

3. Sleeping or dormant partner:

The partner who 'sleeps', that is, he does not take active part in the management of the business is called as the sleeping partner. Such a partner only contributes to the share capital of the firm, is bound by the activities of other partners and shares the profits and losses of the business. Unlike an active partner, he does not needed to give a public notice of his retirement. So that, he will not be liable to third parties which acts after his retirement.

Sleeping vs Nominal Partners:

A nominal partner is not the same as a sleeping partner. A sleeping partner will contribute the capital shares profits and losses, but is not known to the outsiders.

A nominal partner, is admitted with the purpose of taking advantage of his name or reputation. Since, he is known to the outsiders, although he does not share the profits of the firm nor he take part in its management. However, both are liable to third parties for the acts of the firm.

4. Partner by estoppel or holding out:

If a person, with his words or conduct, will hold out to another that he is a partner, but he can be stopped from denying that he is not a partner. The person who thus becomes liable to third parties to pay the debts of the firm is known as a holding out partner.

Conditions for the principle of holding out are as follows:

(a) The person to be held out must have made the representation, by words written or spoken or by conduct, so that he was a partner.

(b) The other party must prove that he had knowledge of the representation and acted on it, for example, gave the credit.

5. Partner in profits only:

If a partner agrees with the others that he might only share the profits of the firm and that would not be liable for its losses, he is the one in own as partner in profits only.

6. Minor as a partner:

A partnership is created by an agreement. if a partner is incapable of entering into a contract, he cannot become a partner. Therefore, at the time of creation of a firm a minor cannot be one of the parties to the contract. However under section 30 of the Indian Partnership Act, 1932, a minor can be admitted to the benefits of partnership, with the consent of all partners. Thus, a minor partner is entitled to his share of profits and to have access to the accounts of the firm for use of inspection and copy.

But he can't file a suit against the partners of the firm for his share of profit and property until he remains with the firm and his liability in the firm will be limited to the extent of his share in the firm and also private property cannot be attached by creditors.

By attaining majority, he should to decide within 6 months whether he shall become a regular partner of withdraw from partnership. Then the choice in either case is to be intimated through a public notice, failing in which he will be treated for deciding to continue as partner. Then, he becomes personally liable like other partners for all the debts and obligations of the firm from the date of his admission to its benefits and also becomes entitled to file a suit against other partners for his share of profit and property.

7. Other partners:

In partnership firms, several other types of partners are also found, namely, the secret partner who does not want to disclose his relationship with the firm to the general public. An outgoing partner, who retires voluntarily without causing dissolution of the firm. A limited partner who is liable only up to the value of his capital contributions in the firm.

But, the moment public comes to know of it he becomes liable to them for meeting debts of the firm. Generally, an outgoing partner is always liable for all debts and obligations that are incurred before his retirement whereas a limited partner is found in limited partnership only and not in general partnership.

Corporation

In a business organization, that has a separate legal personality from its owners is said to be a corporation. The ownership in a stock corporation is represented by shares of stock.

The stockholders enjoys a limited liability but they will also have only limited involvement in the company's operations. The activities of the corporation is controlled by the board of directors, an elected group from the stockholders.

In addition to those basic forms of business ownership, there are some other types of organizations that are common today are as follows:

Limited Liability Company

In USA, they are hybrid forms of business that have characteristics of both a corporation and a partnership. A LLC is not incorporate. Hence, it is not considered a corporation and the owners enjoy limited liability like in a corporation. A LLC may elect to be taxed as a sole proprietorship, a partnership or a corporation.

Cooperative

It cam be a business organization owned by a group of individuals and that is operated for their mutual benefit. The persons who are creating up the group are called members. The cooperatives might be incorporated or unincorporated.

Examples: Water and electricity cooperatives, credit unions, cooperative banking and housing cooperatives.

1.3.2 Objectives and goals

The different objectives of the business firm in the modern set up.

Profit Maximization

Generally, profits are the primary measure of the success of any business. It is the acid test of the economic strength of the firm.

Economic theory makes fundamental assumption that maximize profit is the basic objective of every firm. This may be due to number of measures as follows:

(1) Achieving leadership: The firms often wishes to become leaders in the respective line of business. They would rather try to attain industrial leadership at the cost of profits.

Such cases, the objective of profit-maximization is subordinated to the leadership-goal in the field. The leadership shall connote either maximum sales or manufacture of maximum product lines.

(2) For avoiding potential competition: The firms may restrict the profit in order to discourage other firms from entering the field and competing with them.

When the firm is maximizing profit, it will be an alluring proposition for the new firms to enter the field of production.

The new entrants shall snatch away the market, make infringement on patent rights of the existing firm and can also encroach on the firm's resources of raw materials.

In order to avoid such potential competition, the firms shall adopt a policy of profit restriction, instead of profit-maximization. This is more so in the case of firms enjoying weak or slender monopoly.

(3) For preventing Government's intervention: Higher profit's in business is considered as an index of monopoly power. The government's attitude towards profit and the firm's attitude towards profit is different.

The maximum profit can create an impression that the firm is exploiting the consumers and it shall result in the public demand for nationalizing the firm or firms.

The government shall also probe into the financial structure of the firm, make regulation of the prices, profits and dividends.

Just to woo the public and to restrain the zeal of nationalization, the firms may adopt a policy of restricted profit.

(4) To maintain customer's goodwill: In modern business, customers goodwill is valued more than anything else. For maintaining that, the firms shall adopt the policy of restricted profit and low price for the commodity.

Also, in times of increased taxes and excise duties, these firms shall not increase the price but reduce the profit margin and thereby win the approbation of the customers.

(5) For restraining wage demands: Higher profit is an indication of the ability to pay higher wages by the firms. The organized Trade Unions advance their arguments on the basis of the higher profits earned by the firm for increasing the wages of labourers, bonus benefit etc. But in India this point has no validity as wages of labourers are fixed by the Wage Boards and payment of minimum bonus is a statutory obligation. Thus, the firms may have no elbow-room for making decisions in this matter.

(6) For achieving financial soundness and liquidity: Certain firms may give greater importance to the financial soundness and liquidity, rather than profit-maximization. The considerations of maximum profit shall result in huge investment in fixed assets and consequently the liquidity of the firm will be reduced.

(7) For avoiding risks: The decisions regarding profit maximization may involve risks. Many new projects have to be worked through the uncertainties. Generally, the business managers will avoid taking those risks which may result even in losing their jobs or by losing the image of the firm. Further, the rewards for business managers may not be directly proportional to the profits earned.

Firms may not aim at profit maximization, they may try their best to achieve sufficient profit to cover the risk of economic activity. The first duty of the business is to survive by avoiding losses. The guiding principle of business economics is not profit-maximization, but avoiding loss.

Welfare Goals

Business forms may promote some welfare goals. They forces on welfare of employees and society.

Employees

The firms may focus an welfare of its employees. The resources of the form may be channeled for welfare activities like housing facilities to workers, medical facilities and better living conditions through better wages, leisure and cultural activities, co-operative organizations etc.

Society

This has came into lime light of late and the firms have realized the social responsibility. It provides facilities to society from which it has drawn its resources. Building of hospitals, charitable institution, passes, libraries, roads etc. are examples of this. By adopting there welfare measures ,the firms attempt to bring about a social change.

1.4 Managerial decisions

Decision making is the core of managerial economics. An enlightened management will take decisions scientifically after studying the pros and cons of a particular decision.

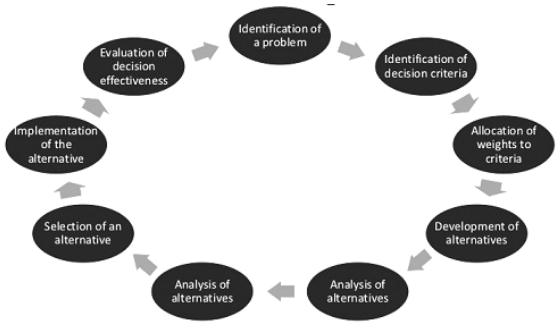
The quality of the decisions taken by the management determines the success or failure of business venture.

Decision Making

Decision making is the process of selecting a particular course of action among the various alternatives.A business manager has to work with uncertainties and the future cannot be predicted with accuracy.

If everything could be predicted accurately,decision making would be a very simple process. Because of the presence of uncertainty ,the decision maker must be very careful in choosing a particular course of action in order to realize the objectives.

The following diagram shows the process of decision making:



Process of Decision Making

Application of Economic Concepts in Business Decision Making

Economic theory has a variety of concepts that can be used by business economist in a decision-making and successful running of the business.

Economics offers certain broad principles that can be conveniently reformulated and made use of by the business economists in solving business problems.

To do this, the business economist requires special skills and adaptability.Though there are many tools in economic theories the five fundamental concepts of economics are basic tools used by the business economists.

Steps in decision making:

Certain things has to be taken into account when making decisions. No matter what's the size of the problem like every thing ,decision making should also be in certain steps.

The following are the various steps involved decision making:

1. Establish objectives.

2. Specify the decision problem.

3. Identify the alternatives.

4. Evaluate alternatives.

6. Select the best alternatives.

7. Implement the decision.

8. Monitor the performance.

Business decision making is a process of selecting the best out of alternative opportunities open to the firm.

The above steps puts the managers analytical ability to test and determine the appropriateness and validity of decisions in the modern business world.

The modern business conditions are changing so fast and becoming so competitive and complex where the personal business sense, intuition and experience alone are not sufficient for making appropriate business decisions.

It is in this area of decision making in which economic theories and tools of economic analysis shall contribute a great deal.

The basic concepts of economics are:

1. Incremental concept

2. Time perspective

3. Discounting principle

4. Opportunity cost

5. Equal-marginal principle.

Opportunity Cost

The resources of any firm operating in the market are said to be limited and investment options are many. Therefore the firm has to decide or select only those investment opportunities/options that provide the firm with the best return or best income on the investment.

It means that if a firm can invest money/resources only in one investment option then the firm will select the investment option that promises best return on investment to the firm.

Also, while doing so, the firm gives up/ rejects the next best option for investing the funds. Thus, the opportunity cost of a company is the income/return which the firm could have earned on the next best investment alternative.

Money Cost

Money Cost of production is the actual monetary expenditure made by company in the production process.

Thus, money cost includes all the business expenses which involve outlay of money to support business operations.

Real Cost

The real Cost of production or business operation on the other hand includes all such expenses/costs of business that may or may not involve actual monetary expenditure.

Accounting Costs/Explicit Costs

Accounting cost includes all such business expenses which are recorded in the book of accounts of a business firm as acceptable business expenses.Such expenses include expenses like Cost of Raw Material, Salaries and Wages etc.

When such business expenses or accounting expenses are deducted from the sales income of any firm that the accounting profit is obtained ,such Accounting/Business expenses or costs are also termed as explicit costs.

Social Cost

Social cost on the other hand includes private cost and also these costs which are not borne by the firm but by the society at large. The cost not borne or paid out by the firm is also known as External Cost.

Fixed, Variable and Average Cost

Fixed Cost is that cost that does not change (that is either goes up or goes down) irrespective of whether the firm is operating or not.

Variable Cost on the other hand is directly proportional to the production operations.

As the size of production at any business grows, along that grow the variable expenses. As the name suggests, the variable expenses vary with the business operations.

When the firm is not operating on account of Strike/Lockout etc., then the variable cost of the firm is Zero.

Average Cost is the cost which is obtained after dividing Total Cost with the number of units produced.

1.5 Decision analysis

Economic Analysis is used to diagnose the situation and internal perspective, which makes clear that the direction of the company may be making the decisions to correct the weak spots that may threaten their future, while that capitalizes on the strengths for the company to achieve its objectives.

From an external perspective, are very useful for anyone interested in knowing the situation and expected development of the company.

They use economic analysis for taking decisions like sales forecasting, pricing decisions, marketing decisions, production decisions and financial decisions.

2

DEMAND & SUPPLY ANALYSIS

Demand – Types of demand – Determinants of demand – Demand function – Demandelasticity – Demand forecasting – Supply – Determinants of supply – Supply function –Supply elasticity.

2.1 Demand

Demand is said to be the aspiration for a commodity of an individual or a group, when they are able to pay for that commodity. That is demand is desire with account to pay.

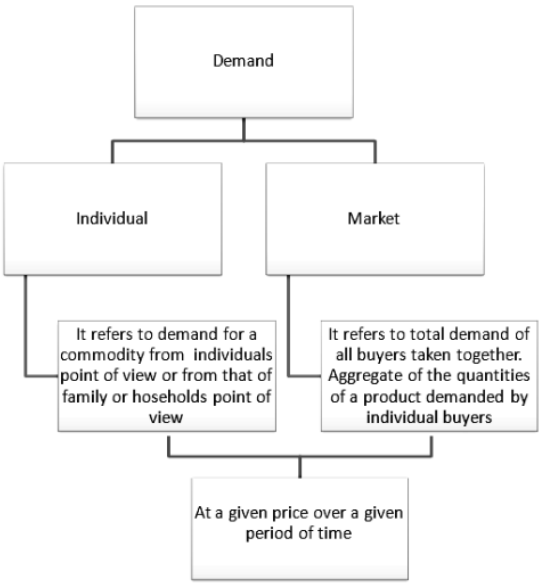
According to Benham's , "Demand for anything at a given price is the amount of it that will be bought per unit of time at that price."

It can also be defined as " the different quantities of a given commodity or service when the consumers might buy in a market in a given period of time at different prices or at different incomes or at various prices of related goods."

In other words, the quantity of goods or services which is desired by an individual, is backed by the ability and willingness to pay.

Demand Schedule

This represents the relationship between the price and the quantity demanded by using a table of figures. It is categorized in two types say one for the price of a product and another for the quantity demanded at that price. The price column displays the different price levels arrayed from lowest to highest or vice versa while the quantity demanded column displays the quantity of that good or service demanded at each price level. This is used for most products which will show a reduction in quantity demanded as the price increases. This is divided into 2 types as shown in the figure:



Types of Demand schedules

i**. Individual demand schedule:**

This refers to a tabular representation of the quantity of products demanded by an individual at different prices and time.

The below table represents the individual demand schedule of product:

Table-1: Individual Demand Schedule	
Price of A(per kg in rupees)	Quantity Demanded (per week in kgs)
10	15
15	10
20	8
25	4

30	2

Characteristics of individual demand schedule:

a. It demonstrates the effect of changing the price on buying behavior of customers but not change in the demand for a product.

b. It describes the disparity in demand with the difference in the product's price.

c. It represents that at higher prices the quantity demanded will reduce and vice versa.

ii**. Market demand schedule:**

It shows a tabular representation of the quantity demanded in aggregate by the individuals at different prices and time. Therefore, it demonstrates the demand of a product in the market at different prices. This can be derived by aggregating the individual demand schedules.

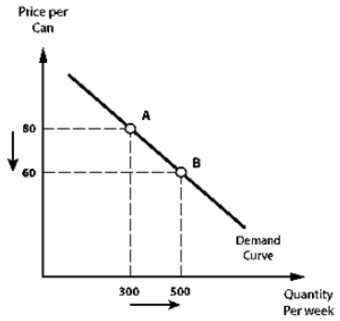
The below table represents the market demand schedule prepared through the individual demand schedule of three individuals:

Price of A(per unit in)	Individual demand (per day)			Market demand(per day)
	X	Y	Z	
4	1	3	4	8
3	3	4	5	12
2	4	5	6	15
1	5	9	9	23

This also demonstrates an inverse relation between the quantity demanded and price of a product.

Demand Curve:

It is a visual form of the demand schedule. An economist depicts that the demand schedule on a two-dimensional graph consists of a vertical axis representing the price and a horizontal axis representing quantity demanded. The vertical axis will display different price levels from the highest to lowest, whereas the horizontal axis will display the various levels of demand. An apex of the vertical and horizontal axis will have value of zero for both quantity and price. The demand curve for most products will slope downward indicating an increase in demand as the price declines.



Demand curve

2.1.1 Types of demand

1. Direct and indirect demand:

It is also called as Producers' goods and consumers' goods. The demand for goods which are directly used for consumption by the ultimate consumer is called as direct demand whereas the demand for goods that are used by producers for producing goods and services is known as indirect demand.

Example for direct demand is demand for T-shirts and for indirect demand is demand for cotton by a textile mill.

2. Derived demand and autonomous demand:

When a producer derives its usage from the use of some primary productis called as derived demand whereas autonomous demand is the demand for a product which can be independently used.

Example for derived demand is demand for tyres derived from demand for car and for autonomous demand is demand for a washing machine.

3. Durable and non durable goods demand:

The durable goods are those which can be used more than once, over a period of time whereas non durable goods can be used only once.

Example for durable goods is micro wave oven and for non durable goods is band-aid.

4. Firm and industry demand:

Firm demand is the demand for the product of a particular firm whereas the demand for the product of a particular industry is industry demand .

Example for Firm demand is dove soap and for industry demand is demand for steel in India.

5. Total market and market segment demand:

A particular segment of the market demands is known as segment demand whereas the sum total of the demand for laptops by various segments in India is the total market demand.

Example for segment demand is demand for laptops by engineering students and for total market demand is demand for laptops in India.

6. Short run and long run demand:

The short run demand refers to the demand with its immediate reaction to the price changes and income fluctuations whereas the long run demand is that which will ultimately exist as a result of the changes in pricing, the promotion or product improvement after market adjustment with sufficient time.

7. Joint demand and Composite demand:

When two goods are demanded in conjunction with one another at the same time to satisfy a single want, this is called as joint or complementary demand whereas a composite demand is one in which a good is wanted for several different uses.

Example for joint or complementary demand is demand for petrol and two wheelers and for composite demand is demand for iron rods for various purposes.

8. Price demand, income demand and cross demand:

The demand for commodities by the consumers at alternative prices is known as price demand. It has the ability and willingness to buy specific quantities of a good at the prevailing price in a given time period.

Income demand :

The quantity demanded by the consumers at alternative levels of income is known as income demand. Here, the total quantity of a good or service that people are willing and able to buy at prevailing prices in a given time period. It is the sum of individual demands.

Cross demand :

The quantity demanded of commodity 'X' at a price of a related commodity 'Y' which may be a substitute or complementary to X is know as the cress demand. This ha the ability and willingness to buy a commodity or service at the prevailing price of the related commodity. That is, it substitutes or complementary products.

Example: people buy more of wheat when the price of rice increases.

2.1.2 Determinants of demand

1. Price of the good:

It is an important determinant of demand since price and demand are inversely related. When it has higher price, it will have less demand and vice versa.

2. Price of related goods:

They are substitutes and complementary goods which also affect the demand. Here, the substitutes, rise in price of one commodity will lead to increase in demand for its substitute where as complementary goods, there is a fall in the price of one commodity shall lead to rise in demand for both the goods.

3. Consumer's Income:

It is directly related to demand. A change in the income of the consumer will significantly influences his demand for most commodities. When the disposable income increases, the demand will be more.

4. Taste, preference, fashions and habits:

When there is a change in taste, habits or preferences of the consumer, even his demand will change since fashions and customs in society determine many of our demands. These are very effective factors affecting demand for a commodity.

5. Population:

When the size of the population is more, the demand for goods will be more . Thus, the market demand for a commodity will substantially changes if there is change in the total population.

6. Money Circulation:

When there is more money in circulation, the demand is higher and vice versa.

7. Value of money:

It determines the demand for a commodity in the market. If there is a rise or fall in the value of money it can affect in the relative prices of different goods and their demand.

8. Weather Condition:

It determines the demand for certain goods.

9. Advertisement and Salesmanship:

When the advertisement is very attractive for a commodity, the demand will be more. Same as advertising when the salesmanship and publicity is very effective then the demand for the commodity will be more.

10. Consumer's future price expectation:

When the consumers expect that there will be a rise in prices in future, then he may buy more at the present price and so his demand increases.

11. Government policy:

If the high taxes, this will increase the price and reduce demand, whereas if there is low taxes, it will reduce the price and extend the demand.

12. Credit facilities:

By depending on the availability of credit facilities the demand for commodities can change. When there are more facilities the demand will be higher.

13. Multiplicity of uses of goods:

When the commodity has multiple uses then the demand will be more while the commodity is used for a single purpose.

2.2 Demand function

The demand function relates with price and quantity. It tells how many units of a good will be purchased at different prices.In general, at higher prices, less will be purchased.

Hence, the graphical representation of the demand function (often referred to as the demand curve) has a negative slope.The market demand function is calculated by adding up all of the individual consumers' demand functions.

2.3 Demand elasticity

Elasticity of Demand

This represents the degree of responsiveness of quantity demanded to the changes in the determinants of demand.

Concept Of Elasticity of demand was introduced by Alfred Marshall in 1890 to measure the magnitude of percentage change in the quantity demanded of a commodity to a certain percentage change in its price or the income of the buyer or in the prices of related goods.The three main determinants of demand are as follows:

1.Price of the good.

2. Income of the consumer.

3. Price of the related goods.

Types of Elasticity Of Demand

Elasticity of demand can be of three types are as follows:

1. Price Elasticity of Demand.

Price Elasticity is the responsiveness of demand to change in price.

2. Income Elasticity of Demand.

Income elasticity means a change in demand in response to a change in the consumer's income

3. Cross Elasticity of Demand.

Cross elasticity means a change in the demand for a commodity owing to change in the price of another commodity.

Price elasticity of Demand:

The sensitivity of demand for a product to a change in the product's own price since Price Elasticity of Demand is predominantly used in economic analysis it is alternatively referred to as Elasticity of Demand.

Definition

The degree of responsiveness of demand to a change in its price is known as price elasticity of demand. In other words, it is the ratio of the percentage change in demand to the percentage

change in price. That is,E_p = Percentage change in quantity demanded/Percentage change in price.it can be represented in mathematical form as:

$E_p = (\Delta q/\Delta p)\ (p/q)$

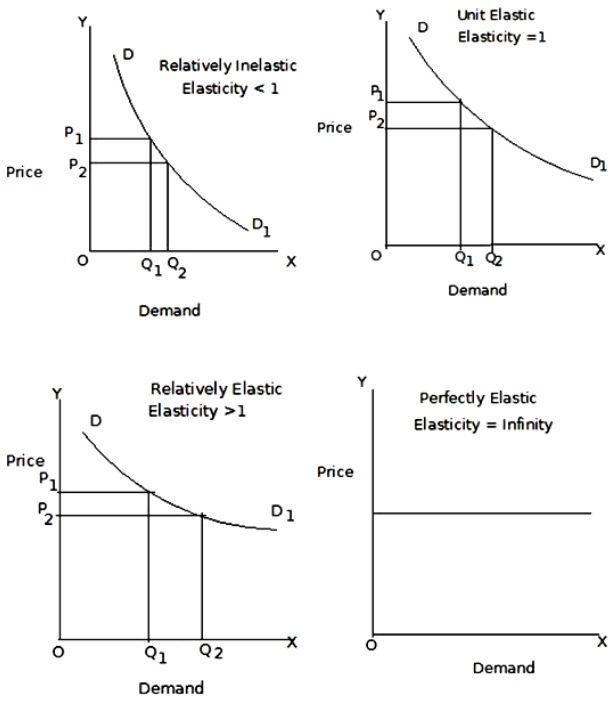
From the definition, it says that,

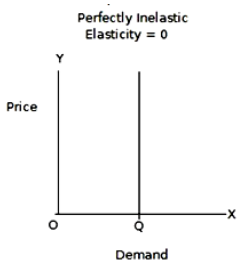
When there is percentage change in the quantity demanded is greater than the percentage change in price then, the price elasticity will be greater than one. So, the demand is said to be elastic.

When there is a percentage change in the quantity demanded is equal to the percentage change in price then the price elasticity can be equal to one. So, demand is said to be unit elastic.

When there is a percentage change in the quantity demanded then it is less than the percentage change in price then, the price elasticity will be less than one. So, the demand is said to be inelastic.

Diagrammatic representation Of Price Elasticity Of Demand:





Cross Elasticity of Demand

A measure of the extent to which the demand for a good changes when the price of a substitute or complement changes, the other things are remaining the same is known as the cross elasticity of demand. An economic concept that measures the responsiveness in the quantity demand of one good when a change in price takes place in another good. The cross elasticity of demand can be calculated by using the following formula:

$$\text{Cross elasticity of demand} = \frac{\text{Percentage change in quantity demanded of a good}}{\text{Percentage change in price of one of its substitute s or complement s}}$$

The cross elasticity of demand for a substitute it is positive whereas for a complement it is negative.

The measure is calculated by taking the percentage change in the quantity demanded of one good divided by the percentage change in price of the substitute good as follows:

$$E_C = \frac{P_1^A + P_2^A}{Q_1^B + Q_2^B} \times \frac{\Delta Q^B}{\Delta P^A}$$

Where:

P_1^A = The price of good A at time period 1

P_2^A = The price of good A at time period 2

Q_1^B = The quantity demanded of good B at time period 1

Q_2^B = The quantity demanded of good B at time period 2]

ΔQ^B = The change in the quantuty demanded of good B

ΔP^A = The change in price of good A

In the concept of elasticity of demand, it is also useful is knowing the different market form.

● When the cross elasticity of demand is infinite, such case there is perfect competition in the market.

● When the cross elasticity of demand is greater than one (or E_c >1), in that case, there is monopolistic competition or imperfect competition.

● When the cross elasticity of demand is less than 1 (or E_c < 1), in that case there is relative monopoly.

● When the cross elasticity is 0 (or E_c = 0) it is a case of absolute or pure monopoly.

Income Elasticity of Demand

A measure of the extent to that the demand for a good changes when the income changes, other things remaining the same is known as income elasticity of demand. In other words, a measure of the relationship between changes in the quantity demanded for a particular good and a change in real income. It is an economics term which refers to the sensitivity of the quantity demanded for a certain product in response to a change in consumer incomes.

The income elasticity of demand can be calculated by using the following formula:

$$\text{Income elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

● For a normal, the income elasticity of demand is positive.

● For an inferior good, the income elasticity of demand is less than 0.

● When the income elasticity of demand is greater than 1. Then the demand is income elastic.

● When the income elasticity of demand is between zero and 1. Then the demand is income inelastic.

Example:

When the quantity demanded for a good increases for 15% in response to a 10% increase in income, then the income elasticity of demand would be 15%/10% = 1.5 and the degree to that the quantity demanded for a good changes in response to a change in income depends on whether the good is a necessity or a luxury.

Methods of Measuring Price Elasticity of Demand:

There are 4 methods of measuring elasticity of demand they are the percentage method, arc method, point method and expenditure method.

(a) The Percentage Method:

The price elasticity of demand is measured by its coefficient (Ep). This coefficient (Ep) measures the percentage change in the quantity of a commodity demanded resulting from a given percentage change in its price. Thus

$$E_p = \frac{\%\ change\ in\ q}{\%\ change\ in\ p} = \frac{\Delta q / q}{\Delta p / p} = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

Where q refers to quantity demanded, p to price and A to change. If Ep> 1, demand is elastic. If Ep <1 demand is inelastic and if Ep =1, demand is unitary elastic. With this formula, we will compute price elasticities of demand on the basis of a demand schedule.

Demand Schedule

Combination	**Price (Rs.) Per Kg. of X**	**Quantity Kgs. of X**
A	6	0
B	5	10
C	4	20
D	3	30
E	2	40
F	1	50
G	0	60

first take combinations B and D.

(i) Assume the price of commodity X falls from Rs. 5 per kg to Rs. 3 per kg and its quantity demanded increases from 10 kg to 30 kg. Then

$$E_p = \frac{\Delta q}{\Delta p} \times \frac{p}{q} = \frac{(30-10)}{(3-5)} \times \frac{5}{10} = \frac{20}{-2} \times \frac{5}{10} = -5 \text{ or } > 1.$$

This shows elastic demand or elasticity of demand greater than unitary.

Note:

The formula will be understood like this:

$\Delta q = q_2 - q_1$ where q_2 is the new quantity (30 kg.) and q_2 the original quantity (10 kg.).

$\Delta P = p_2 - p_1$ where p_2 is the new price (Rs.3) and p the original price (Rs. 5).

In the formula p refers to the original price (p_1) and q to original quantity (q_1). The opposite is the case in example:

(i) Below where Rs. 3 becomes the original price and 30 kg. as the original quantity.

(ii) Measure elasticity by moving in the reverse direction. Assume the price of X rises from Rs. 3 per kg. to Rs. 5 per kg and the quantity demanded decreases from 30 kg. to 10 kg. Then,

$$E_p = \frac{\Delta q}{\Delta p} \times \frac{p}{q} = \frac{(10-30)}{(5-3)} \times \frac{3}{30} = \frac{-20}{2} \times \frac{3}{30} = -1$$

This shows unitary elasticity of demand. Notice which the value of E_p in example:

(i) Differs from that in example

(ii) Depending upon the direction in that we move. This difference in the elasticities is due to the use of a different base while computing percentage changes in each case. Now consider combinations D and F.

(iii) Assume the price of commodity X falls from Rs. 3 per kg to Re. 1 per kg. and its quantity demanded increases from 30 kg. to 50 kg. Then

$$E_p = \frac{\Delta q}{\Delta p} \times \frac{p}{q} = \frac{(50-30)}{(1-3)} \times \frac{3}{30} = \frac{20}{2} \times \frac{3}{30} = -1$$

This is again unitary elasticity.

(iv) Take the reverse order while the price rises from Re. 1 per kg. to Rs. 3 per kg. And the quantity demanded decreases from 50 kg. to 30 kg. Then

$$E_p = \frac{\Delta q}{\Delta p} \times \frac{p}{q} = \frac{(30-50)}{3-1} \times \frac{1}{50} = \frac{-20}{2} \times \frac{1}{50} = -\frac{1}{5} < 1$$

This shows inelastic demand or less than unitary.

The value of E_p again differs in this example than that given in example (iii) for the reason stated above.

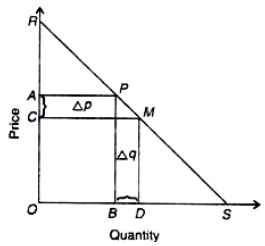
(b) The Point Method:

Professor Marshall devised a geometrical method for measuring elasticity at a point on the demand curve. RS be a straight line demand curve in figure. If the price falls from PB (= OA) to MD (= OC), the quantity demanded increases from OB to OD.

Elasticity at point P on the RS demand curve according to the formula is:

$E_P = \Delta q/\Delta p \times p/q$.

Where Δq represents change in quantity demanded Δp changes in price level when p and q are initial price and quantity levels.



From figure

Δq = BD = QM

Δp = PQ

P = PB

q = OB

By substituting these values in the elasticity formula:

E_P = QM/PQ× PB/OB

QM/PQ × BS/PB.

[<PQM=<PBS are similar Δs]

BS/PB× PB/OB = BS/OB

Since Δ PBS and ΔROS are similar,

Ep at point p = BS/OB = OA/AR = PS/PR =Lower Segment/Upper Segment.

It is easy to point out elasticity at any point along a demand curve. Assume that the straight line demand curve DC in below figure is 6 centimeters. The five points L, M, N, P and Q are taken on this demand curve. The elasticity of demand at each point can be known by the above method. Consider the point N be in the middle of the demand curve. Thus, the elasticity of demand at point.

N = CN (Lower Segment) / ND (Upper Segment) = 3/3 = 1 (Unity)

Elasticity of demand at point:

M = CM/MD = 5/1 = 5 or > 1. It is greater than unity.

L = CL/LD = 6/0 = ∞ . It is infinity.

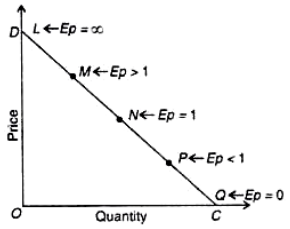
P = CP/PD = 1/5 = it is less than unity.

Q = CQ/QD = 0/6 = 0. It is zero.

We arrive at the conclusion at the mid-point on the demand curve the elasticity of demand is unity. Then moving up the demand curve from the mid-point, elasticity becomes greater. When the demand curve touches the Y- axis elasticity is infinity. The factor at any point below the mid point towards the X-axis will show elastic demand. The elasticity becomes zero while the demand curve touches the X -axis.

(c) The Arc method:

The measurement of elasticity at a point on a demand curve is carried in arc method. When the elasticity is measured between two points on the same demand curve, it is known as arc elasticity. Prof. Baumols states that the Arc elasticity is a measure of the average responsiveness to price change exhibited by a demand curve over some finite stretch of the curve.



Thus, any two points on a demand curve make an arc. An area between P and M on the DD curve in figure is an arc that measures the elasticity over a certain range of price and quantities. At any two points of a demand curve the elasticity coefficients are likely to be different depending upon the method of computation. The price quantity combinations P and M is given in below table.

Demand Schedule:

Point	**Price (Rs)**	**Quantity (Kg)**
P	8	10

M	6	12

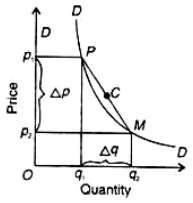
When we move from P to M, the elasticity of demand is,

EP = ΔQ/ΔP × p/q = (12 – 10) / (6-8) × 8/10 = 2/-2 × 8/10 = 4/5

When we move in the reverse direction from M to P, then

(10-20) / (6-8) × 6/12 = -2/2 × 6/12 = -1/2

Hence the point method of measuring elasticity at two points on a demand curve gives different elasticity coefficients because we use a different base in computing the percentage change in every case.



In order to avoid this discrepancy, elasticity for the arc is determined by taking the average of the two prices [(p_1 + p_2)1/2] and the average of the two quantities [(q_1 + q_2)1/2]. Then the formula for price elasticity of demand at the mid-point of the arc on the demand curve is,

$$E_p = \frac{\frac{\Delta q}{(q_1 + q_2)^{1/2}}}{\frac{\Delta p}{(p_1 + p_2)^{1/2}}} = \frac{\Delta q}{(q_1 + q_2)^{1/2}} \times \frac{(p_1 + p_2)^{1/2}}{\Delta p} = \frac{\Delta q}{\Delta p} \times \frac{p_1 + p_2}{q_1 + q_2}$$

On the basis of this formula, we will measure arc elasticity of demand when there is a movement either from point P to M or from M to P.

From P to M at point P, p_1 =8, q_1 = 10 and at point M, p_2 = 6, q_2 = 12.

Applying these values we get,

E_P = Δq/Δp × p_1 + p_2 / q_1 + q_2 = (12-10) / 8-6 × (8 + 6) × (10+12)

= 2/-2 × 14/22 = -7/11

From M to P at point M, P_1= 6, q_1 = 12 and at point, p_2 = 8, q_2 = 10.

Now we have E_P = (10-12) / (8-6) × (6+8)/12+10) = -2/2 × 14/22 = -7/11.

Thus whether we move from M to P or P to M on the arc PM of the DD curve, the formula for arc elasticity of demand gives the same numerical value. The closer the 2 points P and M are the more accurate is the measure of elasticity on the basis of this formula. If the two points which form the arc on the demand curve are so close which its almost merge into each other the numerical value of arc elasticity equals the numerical value of point elasticity.

(d) The Total Outlay Method:

Marshall stated that the total outlay or total revenue or total expenditure method as a measure of elasticity. In comparing the total expenditure of a purchaser each before and after the change in price it can be known whether it is demand for a good is elastic, unity or less elastic. It can be represented as:

Total Outlay = Price x Quantity Demanded.

It is explained with the help of the demand schedule in below table.

Price Rs. Per Kg	**Quantity in Kgs.**	**TE in Rs**	**Ep**
(1)	**(2)**	**(1x2)=3**	**(4)**
9 8 7	2 3 4	18 24 28	>1
6 5 4	5 6 7.5	30 30 30	=1
3 2 1	8 9 10	24 18 10	<1

(i) Elastic Demand:

The demand is elastic, while with the fall in price the total expenditure increases and with the rise in price the total expenditure decreases where above table shows that when the price falls from Rs. 10 to Rs. 9, the total expenditure increases from Rs. 19 to Rs. 25 and if the price rises from Rs. 8 to Rs. 9, the total expenditure falls from Rs. 29 to Rs. 23. Thus the demand is elastic (Ep>1) in this case.

(ii) Unitary Elastic Demand:

If there is a the fall or rise in price, the total expenditure remains unchanged, the elasticity of demand is unity which is shown in the table with the fall in price from Rs. 6 to Rs. 5 or with the rise in price from Rs. 4 to Rs. 5, the total expenditure remains unchanged at Rs. 30, i.e., Ep =1.

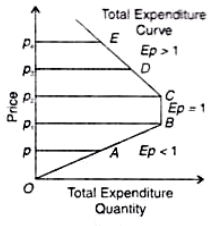
(iii) Less Elastic Demand:

The demand is less elastic if with the fall in price, the total expenditure falls and with the rise in price the total expenditure rises. If the price falls from Rs. 3 to Rs. 2, total expenditure falls from Rs. 24 to Rs 18 and while the price rises from Re. 1 to Rs. 2 and the total expenditure also rises from Rs. 10 to Rs. 18. Thus, the demand is inelastic or less elastic demand, Ep< 1.

Total Outlay Method

Price	**TE**	**Ep**
Falls Rises	Rises Falls	>1
Falls Rises	Unchanged Unchanged	=1
Falls Rises	Falls Rises	<1

The measurement of elasticity of demand in terms of the total outlay method is explained in the figure which is divided into three stages by the relationship between price elasticity of demand and the total expenditure:



First, if the price falls from OP_4 to OP_3 and to OP_2 respectively then the total expenditure rises from P_4 E to P_3D and P_2C respectively whereas when the price in-creases from OP_2 to OP_3 and $OP_4$the total expenditure decreases from P_2 C to P_3 D and P_4 E respectively.

Thus the EC segment of total expenditure curve shows elastic demand (E_p> 1).

secondly, if the price falls from OP_2 to OP_1 or rises from OP_1 to OP_2 the total expenditure equals, P_2 C = P_1B and the elasticity of demand is equal to the unity (E_p =1).

Third , if the price falls from Op_1 to Op_2 the total expenditure also falls from P_1 B to PA. Thus with the rise in price from OP to Op_1 the total expenditure also increases from PA to P_1B and the elasticity of demand is less than unity (E_p< 1).

Factors Affecting Price Elasticity of Demand:

The elasticity of demand for any commodity is determined or influenced by a number of factors that are as follows:

(1) Nature of the Commodity

(2) Substitutes

(3) Variety of Uses

(4) Joint Demand

(5) Deferred Consumption

(6) Habits

(7) Income Groups

(8) Proportion of Income Spent

(9) Level of Prices

(10) Time Factor

(11) Brand

(12) Recurring Demand

(13) Distribution of Income

Significance of Price Elasticity of Demand

1. It allows the business in general and the monopolists in particular to fix the price.

2. It helps the Finance Minister to levy tax on goods.

3.It is very useful to fix the price of jointly supplied goods.

4. It is of greater significance in the sphere of international trade.

5. It guides the producers to fix wages for laborers.

6. The effect of machines on employment opportunities depends upon elasticity of demand for the goods produced by such machines.

7. It explains the paradox of poverty in the midst of plenty.

8. Incidence of tax lies on the person who ultimately pays the tax.

9. The knowledge of elasticity of demand is very important for the government in such matters as controlling of business cycles will remove inflationary and deflationary gaps in the economy.

10. Rate of exchange between two currencies can be changed through the devaluation or overvaluation of one currency in relation to other currencies.

11. The concept of elasticity of demand plays an important role by determining the price of joint products.

12.The concept of elasticity of demand is also useful in knowing the different market form.

13. The concept of elasticity of demand also plays a significant role in the international trade or in terms of trade.

14. This concept is significant in the determination of the prices of public utility services.

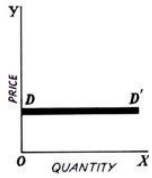
Degrees of Elasticity of Demand:

The different degrees of elasticity of demand with the help of curves are as follows:

(a) Infinite or Perfect Elasticity of Demand:

First, we take one extreme case of elasticity of demand, where when it is infinite or perfect. The elasticity of demand is infinity when even a negligible fall in the price of the commodity will lead to an infinite extension in the demand for it. The below figure shows the horizontal straight line DD'

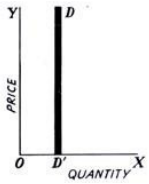
which is infinite elasticity of demand. Though when the price remains the same, the demand goes on changing.



Infinite elasticity

(b) Perfectly Inelastic Demand:

It means that the rise or fall in the price of the commodity in question, its demand remains absolutely unchanged. The another extreme limit is when demand is perfectly inelastic. In the below figure, the vertical line DD' shows a perfectly inelastic demand. In other words in this case elasticity of demand is zero. No amount of change in price induces a change in demand.

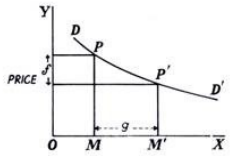


Zero elasticity

But in real world there is no commodity the demand for which might be absolutely inelastic that is, changes in its price will fail to bring about any change at all in the demand for it. Certain extension or contraction is bound to occur that is why economists say that elasticity of demand is a matter of degree only. By same way there are few commodities in whose case the demand is perfectly elastic. Hence, in real life, the elasticity of demand of most goods and services lies between the two limits given above where infinity and zero. Some have highly elastic demand while others have less elastic demand.

(c) Very Elastic Demand:

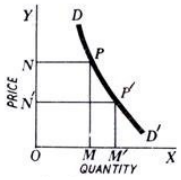
The demand is said to be very elastic when even a small change in the price of a commodity leads to a considerable extension/con-traction of the amount demanded of it. The below Figure shows DD' curve represents such a demand. As a result of change of T in the price the quantity demanded extends/contracts by MM' which clearly is comparatively a large change in demand.



Very elastic demand

(d) Less Elastic Demand:

If there is even a substantial change in price brings only a small extension or contraction in demand it is said to be less elastic.the below figure DD' represents less elastic demand. The fall of NN' in price extends demand by MM' only which is very small.



Less elastic demand

2.4 Demand forecasting

Demand forecasting seeks to investigate and it also used to measure the forces that determine the sales for existing and new products. Generally companies plan their business production or sales in the anticipation of future demand. Thus, forecasting future demand becomes important. Then, the art of successful business lies in avoiding or minimizing the risks involved as far as possible and face the uncertainties in the most befitting manner.

The steps to be followed are as follows:

- Identification of the objectives
- Nature of the product and market
- Determinants of the demand
- Analysis of the factors
- Choice of the technology

Testing the accuracy criteria to choose a method of forecasting are as follows:

- Plausibility
- Accuracy
- Flexibility
- Durability
- Availability

Need for demand forecasting

- Suitable purchase policy
- Appropriate production scheduling
- Setting realistic sales targets for salesmen
- Appropriate price policy
- Business planning
- Forecasting financial requirements
- Planning man-power requirements
- Financial planning

To select the appropriate forecasting technique, the manager or forecaster must accomplish the following:

1. Define the nature of forecasting problem.

2. Explain the nature of data under investigation.

3. Describe the capabilities and limitations of the potentially useful forecasting techniques.

4. Develop some predetermined criteria on which the selection decision can be made.

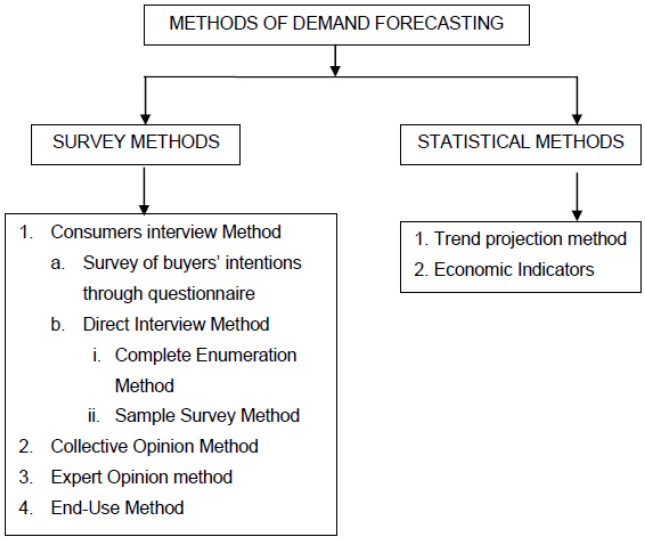
Methods of Forecasting:

Demand forecasting is the highly complicated process as it deals with the estimation of the future demand. It requires the assistance and opinion of the experts in the field of sales management. Demand forecasting, to become more realistic must consider the two aspects in a balanced manner. Application of common sense is needed to follow the pragmatic approach in demand forecasting.

There are two methods of demand forecasting. They are as follows:

1) Statistical methods

2) Survey methods



Methods of Demand Forecasting

1) Survey Methods:

Survey methods helps us in obtaining information about the future purchase plans of the potential buyers through collecting the opinions of the experts or by interviewing the consumers. These methods are extensively used in short run and estimating the demand for new products. There are different approaches under survey methods. They are as follows:

1. Consumers interview method: Under this method, efforts are made in order to collect the relevant information directly from the consumers with regard to their future purchase plans. In order to gather information from the consumers, number of alternative techniques are developed from time to time. Among them, the following are some of the important ones.

a) Direct Interview Method:

Under this method, the customers are directly contacted and interviewed. Direct and simple questions are asked to them.

i. Complete enumeration method:

Under this method, all the potential customers are interviewed in a particular city or a region.

ii. Sample survey method or the consumer panel method:

Under this method, different cross sections of customers that makes up the bulk of the market are carefully chosen. Only such consumers selected from relevant market through some sampling method are interviewed or surveyed.

b) Survey of buyer's intentions or preferences:

Under this method, consumer-buyers are requested to indicate their preferences and willingness about particular products. They are asked to reveal their future purchase plans with respect to the specific items.

2. Collective opinion method or opinion survey method:

Under this method, professional experts, sales representatives and the market consultants and others are asked to express their considered opinions about the volume of sales expected in the future.

3. Delphi Method or Experts Opinion Method:

In this method, outside experts are appointed. They are supplied with all kinds of information and statistical data. The management requests the experts to express their considered opinions and views about the expected future sales of the company.

4. End Use or Input – Output Method:

In this method, sale of the product under consideration is projected on the basis of the demand surveys of industries using the given product as the intermediate product.

2) Statistical Method:

This is the second most popular method of demand forecasting. It is the best available technique and most commonly used method in recent years. In this method, statistical, mathematical models, equations etc are extensively used to estimate the future demand of the particular product. They are used for estimating the long term demand. They are highly complex and complicated in nature. These require considerable mathematical background and competence.

1. Trend Projection Method:

An old firm operating in the market for a long period will have the accumulated previous data on production or sales pertaining to different years. If we arrange them in the chronological order, we get "time series". Trend projection method is an ordered sequence of events over a period of time pertaining to certain variables. It shows the series of values of the dependent variable say, sales as it changes from one point of time to another.

In short, time series is a set of observations taken at specified time, generally at equal intervals. It depicts the historical pattern under normal conditions. It is not based on any particular theory as to what causes the variables to change but merely assumes that whatever forces the contributed to

change in the recent past will continue to have the same effect. On the basis of the time series, it is possible to project the future sales of a company.

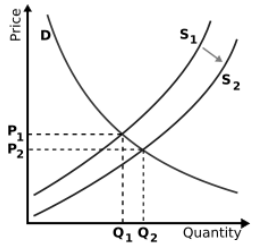
2. Economic Indicators:

In this method, few economic indicators may become the basis for forecasting the sales of a company. An economic indicator indicates change in the magnitude of the economic variable. It gives the signal about the direction of change in the economic variable. This helps in decision making process of the company.

2.5 Supply

Supply is the amount of some product that producers are willing and that is able to sell at a given price, all other factors being held constant. In general, supply depicts a positive relationship which is between the price of a good or service and the quantity that the producer is willing to supply: if a supplier believes that can sell the product for more, it will want to make more of the product. As a result as the price of the good or service increases, suppliers increase the quantity available for purchase.

According to law of supply, more quantities of a commodity will be offered for sale at higher prices and less quantity will be offered for sale at lower price. There is a direct relationship between market price and supply.



Law of supply

2.6 Determinants of supply

Determinants of Supply

The determinants of supply are as follows:

1. Production costs

2. The technology used in production

3. The price of related goods

4. Firm's expectations about future prices

5. Number of suppliers.

Innumerable factors and circumstances could affect a seller's willingness or ability to produce and sell a good. The more common factors are:

(a) **Goods own price:** The basic supply relationship is between the price of the good and the quantity supplied. Though there is no "Law of Supply", generally, the relationship is positive or direct meaning with an increase in price which shall will induce and increase in the quantity supplied.

(b) **Price of related goods:** For purposes of supply analysis ,related goods refer to the goods from which inputs are derived to be used in the production of the primary good.

For example, a firm produces leather belts. The firms managers learn that leather pushes for smart phones are more profitable than belts.

Firm might reduce its production of belts and it shall begin production of cell phone pouches based on this information. Finally, a change in price of a joint product will affect supply.

For instance beef products and leather are joint products. When a company runs both a beef processing operation and a tannery , where an increase in the price of steaks would mean that more cattle are processed might increase the supply of leather.

(c) **Conditions of Production:** The most significant factor is the state of technology. If there is a technological advancement in good's production, the supply increases.

The other variables may also affect production conditions. For e.g., for agricultural goods, weather is crucial for it may affect the production outputs. A good weather condition would result in increased production of rice or wheat and vice-versa when the weather is not appropriate.

(d) **Expectation:** The sellers expectations concerning future market condition can directly affect supply. If the seller believes that the demand for the product will sharply increase in the foreseeable future ,the firm owner shall immediately increase production in anticipation of future price increases. He will reduce supply if he expects the demand is going to fall.

(e) **Price of Inputs:** Inputs include land, labor, energy and raw materials. When the price of inputs increases, the supply curve will shift in as sellers are less willing or able to sell goods at existing prices. For instance, if the price of electricity increases a seller may reduce his supply because of the

increased costs of production. The seller is likely to raise the price of the seller charges for each unit of output.

(f) **Number of Suppliers:** The market supply curve is the horizontal summation of the individual curves. As more firms enter the industry ,the supply will increase driving down prices.

(g) **Government Policies and Regulations:** The government intervention can have a significant effect on supply. The government intervention can take many forms including environmental and health regulations, taxes, hour and wage laws, electrical and natural gas rates and zoning and land use regulations.

2.7 Supply function

Equilibrium is defined as the price-quantity pair where the quantity demanded is equal to the quantity supplied, represented by the intersection of the demand and supply curves.

Market Equilibrium:

It is a situation in a market when the price is such that the quantity that consumers wish to demand is correctly balanced by the quantity that firms wish to supply.

Comparative Static Analysis:

It examines the likely effect on the equilibrium of a change in the external conditions affecting the market.

Changes in Market Equilibrium:

Practical uses of the supply and demand analysis often center on the different variables that change equilibrium price and quantity, can be represented as shifts in the respective curves. Comparative statics of such a shift traces the effects from the initial equilibrium to the new equilibrium.

Demand Curve Shifts:

When consumers increase the quantity demanded at a given price, it is referred as an increase in demand. Increased demand can be represented on the graph as the curve being shifted to the right. At every price point, a greater quantity is demanded, as from the initial curve D_1 to the new curve D_2 it raises the equilibrium price from P_1 to the higher P_2. This raises the equilibrium quantity from Q_1 to the higher Q_2. The movement along the curve is described as a “change in the quantity demanded” to distinguish it from the “change demanded” to distinguish it from a “change in demand”, that is, a shift of the curve, there has been an increase in the demand that has caused an increase in (equilibrium) quantity.

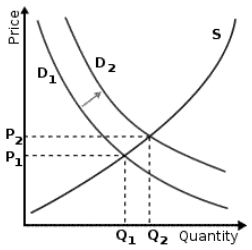
The increase in demand could also come from changing tastes and fashions, price changes in complementary and substitute goods, incomes, market expectations and number of buyers.

It shall cause the entire demand curve to shift changing the equilibrium price and quantity. In the diagram the shift of the demand curve, by causing a new equilibrium price to emerge, resulted in movement along the supply curve from the point (Q_1 P_1) to the point (Q_2 P_2).

When the demand decreases, then the opposite happens: a shift of the curve to the left. When the demand starts at D_2 and decreases to D_1, the equilibrium price will decrease and the equilibrium quantity will also decrease.

Therefore the quantity supplied at each price is the same as before the demand shift, which reflects the fact that the supply curve has not shifted but the equilibrium quantity and price are different as a result of the change (shift) in demand.

Then the movement of the demand curve in response to a change in a non-price determinant of demand which is caused by a change in the X-intercept the constant term of the demand equation.



Demand Curve Shift

Supply Curve Shift:

If the technological progress occurs, then the supply curve shifts. For example, assume that someone invents a better way of growing wheat so that the cost of growing a given quantity of wheat decreases.

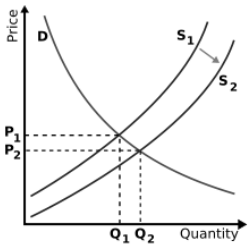
Otherwise stated, producers shall be willing to supply more wheat at every price and this shifts the supply curve S_1 outward, to S_2 - an increase in supply. It increase in supply causes the equilibrium price to decrease from P_1 to P_2 The equilibrium quantity increases from Q_1 to Q_2 as consumers more along the demand curve to the new lower price.

As a result of the supply curve shift, the price and the quantity move in opposite directions.If the quantity supplied decreases, the opposite happens.

When the supply curve starts at S_2 and shifts leftward to S_1, the equilibrium price will increase and the equilibrium quantity decreases as consumers move along the demand curve to the new higher price and associated power quantity demanded.

The quantity demanded at each .price is the same as before the supply shift, reflecting the fact that the demand curve has not shifted.

Due to the change (shift) in supply, the equilibrium quantity and price have changed. Then the movement of the supply curve in response to a change in a non-price determinant of supply is caused by the change in the Y-intercept, the constant term of the supply equation.



Supply Curve Shift

The supply curve shifts up and down the Y-axis as non-price determinants of demand change.

2.8 Supply elasticity

Elasticity

Supply elasticity is defined as the percentage change in the quantity supplied divided by the percentage change in price. It is calculated as per the following formula:

$$\text{Supply Elasticity} = \frac{\%\ \Delta \text{ in quantity supplied}}{\%\ \Delta \text{ in price}}$$

Elasticity of Supply

Elasticity of supply may be defined as a degree of responsiveness of the quantity of commodity supplied for a small charge in its price. It may be also defined as a ratio or percentage changes in quantity supplied of a commodity to the change in its price.

Elasticity of SS_1

$$= \frac{\text{Percentage in quantity supplied of commodity } X}{\text{Percentage change in price of commodity } Y}.$$

Price Elasticity of Supply

Price elasticity of supply measures the responsiveness of quantity supplied to changes in price, as the percentage change in quantity supplied induced by a one percent change in price.

It is calculated for discrete changes as $(\Delta Q/\Delta P) \times P/Q$ and for smooth changes of differentiable supply functions as $(\delta Q/\delta P) \times P/Q$.

Since supply is usually increasing in the price, so the price elasticity of supply is usually positive. For example if the PES for a good is 0.67 a 1% rise in price will induce a two-thirds increase in quantity supplied.

Determinants of Price Elasticity of Supply

(**a) Reaction Time:** The price elasticity of supply coefficient will largely be determined by how quickly producers react to price changes by increasing (decreasing) production and delivering (cutting deliveries of) goods to the market.

(b) **Complexity of Production:** Much depends on the complexity of the production process. Textile production is relatively simple.

The labor is largely unskilled and production facilities are little more than buildings - no special structures are needed. Thus the PES for textiles is elastic.On the other hand, the PES for specific types of motor vehicles is relatively inelastic.

Auto manufacturing is a multi-stage process that requires specialized equipment, skilled labor, a large suppliers network and large R&D costs.

(c) Time to Respond: The more time a producer has to respond to price changes ,the more elastic the supply. For example, a cotton farmer cannot immediately respond to an increase in the price of soya beans.

(d) **Excess Capacity:** A producer who has unused capacity can quickly respond to price changes in his market assuming that variable factors are readily available.

(e) **Inventories:** A producer who has a supply of goods or available storage capacity can quickly respond to price changes.

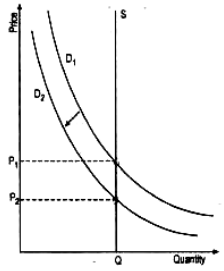
Non-Price Elasticities of Supply

Other **elasticities** can be calculated for non-price determinants of supply.

Input Elasticity of Supply

The percentage change ,the amount of the good supplied caused by a once percent increase in the price of a related good is an input elasticity of supply if the related good is an input in the production process. For example the change in the supply for sweets caused by a one percent increase in the price of sugar.

Perfectly Inelastic Supply (Vertical Supply Curve)



Perfectly Inelastic Supply

If the quantity supplied is fixed (Q) in the very short run no matter what the price, the supply curve (*S*) is a vertical line and supply is called perfectly inelastic. Economists also distinguish the short-run market supply curve from the long-run market supply curve.

In this context, the two things which are assumed constant by definition of the short run, the availability of one or more fixed inputs (physical capital) and the number of firms present in the industry.

In the long run, firms have a chance to adjust their holdings of physical capital, by enabling them to better adjust their quantity supplied at any given price.

Furthermore, in the long run potential competitors may enter or exit the industry in response to market conditions. For both of these reasons, long-run market supply curves are flatter than short-run counterparts.

3

PRODUCTION AND COST ANALYSIS

Production function – Returns to scale – Production optimization – Least cost input –Isoquants – Managerial uses of production function.Cost Concepts – Cost function – Types of Cost – Determinants of cost – Short run and Long run cost curves – Cost Output Decision – Estimation of Cost.

3.1 Production function

A production function specifies the output of a firm, an industry or an entire economy for all combinations of inputs.

Uses of production function

1. It helps in determining how to obtain the optimum output from a given set of inputs

2. It helps in determining how to obtain a given output from the minimum set of inputs.

Production Function

The production function relates the result of a firm to the amount of inputs, typically capital and labor. In a general mathematical form, the production function is expressed as:

$Q = f(X_1, X_2, X_3, ..., X_n)$

Where, Q = quantity of output

$X_1, X_2, X_3, ..., X_n$ = quantities of factor inputs such as capital, labour, land or raw materials.

This general form does not encompass joint production which mean a production process which has multiple co-products or outputs.

It can also be defined as a schedule (table, equation) which shows the maximum amount of output that can be produced from any specified set of inputs, that is given the existing technology or “state of the art.”

In short, the production function is said to be the catalog of various possibilities of output.

Q = f (X,Y) or (K,L)

It is important to keep in mind in which the production function describes technology, not economic behavior. The firm may maximize its profits that is given its production function but generally takes the production function as the given element of that problem. In specialized long-run models, a firm shall choose its capital investments in order to choose among various production technologies.

3.2 Returns to scale

Increasing Returns to Scale and the Long-run

In microeconomics, the diminishing returns is a short-run thing. In the long-run, all inputs may be increased or decreased in proportions. The reduction in the marginal productivity of the labor due to an increase in the labor input can be offset by increasing the tools and equipment, where the workers have to work with. In the long-run, there can be three possible cases which are as follows:

Decreasing returns to scale

If an increase in all the inputs of same proportion K leads to an increase of output in a proportion that is less than K, there are decreasing returns to scale.

For instance, if the inputs to a dairy farm have increased by 50% and the milk output by only 40%, there are decreasing returns to scale in dairy farming. This is also known as the “diseconomies of scale,” because the production is less cheap if the scale is larger.

Constant returns to scale

When an increase in all the inputs of the same proportion k leads to an increase in output in the same proportion k, there are constant returns to scale.

For instance, if the number of machinists and machine tools have been increased by 50% each and the number of standard pieces which is produced by 50%, there are constant returns in machinery production.

Increasing returns to scale

When an increase in all the inputs of the same proportion k leads to an increase of output of the proportion greater than k, there are increasing returns to scale.

For instance, if the inputs to a software engineering firm have been increased by 50% and the output by 60%, there are increasing returns to scale in software engineering. It might occur since in the larger workforce, where some of the programmers can concentrate more on particular kinds of

programming and get better at them. It is also known as the “economies of scale,” since production is cheaper when the scale is larger.

The long-run tendencies are usually discussed in the context of the cost analysis rather than marginal productivity analysis. Also, increasing returns to scale, in particular, which creates some complications for the application of the marginal productivity thinking.

Hence , there may be something to gain by exploring how the increasing returns to scale goes well with marginal productivity. To keep it as simple as possible, we consider a numerical example of the two-person labor market and a fictitious product which is produced with increasing returns to scale. The economists often talks about the production of “widgets”. Hence, this fictitious industry is the widget-tying industry.

3.3 Production optimization

Production optimization means the balance between production rate /deliver ability and demand. The production optimization includes a good understanding about the production Systems & reservoir fluid production systems.

- **Production Systems includes**

Well bore (Completions, Tubing etc).

Surface Facilities (Flow lines, Separator, Pipelines, etc).

Reservoir (Inflow Performance Relationship).

- **Production systems can be very simple to complex**

Simple – Reservoir, tubing, completion, surface facilities.

Complex- Artificial lift system, Water injection and Multiple wells.

3.4 Least cost input

In order to determine the best combination of capital and labor to produce the output, one has to know the amount of finance which is available to the producer to spend on the inputs and also the prices of the input.

Given iso-cost line and the series of isoquants, the producer will choose the level of output, where the given iso-cost line is the tangent to the highest possible isoquant. In Fig. 3.4.1 (a), E1 is the point of equilibrium, where isoquant IQ2 is tangent to iso-cost line AB.

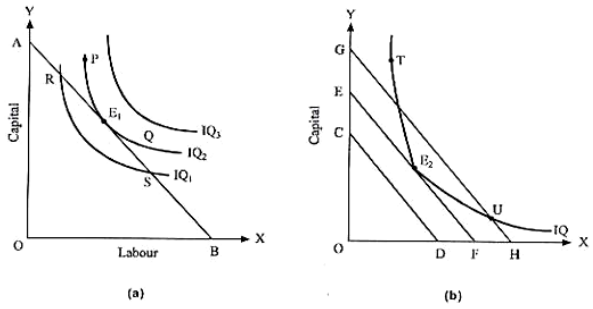
Given budgeted expenditure, all other points are either not in the reach of producer (like points 'P', 'Q' etc. on the same isoquant IQ2 or any point on higher isoquant IQ3) or give lesser output (like points 'R', 'S' on isoquant IQ1) than the point of equilibrium E1 with the same cost and hence are inefficient.

In same way, when the series of iso-cost lines and one isoquant is given, then the producer equilibrium will be at the point, where the given isoquant will touch the lowest possible iso-cost line.

All other points are either not desirable that implies higher total cost indicated by points lying on higher iso-cost line than EF or not feasible though preferable i.e., points lying on lower iso-cost line than EF, as the given output cannot be produced with factor combinations indicated by these points.

The entrepreneur ultimately arrives at the point of equilibrium, where it can best be explained with the help of the concept of the marginal rate of technical substitution (MRTS) and the price ratio of the two factors. The producer may not choose to produce the given output at point 'P' or point 'T' , as at these points MRTS (slope of the isoquant) is greater than the price ratios (slopes of the price lines) of the factors.

Thus, producer will use more of factor 'X' (labour) for factor 'Y' (capital) and then go down on the corresponding isoquants to become better off. Similarly, at point 'Q' or point 'U' , we face the reverse situation and the producer will substitute factor 'Y' (capital) for factor 'X' (labour) and will go up on the respective isoquants to ultimately reach the equilibrium points E1 and E2 to achieve greater output or lower cost in the two cases respectively. At these points, marginal rate of the technical substitution is equal to the price ratio of the factors and the producer would be maximising the output or minimising the cost by using the factor combination in this manner.



Least cost input

3.4.1 Producer Equilibrium

Mathematically,

Slop of isoquant = Slop of iso-cost line

$$\therefore \quad MRTS_{X,Y} = \frac{P_X}{P_Y}$$

$$\text{Or,} \quad MRTS_{X,Y} = \frac{MP_X}{MP_Y} = \frac{P_X}{P_Y}$$

$$\text{Or,} \quad \frac{MP_X}{P_X} = \frac{MP_Y}{P_Y}$$

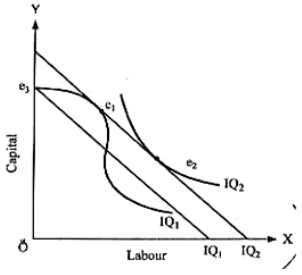
At the point of equilibrium, the marginal physical products of the two factors are proportional to the factor prices. Also, the last rupee spent on one factor (say, labour) is as productive as the last rupee which is spent on other factor (say, capital) and producer has no incentive to change the combination of two factors.

For instance, the price of factor 'X' is twice as much as that of factor 'Y' then the producer might purchase and use such quantities of the two factors that the marginal physical product of factor 'X' is twice the marginal physical product of the factor 'Y'. The result can be extended for more number of factors as MPX/PX = MPy/ PY = MPZ/PZ = …

It is to be noticed that at the point of equilibrium, the isoquant must be convex to the origin i. e. at the point of equilibrium, MRTSX must be diminishing for equilibrium to be stable. In Figure below, 'e' cannot be the point of equilibrium, as isoquant IQ1 is concave at this point and MRTS increases here. With a concave isoquant, we have corner solution . Thus, e_2 is the point of stable equilibrium, where isoquant is at a higher level and it is convex.

Therefore, the behaviour of the producer in choosing the quantities of factors is exactly symmetrical along with the behaviour of the consumer. Both the producer and the consumer purchase things in such quantities as to equate the marginal rate of substitution with the price ratio.

The consumer, to be in equilibrium, equates his marginal rate of the substitution (or the ratio of the marginal utilities of two commodities) with the price ratio of the commodities. Similarly, the producer equates the marginal rate of technical substitution (or, the ratio of the marginal physical products of the two factors) along with the price ratio of the two factors.



Producer Equilibrium

3.5 Isoquants

An isoquant is also known as Iso-product curve. Equal product curve or a Production Indifference Curve, these curves show the various combinations of two variable inputs resulting in the same level of output. Table shows how different pairs of labour and capital resulting in the same output.

An isoquants is a curve that shows the combinations of certain inputs such as Labor (L) and Capital (K) that will produce a certain output Q also termed as equal quantity. Mathematically, the data that an isoquant projects is expressed by the equation

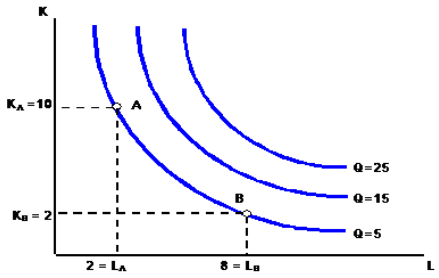
f (K,L) = Q

This equation basically represents that the output that this firm produces is a function of Labor and Capital. Here each isoquant represents a fixed output which is produced with different combinations of inputs. A new isoquant emerges for every level of output. Isoquants have certain properties which resemble that of indifference curves – convex to the origin, downward sloping and nonintersecting curves.

The MRTS (Marginal Rate of Technical Substitution) equals the absolute value of the slope. The MRTS explains us how much of one input a firm will be able to sacrifice while still maintaining a certain output level.

It is also equal to the ratio of Marginal Productivity of Labor (MPL) and Marginal Productivity of Capital (MPK). The mathematical expression in which the Labor (L) can be substituted for Capital (K) in production is :

MRTS (L for K)= $-dK/dL = MP_L/MP_K$



Isoquants

For Example:

When going from point B to A in Figure above, the Slope = (8 units of Capital)/(-6 units of Labor). The MRTS (L for K) = -(8/-6) = 4/3 between points B and A, which means that 4 units of capital for 3 units of labor will be substituted.

Table : Labour and Capital Inputs in Relation to Output

Labour (units)	Capital (units)	Output (units)
1	6	10
2	4	10
3	2	10
4	1	10
5	0	10

Types of Isoquants:

Isoquants assume different shapes that depends upon the degree of substitutability of inputs under consideration.

(1) Linear Isoquants

Here, there is perfect substitutability of inputs.

For instance, a given output say 100 units can be produced by using only capital or only the labour or by a number of combinations of labour and capital say 1 unit of labour and 5 units of capital or 2 units of labour and 3 units of capital and so on.

Similarly, given a power plant equipped to bum either oil or gas, coal various amounts of electric power can be produced by coal only, oil only, varying amounts of each coal and oil are perfect substitutes here. Here, the isoquants are straight lines.

(2) Right-Angle Isoquants

Here, there is complete non-substitutability in between the inputs (or strict complementarity). For example, exactly two wheels and one frame are required for producing a bicycle and in no way can wheels be substituted for frames or vice-verse.

Likewise wheels and one chassis are required for a scooter. It is also known as Leontief Isoquant or Input-Output isoquant.

(3) Convex Isoquant

This form assumes that the substitutability of inputs but the substitutability is not perfect. For example, a shirt can be made with relatively small amount of labour (L_1) and also a large amount of cloth (C_1).

The same shirt can be as well made with less cloth (C_2), when more labour (L_2) is used because the tailor will have to cut the cloth more carefully and reduce wastage.

Finally, the shirt can be made with still less cloth (C_3) but the tailor must take extreme pains so that labour input requirements increases to L_3 So while relatively small addition of labour from L_1 to L_2 allows the input of cloth to be reduced from C_1 to C_2 a very large increase in labour from $L_2$to L_3 is needed to obtain a small reduction in cloth from C_2 to C_3 Thus the substitutability for cloth diminishes from L_1 to L_2 to L_3

Main Properties of Isoquants

1. An isoquant is downward sloping to the right, i.e., negatively inclined.This implies that for the same level of output, the quantity of one variable which will have to be reduced in order to increase the quantity of other variable.

2. A higher isoquant represents larger output: With the same quantity of one input and larger quantity of the other input, larger output will be produced.

3. No two isoquants intersect or touch each other: If two isoquants intersect or touch each other, this would mean that there will be a common point on the two curves and this would imply that the same amount of two inputs that can produce two different levels of output (i.e, 400 and 500 units) which is absurd.

4. Isoquant is convex to the origin: It means that the slope declines from left to right along the curve. In other words, when we go on increasing the quantity of one input , for example, labour by reducing the quantity of other input say capital, we see that less units of the capital are sacrificed for the additional units of labour.

3.6 Managerial uses of production function

Production Function refers to relationship between the inputs and the outputs produced by them. The inputs are otherwise referred to as factors of production in land, labour, capital and organization.

The relationship is purely physical or technological in character, i.e., it ignores price of the inputs.The production function only focuses on maximum output that can be achieved with a set of resources or inputs and with a given state of technology.

Managerial uses of Production Function

Production function has immense utility to the Manager and Executives in decision making at the formal level. It aids in two ways viz.,

(i) It helps in determining how to obtain the optimum output from a given set of inputs;

(ii) It helps in determining how to obtain a given output from the minimum set of inputs.

By assuming that the maximum output technologically is possible from a given set of inputs is achieved, economists using a production function in analysis are abstracting away from the engineering and also managerial problems inherently associated with a particular production process.

Thus, the engineering and managerial problems of technical efficiency are assumed to be solved, so that analysis can focus on the problems of allocative efficiency.

The firm is assumed to be making allocative choices concerning how much of every input factor to use, given the price of the factor and the technological determinants represented by the production function.

The decision frame, in which one or more inputs are held constant, may be used. For example, the capital may be assumed to be fixed or constant in the short run and only labour variable, while in the long run, both capital and labour factors are variable, whereas the production function itself remains fixed.

The relationship of output to inputs is non-monetary, which is a production function relates physical inputs to physical outputs and prices and costs are not considered. However, the production function is not a full model of the production process where it deliberately abstracts away from essential and inherent aspects of the physical production processes, including error, entropy or waste.

Also, the production functions do not ordinarily model the business processes, either, ignoring the role of management, of sunk cost investments and the relation of the fixed overhead to variable

costs. The primary purpose of the production function is to address the allocative efficiency in the use of factor inputs in the production and the resulting distribution of income to those factors. With certain assumptions, the production function is used to derive a marginal product for each factor, that implies an ideal division of the income generated from the output into an income due to each input factor of production.

3.7 Cost Concepts

It is used for analyzing the cost of a project in short and long run.

Objectives

Understand and Identify various cost concepts that are associated or related to various stages of business operations and market situations.

Types of Cost:

- Average fixed costs (AFC)
- Total fixed costs (TFC)
- Average variable cost (AVC)
- Total variable costs (TVC)
- Average total cost (ATC)
- Total cost (TC)
- Marginal cost (MC)

Fixed Costs(FC)

They are costs that do not change per unit of output. The only way to avoid these payments is to go out of business. This is not considered in making a short-run operating decision, but considered in making long-run, entry or exit decisions. It denotes the costs that do not vary with the level of production. It is independent of output. In other words, even if no crops are grown on a piece of land, the bank shall insist on a mortgage payment from the farmer even if no output is produced by the corporation, its bondholders will legally insist on payments of interest.

Eg: Depreciation, Interest Rate, Rent, Taxes.

TFC: All costs associated with the fixed input.

AFC (Average fixed cost per unit of output):

AFC = TFC /Output

Variable Costs(VC)

It is said to be the rest of total cost, the part which varies as we produce more or less. This depends on output. Variable cost is the sum of marginal costs . This is the total expenditure on all variable factors of production. It is also known as operating cost . For instance, when the marginal cost of producing the first unit of output is 10 and the marginal cost of the second item of output is 20, then the variable cost of producing two items is 30.All costs associated with the variable input.

Eg: Increase of output with labour,materials and energy.

AVC (Average variable cost- cost per unit of output):

It the total variable cost divided by the output.

AVC = TVC/ Output

Total costs(TC)

It is the sum of total fixed costs and total variable costs. It is represented as,

TC = TFC + TVC

ATC (Average Total Cost Average total cost per unit of output):

It is represented as,

ATC =AFC + AVC ATC = TC/ Output

Marginal cost

This is the extra cost of one more item of output or the change in total cost divided by change in output . The additional cost incurred from producing an additional unit of output

Marginal cost is the type of cost to consider in short-run output decisions .The firm is in short-run equilibrium .

If MC > P, decrease output.

If MC < P, increase output. 3. If MC = P, leave output unchanged.

It is represented as,

$$MC = \frac{\text{Change in total cost}}{\text{Change in output}} = \frac{\Delta TC}{\Delta Q}$$

MC = Δ TC Δ Output

MC = Δ TVC Δ Output

Average Cost

Average cost is total cost per unit of output or it plays a major role in long-run, entry and exit decisions.

If AC < P, the industry is profitable. ENTER 2. If AC > P, the industry is unprofitable. EXIT 3. If AC = P, the industry yields zero profit. That is it remain at same placewhere firms neither enter nor exit the industry, so this zero profit condition is characteristic of industry equilibrium .

It is represented as,

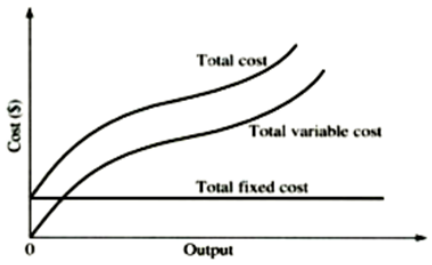
AC = TC/Q

When costs are calculated to include opportunity costs . The firms always have the option of auctioning off their factory and machinery and putting their money in the bank or government bonds. Once if they decide to stay in business, they are incurring an opportunity cost which is equal to the interest they could have earned on a bank deposit or on bonds.

Economic Cost = Accounting Cost + Opportunity Cost

Economic Profit = Revenue - Accounting Cost - Opportunity Cost

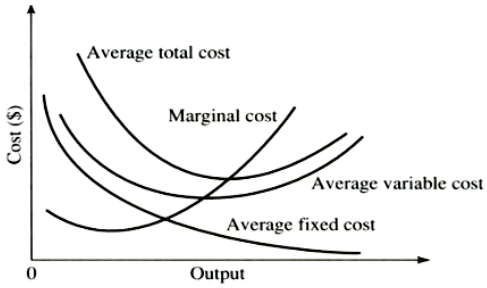
Typical Total Cost Curves



Typical total cost curves

TVC,TC is always increasing.

Typical Average & Marginal Cost Curves



Typical Average & Marginal Cost Curves

3.7.1 Cost function

The cost function is a function of input prices and output quantity. Its value is the cost of making that output given those input prices. There are three types of cost functions linear, quadratic and cubic.

Cost sheet

Cost sheet is a statement showing total cost under proper classification in a logical order. It provides Every industries follow differcost per unit in different stages and helps in comparison anti control of cost. It also acts as a basis of fixation of selling price.

3.7.2 Types of Cost

When cost is expressed in terms of money, it is called as money cost. It relates to the money outlays by a firm on various factor inputs to produce a commodity.

The cost of producing a good or service, including the cost of all the resources used and the cost of not employing those resources in alternative uses.

Opportunity Cost

Since the resources of any firm operating in the market are said to be limited and the investment options are many. Therefore the firm has to decide or select only the investment opportunities or options which will provide the firm with the best return or best income on the investment made. It means that if a firm can invest money or resources only in one investment option then the firm will select the investment option which will promise the best return on investment to the firm.

In same way, the firm gives up or rejects the next best option for investing the funds. Thus, the opportunity cost of a company is income or return which the firm could have earned on the next best investment alternative.

Example:

Let us assume that an individual has two job offers in hand. One job offer is ensure a salary of Rs. 40,000 per month whereas the other job offer ensures a salary of Rs. 35,000 per month. When the job profile and other factors related to the job offers are more or less same then it is expected that the individual will select the job offer that will provide him with the higher salary that is salary of Rs. 50,000 per month. In this case, the opportunity cost is the return involved in the next best alternative that is, Salary of Rs. 35,000 in the next best job offer.

This is closely related to the concept of the Economic profit or Economic Rent. The firm earns or makes economic profit besides covering different costs of operation, a firm is also able to earn more than its opportunity cost. This is also termed as Implicit Cost.

The economic profit is earned only when following is true:

Income of a Firm > Various Costs of Operations + Opportunity Cost

or

Economic Profit = Earnings or Revenue of Firm - Economic Costs.

Where the economic cost is various expenses of the business plus the opportunity cost.

Methods of Costing

Every industries follow different methods in order to establish the cost of their product. It differs by the nature and specifics of each business. It has different principles and procedures for performing the costing. But, the basic principles and procedures of costing remain the same. Some of the methods are mentioned below:

- Job costing
- Batch costing
- Unit costing
- Process costing
- Contract costing
- Operating costing
- Uniform costing
- Multiple costing

Different Methods of Costing

Job costing:

This method of costing is the costs are ascertained for each work order separately as each job has its own specifications and scope. They are used in car repair, painting, decoration and building repair.

Batch costing:

It is used where units produced in a batch are uniform in nature and design. In this costing, each batch is treated as an individual job or separate unit. The industries like bakeries and pharmaceuticals usually use this method of costing.

Process costing:

It is used for products which go through different processes like the manufacturing of clothes that involves many processes. Here, the first process is spinning. Then the output of that spinning process, yarn, is a finished product that can either be sold on the market to weavers or used as a raw material for a weaving process in the same manufacturing unit. For finding out the cost of the yarn, the cost of the spinning process should be determined.

Then the output of the weaving process, cloth, can also be sold as a finished product in the market. Such case, the cost of cloth needs to be evaluated. Third process is converting the cloth in order to a finished product say a shirt or pair of trousers. So, every process that can result in either a finished good or a raw material for the next process should be evaluated separately. The multi-process industries, the process costing is used to ascertain the cost at each stage of production.

Unit costing:

It is also called as "single output costing." They are used for products which can be expressed in identical quantitative units. It is suitable for products that are manufactured by continuous manufacturing activity such as brick making, cement manufacturing, mining, flour mills or flour mills dairy operations. These costs are ascertained for convenient units of output.

Contract costing:

This is performed for the big jobs involving a heavy expenditure, long periods of time and often different work sites. Every contract is treated as a separate unit for costing. It is also known as terminal costing. The projects requiring contract costing includes construction of roads, bridges and buildings.

Operating costing or service costing:

This is used to ascertain the cost of particular service-oriented units, such as in nursing homes, buses or railways. Every service is treated as a separate unit in operating costing. In nursing home, a unit is treated as the cost of a bed per day, whereas for buses, the operating cost for a kilometer is treated as a unit.

Uniform costing:

It is not a separate method of costing, but rather a system in which a number of firms in the same industry which use the same method of costing, using the agreed-on principles and standard accounting practices which helps in setting the price of the product and in inter-firm comparisons.

Multiple costing or composite costing:

If the output is comprised of many assembled parts or components like with television, motor cars or electronics gadgets, the costs have to be ascertained for each component, as well as with the finished product. In this case, the costing may involve different methods of costing for different components. Thus, this type of costing is called as composite costing or multiple costing.

Fixed vs Variable Costs

Fixed Cost

This is a cost, which does not vary in the short term, irrespective of changes in production or sales levels or other measures of activity. It is a basic operating expense of a business which cannot be avoided, such as a rent payment. This concept is used in financial analysis to find the breakeven point of a business, as well as to find product pricing.

Another example is that the rent on a building will not change until the lease runs out or is re-negotiated, irrespective of the level of business activity within that building. Other examples are depreciation, insurance and property taxes. This tends to be incurred on a regular basis and they are considered periodic costs and amount charged to expense tends to change little from period to period.

If a company has a large fixed cost component, this should generate a significant amount of sales volume in order to have sufficient contribution margin to offset the fixed cost. After that sales level has been reached, this type of business generally has a relatively low variable cost per unit and they can generate out sized profits above the breakeven level. This is used an oil refinery, which has massive fixed costs related to its refining capability. When the cost of a barrel of oil drops below a certain amount, the refinery loses money. But, the refinery can be wildly profitable if the price of oil increases beyond a certain amount. Likewise, if a company has low fixed costs, it probably has a high variable cost per unit. Such case, a business can earn a profit at very low volume levels, but does not earn out sized profits as sales increase. Example, a consulting business has few fixed costs, while most of its labor costs are variable.

They are allocated under the absorption basis of cost accounting. This arrangement, fixed manufacturing overhead costs are proportionally assigned to the units which produce in a reporting period and so are recorded as assets. After the units are sold, the costs are charged to the cost of goods sold. Therefore, there can be a delay in the recognition of those fixed costs that are allocated to inventory.

Variable Cost

This is a cost that varies in relation to changes in the volume of activity. This variable cost concept can be used to model the future financial performance of a business, as well as to set minimum price points.

In direct materials, the cost of materials are charged to expense when their associated products are sold. In billable labor, wages associated with billable hours are charged to expense when their associated sales transactions are completed. In commissions, since the sales staff earns commissions when the sales transactions are completed. In credit card fees, where a fee is not incurred unless a customer uses a credit card to pay for a purchase. In piece rate labor, where employees are paid based on the number of units produced.

In direct labor might not be a variable cost if labor is not added to or subtracted from the production process as production volumes change. In such situation, this arises when a production line should be staffed, irrespective of the amount of production volume. An overhead is not a variable cost, since overhead costs will be incurred, irrespective of production levels. For instance, both the rent and machine depreciation, which are overhead costs, will be incurred even if there is no production activity. Thus company with a high proportion of variable costs can usually generate a profit at a relatively low sales level because there are few fixed costs that should also be paid for in each accounting period.

Explicit Costs vs Implicit Costs

Explicit Costs: They are paid directly in money - money costs. A firm incurs explicit costs if it pays for a factor of production at the same time it uses it.

Examples - any cost that results from using an asset instead of selling, renting or lending it.

This is represented as,

Explicit Cost = The payments by a firm to purchase the service of productive resources (wages, interest, rent, capital)

A cost that is diagrammatic by lost chance within the use of a company's own resources, excluding money. The implicit price for a firm are often thought of because the cost associated with enterprise a precise project or call, like the loss of interest financial gain on funds or depreciation of machinery used for a capital project.

Implicit Costs:

It is measured in units of money, but are not paid for directly in money. The costs of non purchased inputs, to which a cash value should be imputed because the inputs are not purchased in a market transaction. Business firm will incur implicit costs when it uses capital, inventories or owner’s resources. Examples - wage expense, rent or lease costs and the cost of materials that go into the production of goods.

This is represented as,

Implicit Costs = Opportunity costs associated with a firm's use of resources that it owns (wages foregone by owner, interest rates loss through purchases)

It can also be thought of as intangible prices that aren't simply accounted for. For instance, the time and energy that associate degree owner puts into the upkeep of the corporate, instead of engaged on enlargement, are often viewed as associate degree implicit price of running the business. In finance choices, implicit prices should be thought of once coming back to a call on a way to allot resources.

Economic Cost: The monetary value of all inputs which are used in a particular activity or enterprise over a given period. It reflects the opportunity cost of resources.

Accounting Costs: It measures the explicit costs of operating a business . That is, the results from purchases of input services.

Economic Profit:

It is the difference between the total revenue and the cost of all inputs used by a firm over a given period. It is the TR - OC. The OC are the explicit and implicit costs of the best alternative actions.

Out of Pocket Costs vs Imputed Costs

Out of Pocket Costs

The out-of-pocket costs are actual expenses we incur. If we buy land for $100,000 and lose the opportunity to buy discounted machinery we will require to buy later at a price that will be $50,000 higher, our out-of-pocket costs on the land purchase is $100,000.

The out-of-pocket costs do not include any future repairs, improvements, depreciation, lawsuits or other expenses associated with our purchase. If we buy something on credit, the interest on the money we borrowed to create the purchase can be considered an out-of-pocket cost over the life of the loan.

Imputed Costs

Imputed or Notional cost - CIMA defines notional cost as "the value of benefits where no actual cost is incurred". Hence, imputed cost is that cost which does not involve any cash outlay. Though it is a hypothetical cost, it is relevant for decision making. The interest on capital, the payment for which is not actually made, is an example of imputed cost.

Also, it can be defined as, a cost that is incurred by virtue of using an asset instead of investing it or undertaking an alternative course of action. Thus, it is an invisible cost that is not incurred directly, as opposed to an explicit cost, which is incurred directly.

3.7.3 Determinants of cost

Cost Determinants

The cost of production of goods and services depends on many input factors which is used by the organization and it differs from firm to firm. So the determinants are as follows:

1. Level of output:

If the size of production is large then the cost of production will also be more. The cost of production varies according to the quantum of output.

2. Productivities of factors of production:

If the productivity of the input factors is high then the cost of production will fall.

3. Price of input factors:

When there is a rise in the cost of input factors will increase the total cost of production.

4. Size of plant:

It will be low in large plants due to mass production with mechanization.

5. Lot size:

When the size of production is larger per batch then the cost of production will come down because the organizations enjoy economies of scale.

6. Output stability:

The overall cost of production is low if the output is stable over a period of time.

7. Laws of returns:

The cost of production will increase when the law of diminishing returns applies in the firm.

8. Time period:

During long run cost of production will be stable.

9. Levels of capacity utilization:

When the capacity utilization is higher, lower the cost of production.

10. Technology:

If the organization follows advanced technology in their process then the cost of production will be low.

A forecast of technology is also essential for the purpose of tacking the problem of equipment replacement. Here one has to determine the degree of obsolescence of the old machine to be replaced.

11. Learning Effect

Learning effect means that in many activities cost decline as the activity is repeated an increasing number of times. As workers and management becomes more familiar with production process or a particular product, there will be cost reductions. If there are substantial learning effects, there will be first most advantages by virtue of being the first to undertake an activity as against late comers.

12. Breadth of Product Range

Costs are determined by the breadth of product range. Such cost advantages cost occur when the processing of different goods can share inputs or where distributed and promotion can take place jointly.

13. Degree of Vertical Integration

Cost advantages can be achieved by increasing the degree of vertical integration with the firm, moving closer to the final customer (forward vertical integration) or to sources of supply (backward vertical integration).

14. Geographical Location

Costs may be affected by geographical location when factor prices, tax regimes and government incentives vary from place to place.

15. Institutional Factors

Institutional factors like unionization, local content/indigenization rules and tariffs also affect costs.

16. Firm's Discretionary Policies

Costs also depend upon a wide range of firm's discretionary policies.

The examples are:

(1) Nature and design of the product being manufactured,

(2) Level of services provided to customers,

(3) Package of human resources policies adopted regarding pay, incentive schemes, employees benefits, training etc.

Cost-plus Pricing

It is a pricing method used by companies to maximize their profits. The firms accomplish their objective of the profit maximization by increasing their production until marginal revenue equals marginal cost. and then charging a price which is determined by the demand curve. But, in practice, most firms use cost-plus pricing, also known as **markup pricing**.

Cost-plus pricing is specially useful in the following cases:

1. Public-utility Pricing

2. Finding out the design of the product while the selling price is predetermined. i.e., product tailoring.

3. By working back from the price, the product and the permissible cost is decided upon. This means that market realities are taken into an account as this approach considers the viewpoint of the buyer in terms of what he wants and what he will pay.

Pricing products which are designed to the specification of a single buyer-,he basis of pricing is the estimated cost plus the gross margin that the firm could have got by using facilities otherwise.

Cost-plus pricing is useful in cases like the 'Monopsony Buying' here, where the buyers have enough knowledge about suppliers' costs. Thus, they may make the product themselves if they don't comply with the offered prices. So, relevant cost would be the cost which a buying company would incur if it made the product itself.

LIMITATIONS

- Provides incentive for inefficiency.
- Tends to ignore the role of competitors.
- Uses "normal" or "standard" output level for allocating fixed costs
- Uses historical rather than replacement value.
- Tends to ignore the role of consumers.
- Includes sunk costs rather than just using incremental costs.
- Ignores opportunity cost.

3.8 Short run and Long run cost curves

The short run is the conceptual time period where at least one factor of production is fixed in amount and others are variable in amount.

Costs that are fixed, say from the existing plant size, have no impact on a firm's short-run decisions, since only variable costs and revenues affect short-run profits.

Those fixed costs raise the associated short-run average cost of an output level over the long-run average cost when the amount of the fixed factor is better suited for a different output level.

In the short run, a firm can raise the output by increasing the amount of the variable factor(s), say labor through overtime.

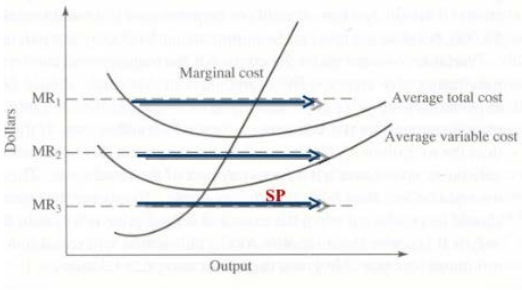
Short-Run Output Cost Curves

Production Rules for the Short-Run

• When expected selling price < minimum ATC but > minimum AVC: (which implies TR > TVC but < TC). Minimize loss by producing where MR = MC.The loss will be between 0 and TFC.

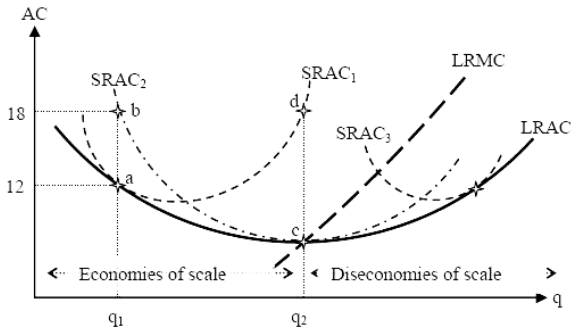
When expected selling price < minimum AVC (which implies TR < TVC): Minimize loss by not producing. The loss will be equal to TFC.

When expected selling price > minimum ATC (which implies TR > TC): Maximize profit by producing where: MR = MC.



Short Run Production Decisions

The short-run cost and long-run cost curve:



Short-run cost and long-run cost curve

The cost-output relationships can also be shown through the use of graphs.

It will be seen that the average fixed cost curve (AFC curve) falls as output rises from lower levels to higher levels. The shape of the average fixed cost curve, therefore, is a rectangular hyperbola.

The average variable cost curve (AVC curve) first falls and then rises. So, also the average total cost curve (ATC curve). However, the AVC curve starts rising earlier than the ATC curve.

Further, the least cost level of output corresponds to the point L_T on the ATC curve and not to the point L_V which lies on the AVC curve.

Another important point to be noted is that in the marginal cost curve (MG curve) intersects both the AVC curve and the ATC curve at their minimum points.

This is very simple to explain. If marginal cost (MC) is less than the average cost (AC), it will pull AC down.

If the MC is greater than AC, it will AC down. If the MC is greater than AC, it will pull AC up. If the MC is equal to AC, it will neither pull AC up nor down. Hence MC curve tends to intersect the AC curve at its lowest point. Similar is the position about the average variable cost curve.

It will not make any difference whether MC is going up or down.The rate of change in MC is greater than that in AVC and hence the minimum MC is at an output lower than the output at which the AVC is the minimum.

The ATC falls for a larger range of output than AVC and hence the minimum ATC is at a larger output than the minimum AVC.

The inter-relationships between AVC, ATC and AFG can be summed up as follows:

1. If both AFC and AVC fall, ATC will fall.

2. If AFC falls but AVC rises:

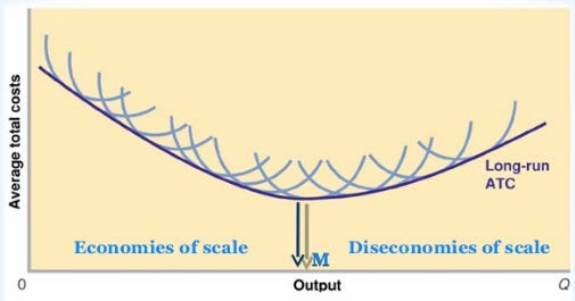
(a) ATC will fall where the drop in AFC is more than the rise in AVC.

(b) ATC will not fall where the drop in AFC is equal to the rise in AVC.

(c) ATC will rise where the drop in AFC is less than the rise in AVC.

Long-Run Costs

All costs are variable in the long run. There is only AVC in LR, since all factors are variable. This is also called as Planning Curve or Envelope or scale curve.



Long run curve

Production Rules for the Long-Run

• When selling price < ATC (or TR < TC):Sell the fixed assets to eliminate fixed costs. Reinvest money is a more profitable alternative.

• When selling price > ATC (or TR > TC): Maximize profit by producing where MR = MC.

In order to study the cost-output relationship in the long-run, it would be necessary to explain the concept of long-run costs.The long-run, as we have already seen earlier, is a period long enough to make all costs variable including such costs as are fixed in the short-run.

In the short-run, variations in output are possible only within the range permitted by the existing fixed plant equipment.

But in the long run, the entrepreneur has before him a number of alternatives which. include the construction of various kinds and sizes of plants.Thus there are no fixed costs because the firm has sufficient time to fully adapt its plant. And all costs become variable.

In view of this, the long-run costs refers to the costs of producing different levels of output by changes in the size of plant or scale of production.

The long-run cost-output relationship is shown above graphically by the long-run cost curve - a curve showing how costs would change when the scale of production is changed.

Suppose that at a particular time, a firm operates under average total cost curve. U_2 and produces OP.

Now it is desired to produce OQ. If the firm continues under the old scale, its average cost will be Q.

If the scale of the firm is altered, the new cost curve would be U_3.

The average cost of producing OQ would then be QA.

QS is less than QT.So the new scale is preferable to the old one and should be adopted.

In the long run, the average cost of producing ON output is QA.

This may be called as the long-run cost of producing OQ output.

It may be noted here that we shall call QA as the long-run costs only so long as the U_3 scale is in the planning stage and has not actually been adopted.

The moment the scale is installed, the NA cost would be the short-run cost of producing ON output.

To draw a long-run cost curve, we have to start with a number of short-run average cost curves (SAC curves), each curve representing a particular scale or size of the plant, including the optimum scale. One can not draw the long-run cost curve which would be tangential to the entire family of SAC curves, that is, it would touch each SAC curve at one point.

In this connection, the following points are to be noted:

1. The LAC curve is tangential to the various SAC curves. It is said to envelop them and is often called as the “Envelop Curve” since no point on an SAC curve can ever be below the LAC curve.

2. The LAC curve is U-shaped or like a “dish”. The U-shape of the LAC curve implies lower and lower average cost in the beginning until the optimum scale of the enterprise is reached and successively higher average costs thereafter, i.e., with plants larger than that of the optimum scale.

The tendency for the long-run average costs to fall as the firm expands its scale of operations is a reflection of cost economies available with the increase in size, while the ultimate rise in the long-run cost curve is due largely to the eventual setting in of diseconomies of scale.

The SAC curve also has a U-shape but the difference is that LAC curve is flatter, that is, U-shape of the LAC curve will be less pronounced. Since in the long run, such economies are possible as cannot be had in the short run. Similarly, some of the diseconomies, which are faced in the short run, may not be faced in the long run.

3. The long-run average cost curve will not be able to cut a short-run average cost curve (though they are tangential to each other). This implies that for any given output, average cost will not be higher in the long run than in the short run. This is because any adjustment which will reduce costs and which it is possible to make in the short run, can also be made in the long run. On the other hand, it is not always possible in the short run to produce a given output in the cheapest possible way.

4. LAC curve will touch the "optimum scale" curve at the latter's least-cost point, i.e., N_1.

5. LAC curve will touch SAC curves lying to the left of the optimum scale curve at the left of their least-cost points.

6. LAC curve will touch SAC curves lying to the right of the optimum scale curve at the right of their least-cost points.

Thus it will be seen that LAC curve is tangential to the minimum cost point in the case of the optimum scale SAC and not in the case of other SAC curves.

Usefulness of LAC Curve

A firm is not interested in achieving the minimum cost output for a given plant. On the other hand, it is interested in producing a given output at the minimum cost.

The LAC curve helps a firm to decide the size of the plant to be adopted for producing the given output.

For outputs less than the low-cost combination at the optimum scale, that is,when the firm is operating subject to increasing returns to scale, it is more economical to underuse a slightly larger plant operating at less than its minimum cost output level than to overuse a smaller plant.

At the outputs beyond the optimum level, that is, when the firm experiences decreasing returns to scale, it is more economical to overuse a slightly smaller plant than to underuse a slightly larger one.

3.9 Cost Output Decision

In a competitive market, price (P) equals marginal cost (MC). Marginal cost is given at $20 per styling. The problem states that Barber Shop will NOT have superior operating efficiency, so we can assume that this would be the Marginal cost and thus the price, of all styling salons in the absence of the restrictive licensing requirements.

For free market quantity, use the demand equation as follows: P=80-.0008Q P=20, so Q=75,000 Monopoly output maximizes revenue without competition and is found where the marginal revenue equals zero. (If this doesn't make sense, just consider that in a free market, firms can drop

their prices, to get a larger market share and make more money until price drops below the cost of making an additional product.

The monopoly already has the entire market, so it doesn't have an incentive to drop the price.) So, MR=80-.0016Q=0 Q=50,000 rice is given by the demand curve: P=80-.0008Q=40 B) Monopoly profits are given by quantity multiplied by revenue(R) minus cost. R=PQ=2,000,000 C=20Q=1,000,000 Monopoly profit=2,000,000-1,000,000=1,000,000 - The monopoly is making a million bucks in economic profit, where free market firms would make none. - We know that The Barber Shop that has a whole bunch of little salons (each salon only does 750 stylings a month), yet there are no little independent guys because they can't get permits. - When competitors could get in, they could rice lower than The Barber Shop and get a larger market share.

3.10 Estimation of Cost

An approximation of the probable cost of a product, program or project, computed on the basis of available information.

The four common types of cost estimates are:

Planning estimate: A rough approximation of cost within the reasonable range of values, prepared for information purposes only. Also called ball park estimate.

Budget estimate: The approximation based on well-defined (but preliminary) cost data and established ground rules.

Firm estimate: A figure which is based on cost data sound enough for entering into a binding contract.

Not-to exceed /Not-less-than estimate: The maximum or minimum amount which is required to accomplish a given task, based on a firm cost estimate.

4

PRICING

Determinants of Price – Pricing under different objectives and different market structures– Price discrimination – Pricing methods in practice – role of Government in pricingcontrol.

4.1 Determinants of Price

The price elasticity of the demand measures how responsive the quantity demanded of a good is to a change in its price. The value that illustrates if the good is relatively elastic (PED is greater than 1) or relatively inelastic (PED is less than 1).

The good's PED is determined by numerous factors, these include:

Number of substitutes: The larger the number of close substitutes for the good will be easier for the household that can shift to alternative goods if the price increases. Generally, the larger the number of close substitutes, the more elastic the price elasticity of demand.

Degree of necessity: If the good is a necessity item then it is said that the demand is unlikely to change for a given change in price. This implies that necessity goods shall have inelastic price elasticities of demand.

Price of the good as a proportion of income: It can be argued that goods which account for a large proportion of disposable income tend to be elastic. This is due to consumers being more aware of the small changes in price of expensive goods compared to small changes in the price of inexpensive goods.

The following example will illustrate how to determine the price elasticity of demand for a good.

The price elasticity of demand for the supermarket own produced strawberry jam is likely to be elastic. This is because there are a very large number of close substitutes and the good is not a necessity item. Therefore, consumers can and will easily respond to a change in price.

Determinants of price

Pricing is a complex and also a complicated process, depending on so many internal and external factors. Formulation of pricing policy and pricing decisions cannot be easily done, is there is no hard and fast rule in fixing up prices.

There is no infallible formula of determining the right price for a product, as pricing is not an exact since. The pricing decisions depend on balancing of many considerations and it is purely a matter of judgment and also a trial in the market place.

Even if a commodity is priced fairly and logically, it may not attract adequate customers. Then, it is a wrong price.Generally, pricing depends on the objectives of the business, competitions in the market, price sensitivity among customers, quality of the product, interference of government in pricing, etc.

Important factors affecting price policy and decisions in pricing of the products:

1. Objectives of the business

Pricing decision forms part of the overall objectives of the business; whether it is maximization of profit or promotion of long-term welfare of the firm. It may be for discouraging entry of competitors.

The pricing should be adapted and adjusted to suit diverse competitive situations in the market and also to meet changing economic conditions affecting the industries.

2. Cost of Production

Cost of producing the commodity plays a vital and dominant role in taking decisions on pricing the commodity.

Cost of production, advertisement expenses, promotional expenditure, taxes connected with the production have all to be considered and brought under costs of various categories to decide the final price of the product.

Cost may be affect due to increase in the price of raw materials, wages, packing materials, establishment charges and taxes levied by Central and State governments and also local bodies.

In this context, the quality of the product in relation to cost has to be balanced. The quality of the product can be improved and cost increased, only if the customers are willing to pay higher price for better quality commodities.

Generally, costs determine the price. But price decisions cannot be entirely based on cost accounting facts and data.

Cost data are of historical value, while prices have to work in the market at a future date. It is also very difficult to measure cost accurately.

Costs are affected by volume of business and volume is affected by price in the market. So, the management has to assume some desired price and volume relationship for determining costs.

That is why costs play a less important role in new products, than old products.Until the market is decided and some idea is obtained regarding the volume of sales, it is not possible to determine the costs.

With the little knowledge of the costs, the producer starts with the going market price for similar products. This does not mean that costs should be ignored in pricing.

Costs have to be taken into consideration, as in the long-run, prices must cover costs. If this is not possible, the product has to be withdrawn from the market.

The important point to be borne in mind is that cost considerations are essential factors for pricing; but, it is not the only factor in setting prices.

3. The price policy of a firm also depends on elasticity of demand of the product

If the demand is inelastic, the policy of price increase and fixing price at a high level would prove profitable.

On the other hand, if the demand is elastic, a policy of reducing price and keeping the price at the lower side would prove profitable for the firm. Thus, the pricing of a product depends on the demand of the product and its elasticity of demand.

4. Competition

Most often prices are determined after taking into consideration the competitor's pricing strategy and patterns.

Since the products and services are competing in the market place, the firm mostly takes into consideration what the competition is doing before the prices are finalized.

5. Experience

Another important aspect considered for determination of prices are the past experience on what the customers are willing to play for the product. Past experiences would reflect the price level at which the demand increases and vice versa.

6. Consumer Perception

Apart from above state facts, pricing depends on consumer perception. How for the consumer is sensitive to prices and also to price changes has to be studied and decided and the pricing policy should adapt to the consumers' psychological set up.

Rigid law of demand and elasticity of demand studies may not work perfectly in the world of psychology of consumers and customers.

Some characteristic features and behaviour of consumers are stated below:

(a) For consumers, prices are quantitative in measure, while other things related to the product, i.e., quality, price image, customer service etc., are only qualitative and subjective. Hence, the consumer can depend on quantitative measure, i.e., price, which is definite, while qualitative respects of the product are the consumers will react, if prices are increased by 10 per cent than if quality is increased by 10 per cent.

(b) Price constitutes a barrier to demand when it is too high, arid also when it is too los. When the price is too high, the consumer considers that it is too expensive for him to have it or be may consider that the utility derived from the product is low. Consequently, the consumer may not demand the product. If the price is too low, the consumer may suspect the quality of the product and may not demand it. Lowering prices too much has got its own risks.

(c) Price inevitably enters into the quality estimate of the product by the consumers, price is considered as an indication of the quality and and a high-priced material is a symbol of external quality. Very often, consumers purchase a high-priced product either for snob-appeal or attributing higher quality of the product. It is very difficult to convince a customer that a cheap commodity is of high quality and a costly commodity is of low quality. According to H.J. Levitt, “Retailers have very often observed phenomenon of the dormant shirt that comes to life, when the price is marked up”. This is true in the case of consumer durable goods through brand names, packaging and advertising. In such cases, sales could be simulated by higher prices than by lower prices, as it creates confidence in the customer that he is getting good quality product, besides catering his snobbery.

(d) Average consumers become quality-conscious, if there is an improved in the income of the people. In such circumstances, an improvement in quality of the product may lead to an increase in demand. In due course, a rise in price will increase the demand. This is more so in affluent societies who consider that price is the indicator of quality.

(e) Prices of products of firms with long-standing reputation and greater financial success can be increased by virtue of their reputation and standing in the market. Consumers always associate these firms with superior quality product. Similarly, heavily advertised goods will have increased prices.

(f) Finally, in bargain pricing, the price would depend upon the average prevailing market price of the commodity and also the sex of the consumer and the value of the product to the consumer. Generally, bargain pricing, price reduction, gift articles with sales, etc., would attract more of women customers, rater than men.Consumers’ readiness to buy higher priced products may sound rather uneconomic in theory; but it is realistic.

4.2 Pricing under different objectives and different market structures

Perfect Competition:

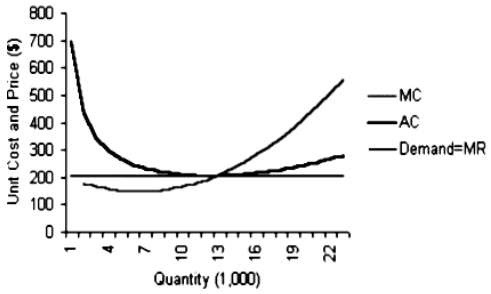
Perfect competition is a type of market characterized by:

- A very large number of small producers or sellers.

- A standardized, homogeneous product

-The inability of individual sellers to influence price

-The free entry and exit of sellers in the market and- Unnecessary non price actions.



Perfect competition

Monopoly – One firm dominates the market, barriers to entry, possibly super-normal profit. A market structure characterized by a single seller, selling a unique product in the market. In a monopoly market, the seller faces has no competition, as he is the sole seller of goods with no close substitute.

Oligopoly – An industry can be dominated by a few firms, e.g. 5 firm concentration ratio of > 50% . An oligopoly is a market structure in which a few firms dominate. If a market is shared between a few firms, it is said to be highly concentrated. Though only a few firms dominate, it is possible that many small firms may also operate in the market.

Monopolistic Competition – The freedom of entry and exit, but firms have differentiated products. Likelihood of normal profits in the long term.

Contestable Markets – The industry with freedom of entry and exit, low sunk costs. The theory of contest ability suggests the number of firms is not so important, but the threat of competition

One of the important determinants of how a societies resources are used and how its market are organized.

Competition:

An environment in which economic activities like production and distribution are carried out.

Classification of market structures:

Market is classified purely based on the nature of competition.

1. Perfect competition Ex. Agricultural commodities, Stocks and share market.

2. Monopolistic competition Ex. Retail Trade, Restaurants.

3. Oligopoly: Auto, Steel, Machinery.

4. Monopoly: Ex. Public Utilities.

1. Perfect Competition :

a. Homogeneity of products.

b. Many buyers and sellers.

c. Mobility of resources.

d. Freedom of entry and exit.

e. Perfect market.

2. Monopoly

Causes of monopoly:

1. Patents Ex. Microsoft corp. with its Ms.dos

2. Control of input: Ex. International, Nickel Company of Canada controls about 9/10th

of the proven nickel resource in the world.

3. Amount of capital: Manufacture of steel, telecommunication, bankwith expansion requires large amount of capital.

4. Government actions: Ex. Railway, Costal, BSNL, Postal,Electricity.

5. Smallness: Sometimes small neglected and insulated markets may also give raise to monopoly

3. Monopolistic Competition:

Conditions of competitions:

1. Product differentiation.

2. Large no. Of firms in the market.

3. Freedom of entry and exit.

4. Existence of selling cost.

5. Firms produce similar products. Ex. Tooth paste etc.

4. Oligopoly:

Features:

1. Dominated by few firms.

2. Interdependencies among the firms.

3. Price rigidity.

4. Economies of scale.

5. Entry of some industries may be blocked due to large financial investment.

6. As products are differentiated, firms in oligopoly enjoy some monopoly problems.

7. Advertisement and variation design and quality are simultaneously used to increase market share.

8. Possibility of price-rigging (Same price).

9. Demand curve depend on what other firms are doing.

Price elasticity of demand

It is a measure which is used in economics to show the responsiveness or elasticity, of the quantity demanded of the good or service to a change in its price. Moreover, it gives the percentage change in quality demanded in response to a one percent change in price which holds constant all the other determinants of demand, such as income.

Measure of Price elasticity of demand (PED or E_d)

Price elasticity of demand is a measure that is used in economics for showing the responsiveness or elasticity, of the quantity demanded of the good or service to a change in its price. Moreover, it gives the percentage change in quantity demanded which is in response to a one percent change in price (holding constant all the other determinant of demand, such as income).

Measures of Price Elasticity

An important aspect of the products demand curve is how much the quantity demanded changes during the price changes. The economic measure of the response is the price elasticity of demand.

The Price elasticity of demand can be calculated when the proportionate change in quantity demanded is divided by the proportionate change in price. The proportionate (or percentage)

changes are used so that the elasticity is a unit-less value and does not depend on the types of measures used (For e.g., kilograms, pounds, etc.).

As an example, if a 2% increase in price results in a 1% decrease in quantity demanded, where the price elasticity of demand might be equal to approximately 0.5. It is not exactly 0.5 since the specific definition for the elasticity uses the average of the initial and final values when calculating percentage change. If the elasticity is calculated over a certain are or section of the demand curve, it is known as the *arc elasticity* and that is defined as the magnitude (absolute value) as shown below:

$$\frac{\frac{Q_2 - Q_1}{(Q_1 + Q_2)/2}}{\frac{P_2 - P_1}{(P_1 - P_2)/2}}$$

Where, Q_1 - Initial quantity

Q_2 = Final quantity

P_1 = Initial price

P_2 = Final price

The average values for the quantity and price are used because the elasticity will be the same whether it is calculated going from lower price to higher price or from higher price to lower price.

For instance, going from $8 to $10 is a 25% increase in price, however going from $10 to $8 is only 20% decrease in price.

This asymmetry is eliminated using the average price as the basis for the percentage change in both cases. Hence, for slightly easier calculations, the formula for the arc elasticity can be rewritten as:

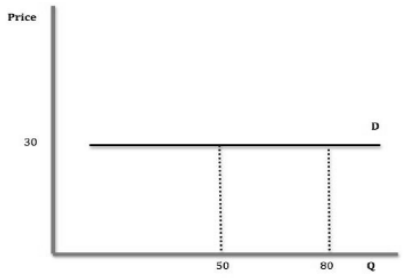
$$\frac{(Q_2 - Q_1)(P_2 + P_1)}{(Q_2 + Q_1)(P_2 - P_1)}$$

To understand better the price elasticity of demand, it is worthwhile for considering the different ranges of values.

Elasticity >1

In this case, the change in the quantity demanded is said to be proportionately larger than the change in price. This means that an increase in price might result in a decrease in revenue and also a decrease in price would result in an increase in revenue. In the case of near infinite elasticity, the demand curve can be nearly horizontal, meaning than the quantity demanded is extremely sensitive to changes in price. Therefore, the case of infinite elasticity is described as being perfectly elastic and is illustrated below:

Perfectly Elastic Demand Curve



Perfectly Elastic Demand curve

From this demand curve it is easy to visualize how an extremely small change in the price would result in an infinitely large shift in quantity demanded.

Elasticity < 1

In such a case, the change in the quantity demanded is proportionately small than the change in price. An increase in price might result in an increase in the revenue and a decrease in price would result in a decrease in revenue. During the extreme case of elasticity near 0, the demand curve can be nearly vertical and the quantity demanded would be almost independent of price. Therefore, the case of zero elasticity is described as being perfectly inelastic.

Perfectly Inelastic Demand Curve

Perfectly Inelastic Demand curve

From the above demand curve, it is easy to visualize how even a very large change in price would heave no impact on quantity demand.

Elasticity = 1

This case is referred to an unitary elasticity. The change in the quantity demanded is said to be in the same proportion as the change in price. A change in price in either direction therefore would result in no change in revenue.

Price elasticity of supply is a measure which is used in economics to show the responsiveness or elasticity, of the quantity supplied of the good or service to a change in its price.

When the coefficient is less than one, the st good can be described as inelastic, if the coefficient is greater than one, the supply can be described as elastic. An elasticity of zero indicates the quantity supplied does not respond to a price change: it is "fixed" in supply. Such goods often have no labor component or are not produced, limiting the short run prospects of expansion. If the coefficient is exactly one, the good is said to be unitary elastic.

The quantity of goods supplied can, in the short term, be different from the amount produced, a manufacturers will have stocks which they can build up or run down.

The price elasticity of supply is a number that is used to measure the sensitivity of changes in quantity supplied to given percentage changes in the price of a good, other things being equal. The price elasticity of supply indicates the percentage change in quantity which is supplied that results from each 1 percent change in price. It can be calculated by dividing the percentage change in the quantity supplied by the percentage change in price that cause it, given all other supply determinants:

$$\text{Price elasticity of supply} = \frac{\%\text{ change in quantity supplied}}{\%\text{change in price}}$$

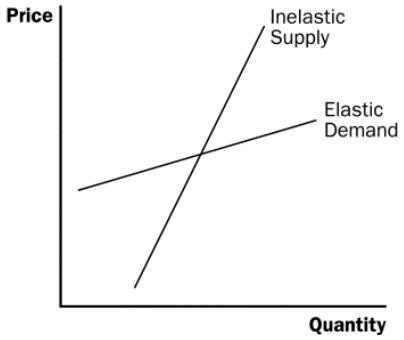
For example, if there is 10 percent increase in price results in a 20 percent increase in quantity supplied, the price elasticity of supply is,

$$\frac{20\%}{20\%} = 2.$$

As supply curves generally slop upward, supply elasticity tends to be positive. An increase in price tends to generate an increase in quantity supplied, during a decrease in price tends to generate a decrease in quantity supplied. In the equation for the price elasticity of supply, the signs of the numerator and the denominator are the same. The ratio, therefore, has a positive sign.

As with demand, be sure we remember that the slope of a supply curve is an unreliable measure of its elasticity. The price elasticity of the supply is related to, but is n't the same as, the slope of the supply curve.

The price elasticity of supply will range from 0 to infinity. An elastic supply prevails when the price elasticity of supply is greater than 1. When the price elasticity of supply is equal to or greater than 0, but less than 1, an inelastic supply prevails. Hence, when the price elasticity of supply is just equal to 1, unit elastic supply prevails. Box 7 summarizes the relationship in between percentage changes in price and quantity supplied for various cases. The greater the price elasticity of the supply of an item, the more responsive or elastic, is the quantity supplied to given percentage



Elastic and Inelastic supply curve

Unitary Supply Curve

Unitary Supply Curve

Fixed price

Prices under perfect competition are determined by the forces of supply and demand. Prices will be fixed a point where the supply and demand at an equilibrium.

4.3 Price discrimination

Meaning

Price discrimination, also known as differential pricing may be defined as the practice by a seller of charging different prices to the same layer or to different buyers for the same commodity or service without corresponding difference in cost.

Differences in rates are based, in part on cost differences.

For example, it may cost less to serve one class of customers than another and to sell in large quantities than in smaller lots. If rates or prices are proportional to cost, some buyers with pay more and others less, but this will not be price discrimination. In such a situation, charging uniform price will amount to discrimination.

Degrees of Price Discrimination

It is convenient to distinguish between three degrees of price discrimination:

First Degree Discrimination. The seller charges the same buyer a different price for each unit bought, e.g., prices determined by haggling with individual customers or prices quoted for tenders floated by government authorities.

Second Degree Discrimination. The seller charges different prices for blocks of units instead of for individual units, e.g., quantity discounts. For instance, there may be one rate for printing 1,000 booklets and another rate for printing more than 1,000 booklets.

Third Degree Discrimination. The seller segregates buyers according to income, geographic location, individual tastes, kinds of uses for the product or other criteria and charges different prices to each group or market despite equivalent costs in serving them.

As long as the demand elasticities among different buyers are unequal, it will be profitable for the seller to group the buyer into separate classes according to distance and charge each class a separate price.

It is referred to as market segmentation, i.e., dividing the total market into homogeneous sub-groups according to some economic criterion, usually the demand elasticity, e.g., different rates charged by an electricity undertaking for light and fan, for domestic power and for industrial use.

Conditions for Price Discrimination

1.Multiple Demand Elasticities: There must be difference in demand elasticities among buyers due to differences in income, location, available alternatives, tastes or other factors.

2.Market Segmentation:

The seller must be able to partition (segment) the total market by segregating buyers into groups or sub-markets according to elasticity.

3. Market Sealing:

The seller must be able to prevent or natural circumstances must exist which will prevent any significant resale of goods from the lower to the higher price sub-market. Any leakage in the form of resale by buyers between sub-markets will, beyond minimum critical levels, tend to neutralize the effect of differential prices and narrow the effective price structure to where it approaches that of a single price to all buyers.

Objectives of pricing:

The pricing objectives or goals give direction to the whole pricing process. Determining what our objectives are is the first step in pricing. While deciding on pricing objectives we must consider the following,

1) The overall marketing, financial and strategic objectives of the company.

2) The objectives of our product or brand.

3) The resources that are available.

4) Consumer price elasticity and price points.

Two common pricing objectives are:

• Maximize long-run profit and short-run profit.

• Increase sales volume (quantity).

4.4 Pricing methods in practice

Pricing method

• Cost plus pricing methods,

• Target return pricing methods,

• Value based pricing methods,

• Psychological pricing methods.

Pricing methods in practice:

A. **Cost plus method:** Add a % of the cost of producing and marketing the

product to a % of overhead cost to a desired profit margin using the

following formula.

Price = Direct cost + overhead cost + profit Margin.

B. **Break-even analysis method:** Break even point = fixed cost / (price –

variable cost per unit).

C. **Target rate return method:** It express the desired % return on investment.It can be set in the way the company feels fair, in that tradition of industry.

D. **Leadership pricing:** It is fixed by the firm depending upon the price charged by one of the firm in industry.

E. **Marginal costing:** the system of recording only the variable expenses

F. **Going rate pricing:** The firm adjusts its own price policies on the general pricing structure in industry.

G. **Marginal cost pricing:** Fixed cost are ignores and prices are determined on the basis of marginal cost.

The various methods of pricing are as follows:

1. Cost Based Pricing

2. Demand Oriented Pricing

3. Competition Oriented Pricing

4. Strategy Based Pricing

Cost –Based Pricing Methods

1. Cost plus pricing(full cost or mark up pricing):

The product unit's total cost and add percentage of profit to arrive at the selling price. It is suitable where the cost keep fluctuating from time to time.

2. Marginal cost pricing :(break even pricing or target profit pricing)

The selling price is fixed in such a way which covers fully the variable or marginal cost andcontributes towards recovery of fixedcosts fully or partly, depending upon the market situations.

Competition –Oriented Pricing:

a. Sealed bid pricing:

Each contracting firm quotes its price in a sealed cover called tender. They are opened on a scheduled date and the person who quotes the lowest prices, where the other things remaining the same, is awarded the contract.

B. Going rate pricing:

A prevailing market price at a given point oftime is the guiding factor. Later the price charged by the firm is in tune with the price charged in the industry as a whole.

Demand –Oriented Pricing

The key to pricing here is the value as perceived by the consumer. Hence, higher the demand, the higher can be the price.

a. Price discrimination:

This is a practice of charging differentprices to customers for the same good and it is also called differential pricing. Here, the firm uses its discretion to charge differently the different customer.

b. Perceived value pricing:

In this case, the price is fixed on thebasis of the perception of the buyer of the value of the product.

Strategy –Based Pricing:

1. Market skimming:

If the product is introduced for the first time in the market, the company follows this method. Here, the company fixes a very high pricefor the product. This to charge the customer a maximum rate. Example Sony introduces a particular TV model, it has a fixed high price and other company.

2. Market penetration:

This is exactly opposite to the market skimming method. The price of the product is fixed so low that the company can increase its market share. Then the company attains the profits with increasing volumes and increase in the market share. Generally, the companies believe that it is necessary for dominating the market in the long run making profit in the short-run.

3. Two –part pricing:

A firms with market power will enhance profits by the strategy of two –part pricing. Here, a firm charges a fixed fee for the right to purchase its goods and also a per unit charge for each unit purchased. Example, entertainment houses such as country clubs, athletic clubs, golf courses, health clubs usually adopt this strategy where they charge a fixed initiation fee plus a charge, per month or per visit, to use the facilities.

4. Block pricing:

It is another way a firm with market power can enhance its profits. It is used day –to –day life very frequently. Example, like six lux soaps in a single pack or five magi noodles in a single pack.

5. Commodity bundling

This refers to the practice of bundling two or more different products together and selling them at a single bundle price such as the package deals offered by the tourist companies. Example,airlines hold testimony to this practice. The package includes the airfare, hotel, sight seeing, meals and so on.

6. Peak load pricing:

Around a seasonal period when demand is likely to be higher, a firm may enhance profits by peak load pricing. Firm philosophy is to charge a higherprice during peak times than is charged during off peak times. Examples are Apsrtc, air india, jet air, etc,.

7. Cross subsidization:

In cross subsidization where the demand for two products produced by a firm isinterrelated through demand or costs, this may enhance the firm with profitability.

8. Transfer pricing:

It is an internal pricing technique. This refers to a price atwhich inputs of one department are transferred to another, in order to maximize theoverall profits of the company. Example like kinetic Honda, hero Honda.

Limit Pricing

It is the act of setting prices low in an attempt to eliminate the competition. A predatory pricing is illegal under anti-trust laws, as it makes markets more vulnerable to a monopoly. The companies might engage in a variety of activities which intend to drive out competitors, such as to create barriers to entry for new competitors or unethical production methods to minimize costs.

It is a pricing strategy, a monopolist may use to discourage entry. When a monopolist set its profit maximizing price (where MR=MC) the level of supernormal profit would attract new firms into the market.

Hence, the monopolist might decide to set a price below this profit maximizing level, but still it enables them to make higher profits than in a competitive market. To be effective, the monopolist needs to increase output up to the level where a new firm will not be able to make any profit on entering the market and can also build excess capacity as a threat that if firms enter, it will reduce price even further.

This is the price set by a monopolist with a view to discourage others from entering into a market. Here it is often lower than the average cost of production or just low enough to make entering not profitable. In limit price operation, those entering the market with a view to compete with the monopolist will find it totally unattractive to survive. Every firms use different strategies to keep competition off. Certain strategies include signing a union contract to employ a high level of labor for a long period of time or building a excess production capacity so as to drive out competition effortlessly. It is illegal in many countries.

Skimming Pricing

This is called as charging high price in initial stages. It can be followed by a firm by charging skimming price for a new product in pioneering stage. If the demand is either unknown or more inelastic at this stage, market is splitted into segments on the basis of different degree of elasticity of demand of different consumers.

It is a short period device for pricing. The demand for new products is likely to be less price elastic in the early stages, which is the initial high price helps to “Skim the Cream” of the market which is relatively insensitive to price.

Its policy is shown in below figure, where the manufacturer of new product initially determines OP price and sells OQ quantity. Hence, it receives KPMN abnormal profit. In this policy, the consumers are distinguished by the producers on the basis of their intensity of desire for a commodity.

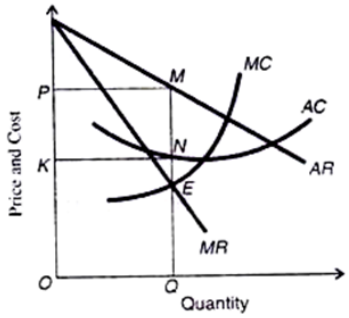
If a product is introduced for the first time in the market, the company fixes a very high price for it. The main idea is to charge the customer the maximum possible. Thus, the strategy is mostly found in the case of technology products. Example, when Sony introduces a particular TV model, it fixes a very high price likewise a new series of Pentium is priced very high when it is released into the market. Initially everyone cannot afford to buy it. However along time, the price comes down and more people can afford to the product. This method can be followed only when :

(i) the demand for the product is inelastic

(ii) there is no threat from competition

(iii) high price is coupled with high.

In the beginning the prices of TVs, computers, electronic calculators, etc., were very high but now they are declining every year. If a high initial price together with heavy promotional expenditure might be used to launch a new product if conditions are appropriate.



Skimming Pricing

These conditions are listed below:

(i) The demand is likely to be less price elastic in the early stages than later and the cross elasticity demand should be very low.

(ii) If the demand elasticity is unknown, high introductory price serves as a refusal price during the stage of exploration.

(iii) When launching a new product with a high price is an efficient device for breaking the market into segments that differ in price elasticity of demand.

(iv) If it has high initial prices supports to finance the flotation of the product. In the early stages, the cost of production and organization of distribution are high and also research and promotional investments have to be made.

Price and Cost Relationship

The price policy for any product, price and cost relationship is the basic consideration. The cost conditions determine price. Thus, the cost estimates must be correctly made. Even though a firm should recover its common costs, this is not necessary that prices of each product be high enough to cover an arbitrarily apportioned share of common costs.

A proper pricing does require, but prices at least cover the incremental cost of producing each good. The incremental costs are additional costs that would not be incurred if the product were not produced. Until the price of a product exceeds its incremental costs, the firm can rise total profit by supplying that product.

Thus the decisions must be based on an evaluation of incremental costs. A price that offers maximum contribution over costs is generally acceptable but in multi-product cases, incremental cost will become more essential to make such decisions.

A set of alternative price policies should be considered and they are:

(i) the prices of the multi-products might be proportional to full cost. This price might produce equal per-centage of profit margin for all products. When the full cost for all products are assumed equal then the pricing will be equal.

(ii) The pricing for multi-products might be proportional to incremental cost.

(iii) The prices of multi-product might be fixed differently keeping into consideration market segments.

(iv) The prices of multi-products might be assessed with reference to their contribution margin proportional to conversion cost.

(v) The prices for multi-products may be fixed as per the product life cycle of each product.

It has been a force for moving today's business and many other business and also pricing models have been designed. In pricing mechanisms, assessing the value in the Internet is complicated owing to its nature. This is an abstract and its value depends on its context, speed, reliability, accessibility and the others which are similar.

Flat Rate Pricing

The flat rate pricing is used for wireless data service. This provides unlimited wireless data transfer for a variety of applications including wireless e-mail, remote LAN and corporate Intranet access for the mobile computing customers. The aggressive new plans can ultimately simplify the wireless data pricing and allow AT & T customers to better anticipate monthly usage costs.

The two new plans include:

• For local Unlimited, a monthly rate of $54.99, it carries an additional $0.20 per kilobyte roaming fee when the users are outside of markets where AT&T operates wireless IP service.

• For National Unlimited, a monthly rate of $64.99 with roaming charges extra.

The wireless IP rates also known Cellular Digital Packet Data have historically used variable charges for each kilobyte of data where the customer transmits over the network. The reason for implementing this is to introduce the "Digital One Rate" service. Hnce, these new plans are designed for customers who use an IP compatible modem with their hand-held computer, laptop, PDA or a specialized portable device.

Thus, the Local Unlimited plan will appeal to customers who use their wireless applications mainly in their local AT&T wireless IP markets, whereas the National Unlimited plan is designed for frequent travelers who need wireless access to information from various locations across the country. So, both plans would benefit customers on average can send and receive at least one MB of information by wireless a month or whose usage levels vary monthly.

But, in other aspect relating to quality of services like transmission, monitoring traffic, congestion and similar to them are not provided. Therefore, Flat Rate Pricing, according to AT&T, will give the user the ability to accurately budget for communication and media needs because the remote access to data is becoming an increasingly vital tool for mobile professionals and AT&T's new data pricing plan will permit the user to utilize their investment in wireless technology without worrying about access costs.

The price is charged at a flat rate or single fixed rate for a particular product or service irrespective of the usage, flat rate pricing is said to exist. For example, internet service providers. We pay a flat rate to access internet at all hours and days of the year. Especially for internet broad band connections, charging a flat rate is common practice across the world.

Usage-based Pricing

The users pay one portion of their bill for a connection charge and another portion for the bits received or sent. Thus, the marginal monetary cost of sending or receiving another bit is non-zero for part of the time.

In this case, there are two components present that is a charge for getting connected and subsequently marginal charges for using the services, precisely when bit / bytes are received or sent. Hence, this mechanism falls into the category of two-component pricing. For example, we can have usage-based pricing during peak hours and flat rate pricing during off-peak hours.

In other words, the usage-based pricing can be explained as the Service Providers such as internet, electricity companies or mobile communication companies shall offer their customers time sensitive or time of use, pricing plans. Those plans can reflect the actual cost of providing service at the time it is needed. It is designed to encourage customers to lower their consumption during times when the cost of providing the service is high.

For example, during the peak hours such as 11.00 AM, when all offices and factories work, the electricity charge for consumption of every unit is priced relatively higher than the non-peak period such as morning 6`O'clock. Hence, this type of strategy will enable the consumers to use these services all through the day adjusting to these changing price tariff.

Thus, when demand is low, the utilities can supply electricity drawing from less expensive sources whereas when demand for electricity is high, draw from more expensive sources to supply enough electricity. This is also called peak load pricing.

Transaction-based Pricing

It allows to acquire enterprise-wide case management solution including all the services that will be required in terms of support, maintenance, version upgrades and training . This needs a large capital expenditure. However when these are associated with the main transaction, the charges for all these services could be factored into the price of the main transaction. In today organisations, we have several constraints in terms of budget availability and skillset. Thus, transaction based pricing is viewed as the best alternative in such a case. For example, an annual maintenance

contract for a refrigerator or an air conditioner will be cheaper if taken up at the time of purchase of the asset. Then the transaction costs can be kept lower to attract the customers. This allows for immediate profits for the customers also. The unlimited support and new version upgrades offer more attraction for the customers to prefer transaction-based pricing and it is equally profitable for the sellers or service providers also.

In transaction based pricing, this technology is a leading Canadian competitive local exchange carrier (CLEC) which gives high-speed data, voice and Internet services that can be customized for meeting the requirements of small and medium-sized enterprises.

For example, Axxent's success is deeply rooted in its understanding that customers are the greatest asset. 34,000 businesses representing more than 126,000 access lines. Hence, AXXENT is Canada's largest CLEC in terms of the size of its operating footprint.

The Axxent provides Global Internet Roaming in which customers can browse the internet for the price of a local call from anywhere in the world. It caters for customers who frequently travel a lot and use the Internet outside of Toronto.

Benefits :

• Better quality Internet connections.

• One bill for all Internet and roaming charges.

• Roaming charges are extra for local and long distance.

• Roaming also gives the customer proper authentication from any part of the world.

Another service provided by Axxent, which caters for transaction pricing, is that of DSL Internet. It is a high-speed data service offering a fast and reliable service for downloading files or attachments. The DSL stands for Digital Subscriber Line, is a technology that uses existing copper telephone wires to deliver high speed data services.

The customers are actually paying for the quality, speed and reliability of the Internet service offered by Axxent. This is service which is always on, meaning that unlike dial-up connections to the Internet, the DSL connection is always switched on.

Hence, the customers also have the provision to upgrade their service plans. For instance, if the customer values speed of transmission or requires any other service, then they would have to pay a higher monthly rate which is associated with the increased service level.

It also offers a full range of services such as quality of transmission, speed and service at a price that benefits the customer. However monitoring, reducing congestion and trafficking problem in the internet still remains to be seen. These facilities give vital services which are not properly implemented.

4.5 Role of Government in pricing control

Role of Government in pricing control

For various reasons governments may wish to intervene in a free market to set prices. Usually prices are set the market forces (where supply and demand differ) But, in some markets governments may want to artificially set different prices.

Minimum Prices:

This is when the government don't allow prices to go below a certain level. If minimum prices are the market forces (where supply and demand differ) But, in some markets governments may want to artificially set different prices.

Maximum Prices:

This is when the government wish to prevent prices going above a certain level. If a maximum price is placed below the equilibrium, prices will fall.

5

FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT)

Balance sheet and related concepts – Profit & Loss Statement and related concepts –Financial Ratio Analysis – Cash flow analysis – Funds flow analysis – Comparativefinancial statements – Analysis & Interpretation of financial statements.Investments – Risks and return evaluation of investment decision – Average rate of return– Payback Period – Net Present Value – Internal rate of return.

5.1 Balance sheet and related concepts

The balance sheet

It is a statement which consists of assets and liabilities that reflects the financial soundness of a concern at a given date. For judging the financial position, it is necessary to rearrange the balance sheet in a proper set of form. The figures in Balance Sheet rearranged in a Vertical Form and given below for the analysis and interpretation.

Balance Sheet as on 31st Dec. .....

Particulars	*Amount Rs.*	*Amount Rs.*
Cash in Hand	...	
Cash at Bank	...	
Bills Receivable	...	
Sundry Debtors	...	
Marketable Securities	...	
Other Short-Term Investments	...	...
Liquid Assets (1)	...	
Add : Stock in Trade	...	
(Closing Stock of Raw Materials		
Closing Stock of Work in Progress		
Closing Stock of Finished goods)		
Prepaid Expenses	...	...
Current Assets (2)		...
Less : Current Liabilities :		
Bills Payable	...	
Sundry Creditors	...	
Bank Loans (Short-term)	...	
Bank Overdraft	...	
Outstanding Expenses	...	
Accrued Expenses	...	
Trade Liabilities	...	
Other Liabilities Payable within year	...	...
Total Current Liabilities : (3)		...
Add : **Provisions : (4)**		
Provision for Tax	...	
Proposed Dividend	...	
Provision for Contingent Liabilities	...	
Total Current Liabilities and Provisions (5) = (3 + 4)	...	...
Net Working Capital (6) = (2 – 5)		...
(Current Assets – Total Current Liabilities & Provision)		
Add : **Fixed Assets : (6)**		
Goodwill	...	
Land and Buildings	...	
Plant and Machinery	...	
Loose Tools	...	
Furniture and Fixtures	...	
Patents and Copyrights	...	
Live Stock	...	
Investment in Subsidies	...	...
Capital Employed (7) = (5 + 6)		...
(Net Working Capital + Fixed Assets)		
Add : **Other Assets : (8)**		
Investment in Govt. Securities	...	
Unquoted Investments	...	
Other Non-Trading Investments	...	
Advances to Directors	...	...
Company's Net Assets (9) = (7 + 8)		...
(Capital Employed + Other Assets)		
Less : **Long-Term Liabilities (10)**		
Debenture	...	
Long-Term Debt	...	
Long-Term Loan from Bank & Financial Institutions	...	
Long-Term Debt Raised by Issue of Securities & Public Deposits	...	
Other Long-Term Loan payable after a year	...	...
Share Holders Net Worth (11) = (9 – 10)		
(or) Total Tangible Net Assets – Shareholders Net Worth		...
Less : **Preference Share Capital (12)**		...
Equity Shareholders Net Worth (13) = (11 – 12)		...
(Total Tangible Net Worth – Preference Share Capital)		

Balance Sheet Equations :

The accounting equations can be drawn from the above balance sheet:

(1) Liquid Assets = Current Assets - Stock and Prepaid Expenses

(2) Current Assets = Net Working Capital - Current Liabilities

(3) Net Working Capital = Current Assets - Current Liabilities

(4) Capital Employed = Net Working Capital + Fixed Assets (or) (Current Assets - Current Liabilities) + Fixed Assets (or) Total Assets - Current Liabilities

(5) Shareholders' Net Worth = Company's Net Assets - Shareholders' Net Worth

(6) Equity Shareholders' Net Worth = Total Tangible Net Worth - Preference Share Capital

Current ratio,Liquidity ratio,Proprietary ratio,Debt-Equity ratio.using given information.

(i) Current Ratio = Current Assets/Current Liabilities

$$= \frac{1,20,000}{40,000} = 3 \text{ times}$$

(ii) Liquidity Ratio = Liquid Assets/Current Liabilities

$$= \frac{1,20,000 - 35,000}{40,000} = 2.13 \text{ times}$$

(iii) Proprietary Ratio = Share holders funds/Total Tangent assets

$$= \frac{1,25,000 + 75,000 + 60,000}{3,50,000} = 0.74$$

(iv) Debt-Equity ratio = External Equities/Internal Equities

$$= \frac{50,000 + 20,000 + 15,000 + 5,000}{2,60,000}$$

$$= 0.35$$

Balance Sheet of M/s X & Co Ltd., as on 31.03.2010

Liabilities	**Rs.**	**Assets**	**Rs.**	**Rs.**
Equity share capital	2,00,000	Goodwill		50,000
Reserve & surplus	1,00,000	Machinery less	1,00,000	
		Depreciation @10%	10,000	90,000
Debentures	30,000	Furniture		50,000
Loan from Bankers	10,000	Patents & Trademark		20,000
Bills Payable	5,000	Stock		20,000

Sundry creditors	1,000	Bills Receivable		30.000
Outstanding expenses	500	Sundry Debtors		30.000
Provisions for a tax	1,000	Cash in hand		50,000
		(prepaid expenses)		2,500
		Preliminary expenses		5,000
	3,47,500			3,47,500

1. Fixed Assets = Machinery & Furniture = 90,000 + 50,000

2. Current Assets = Stock + Bills Receivable + Cash in hand + Prepaid exp

= 20,000 + 30,000 + 30,000 + 50,000 + 2500

3. Fictitious Assets = Preliminary exp = 5000

4. Intangible Assets = Goodwill = 50,000

5. Share holders funds = Eq. share capital + Reserve & Surplus

= 2,00,000 + 1,00,000 = 3,00,000

6. Secured Loans = Debentures + Loan from Banks

= 30,000+ 10,000 = 40,000

7. Current Liabilities = Bills payable + Sun. Cr + Outstanding expenses

= 5000 + 1000 + 500 = 6500

8. Provisions = 1000

Schedule changes in working capital for the year 1996

Particulars	**1995 Rs in 1000s**	**1996 Rs in 1000s**	**Change in Working Capital**

			Increase Rs.(in 000s)	Decrease Rs. (in 000s)
Current Assets	50	60	10	
Stock	30	40	10	
Cash	20	30	10	
Current Liabilities				
Creditors	25	30		5
Bills Payable	15	20		5
Increase in Working Capital				20
			30	30

Adjusted Profit and Loan A/c

(Rs. in '000s)		(Rs. in '000s)	
To		By Balance b/f	10
To balance C/o	20	By funds from operation	10
	20		20

Funds Flow Statements for the year 1996

Particulars	Rs. (in '000s)	Rs. (in '000s)

Sources of Funds		
Funds from operation	10	
Issue of share capital	80	90
Application of Funds		
Fixed Assets purchased		70
Increase in working capital		20

problem based on information

(i) Current ratio = Current Assets / Current Liabilities

$$= \frac{14,000}{16,000} = 2.33$$

(ii) Liquid ratio = Liquid Assets/Current Liabilities

$$= \frac{8,000}{6,000} = 1.33$$

(iii) Proprietary ratio

= Shareholders Funds/Total Tangible Assets

$$= \frac{10,000 + 2,000 + 8,000}{40,000} = 0.50$$

(iv) Debit-Equity Ratio

= Long term Debits/SH funds

$$= \frac{14,000}{20,000} = 0.70$$

(v) Stock Turnover Ratio

= Cost of goods used/Average inventory

$$= \frac{51,600}{6000} = 8.6 \text{ times}$$

Note: Since opening stock, is not available, closing stock is taken as average stock.

(vi) Gross profit ratio

= Gross Profit/Net Sales × 100

Cost of sales = Sales − Gross Profit

51,600 = 60,000 - Gross Profit

Gross Profit = 8,400

$$= \frac{8,400}{60,000} \times 100 = 14\%$$

(vii) Net profit ratio = Net profit after tax/Net Sales × 100

$$= \frac{2,000}{60,000} \times 100 = 3.33\%$$

(vii) Return on investment = Operating profit/Capital employed × 100

$$= \frac{4,000}{30,000} \times 100 = 11.8\%$$

Operating profit = Profit before Interest & Tax

Capital employed = Fixed Assets + Working Capital

= 26000 + 8000 = 34,000

5.2 Profit & Loss Statement and related concepts

A financial statement that summarizes the revenues, costs and expenses incurred during the specific period of time - usually a fiscal quarter or year. These records provide information that shows the ability of a company for generating the profit by increasing revenue and reducing costs.

The P&L statement is also known as an "income statement","statement of profit and loss" or an "income and expense statement. The statement of profit and loss will follow a general form as shown in this example.

It begins with an entry for revenue and subtracts from revenue the costs of running the business, includes the cost of goods sold, operating expenses, tax expense and interest expense.

The bottom line (literally and figuratively) is the net income (profit). Many templates can be found online for free, that can be used in creating the profit and loss or income statement.

The balance sheet, income statement and statement of cash flows are the most important financial statements which is produced by a company. While each is important in its own right, they are meant to be analyzed together.

5.3 Financial Ratio Analysis

Financial Ratios Analysis

It is the most common form of financial statements analysis. They represent the relationships between different aspects of a company's operations and also provide relative measures of the firm's conditions and performance. This might provide the clues and symptoms of the financial condition and indications of potential problem areas.

This can be an important tool for small business owners and managers for measuring their progress toward reaching company objectives, also toward competing with larger companies within an industry.

They generally hold no meaning unless it is compared against something else, like past performance, another company/competitor or industry average. Hence the ratios of firms in different industries, which face different conditions, are usually hard to compare.

They are also used by bankers, investors and also business analysts to assess the different attributes of a company's financial strength or operating results. It is used to measure the establishment of relationship between the two interrelated accounting figures in financial statements. In addition, tracking different ratios over time is a powerful way for identifying trends. When performed regularly over time, this can also give help the small businesses recognize and also adapt to trends affecting their operations. It helps to Management for decision making. It is an effective tool which is used to ascertain the liquidity and operational efficiency of the concern.

According to the financial aspect of the business which the ratio measures the financial ratios are categorized by:

Market ratios measures investor response to owning a company's stock and also the cost of issuing stock.

Profitability ratios measures the company's use of its assets and also control of its expenses to generate an acceptable rate of return.

Leverage ratios examine the company's methods of financing and also measure its ability to meet financial obligations.

Efficiency ratios measure how quickly a firm can convert non-cash assets to cash assets.

Liquidity ratios investigates the availability of company's cash to pay debt.

5.4 Cash Flow Analysis

An examination of a company's cash inflows and outflows during a specific period. The analysis begins with the starting balance and generates an ending balance after accounting for all cash receipts and paid expenses during the period. Cash flow analysis is often used for financial reporting purposes.

Cash-flow statement

The cash flow statement, also known as statement of cash flows or funds flow statement, is a financial statement which shows how changes in balance sheet accounts and income affect cash and cash equivalents and breaks the analysis down to investing, operating and financing activities.

The cash flow statement is partitioned into three segments, namely:

i. Cash flow resulting from operating activities.

ii. Cash flow resulting from investing activities.

iii. Cash flow resulting from financing activities.

Operating Activities

The operating activities include the production, sales and delivery of the company’s product as well as collecting the payment from its customers. This could include purchasing raw materials, building inventory, advertising, advertising and shipping the product.

Operating cash flows include:

• Receipts for the sale of loans, debt or equity instruments in a trading portfolio.

• Receipts from the sale of goods or services.

• Payments to suppliers for goods and services.

• Interest received on loans.

• Interest payments.

• Payments to employees or on behalf of employees.

Investing Activities

Examples of Investing activities are,

• Purchase or Sale of an asset (assets can be building, land, marketable securities, equipment, etc.).

• Loans made to the suppliers or received from customers.

• Payments which are related to mergers and acquisitions.

Financing Activities

Financing activities include the inflow of cash from the **investors** such as **banks** and **shareholders,** as well as the outflow of cash to shareholders as **dividends** as the company generates income. Other activities that impact the long-term liabilities and equity of the company are also listed in financing activities section of the cash flow statement.

• Proceeds from issuing short-term or long-term debt.

• Payments for repurchase of company shares.

• Payments of dividends.

• For non-profit organizations, receipts of donor-restricted cash that is limited to long-term purposes.

• Repayment of debt principal, including capital leases.

Sample cash flow statement using the direct method

Cash flows from (used in) operating activities

Cash receipts from customers9,500

Cash paid to suppliers and employees (2,000)

Cash generated from operations (**sum**)**7,500**

Income taxes paid (3,000)

Interest paid (2,000)

Net cash flows from operating activities 2,500

Cash flows from (used in) investing activities

Proceeds from the sale of the equipment 7,500

Dividends received 3,000

Net cash flows from investing activities 10,500

Cash flows from (used in) financing activities

Dividends paid (2,500)

Cash and cash equivalents, beginning of year 1,000

Cash and cash equivalents, end of year Rs. 11,500.

Net cash flows used in financing activities (2,500)

Net increase in cash and cash equivalents 10,500

Problem based on the given information and determine whether the purchase of the machine is worth or not.

Year	**Cash Flow**	**P.V @10%**	**Present value**
1	50,000	0.909	45,450
2	50,000	0.826	41,300
3	50,000	0.751	37,550
4	50,000	0.682	34,150
5	50,000	0.621	31,050
		P.V. of future cash flow	1,89,500
		Initial Investment	1,50,00
		NPV	39,500

Since it is positive net present value, machine can be purchased.

Analyzing an Example of a CFS

Cash Flow Statement Company XYZ FY Ended 31 Dec 2003 all figures in USD	
Cash Flow From Operations	
Net Earnings	2,000,000
Additions to Cash	
Depreciation	10,000
Decrease in Accounts Receivable	15,000
Increase in Accounts Payable	15,000
Increase in Taxes Payable	2,000
Subtractions From Cash	
Increase in Inventory	(30,000)
Net Cash from Operations	2,012,000
Cash Flow From Investing	
Equipment	(500,000)
Cash Flow From Financing	
Notes Payable	10,000
Cash Flow for FY Ended 31 Dec 2003	**1,522,000**

5.5 Funds flow analysis

The net of all cash inflows and outflows in and out of the various financial assets. Fund flow is usually measured on a monthly or quarterly basis. Here, the performance of an asset or fund is not taken into account, only share redemption's (outflows) and share purchases (inflows). The net inflows create excess cash for managers to invest, which theoretically creates demand for securities such as stocks and bonds.

Fund Flow:

The statement of fund flow was primarily used by accountants to report any change in the company's net working capital during a set period of time. Much of this information is captured in the statement of cash flow.

Nowadays investing use of fund flow is more useful. Here, overall investor sentiment can be gauged as it relates to different asset classes. When the flow of funds for equities is positive, for example, it suggests that the investors have a generally optimistic view of the economy (or at least the short-term profitability of listed companies).

This represents the inflow and outflow of funds i.e. sources and applications of funds for a particular period. It is a statement prepared to analyze the reasons for changes in the financial position of a company between two Balance Sheets. It is also prepared to explain the changes in the working capital position of a company. There are two types of Inflows of Funds:-

1. Long term funds raised by debentures , issue of shares or sale of fixed assets.

2. Funds generated from operations.

Steps for Preparing Funds Flow Statement:

1. First, find the change (increase or decrease) in working capital.

2. Second, find the adjustments account to be made to net income.

3. Then, each non-current account on the balance sheet, will establish the increase or decrease in that account. Analyze the change to decide whether it is a source (increase) or use (decrease) of working capital.

4. Finally, be sure the total of all sources including those from operations minus to the total of all uses equals the change found in working capital in Step 1.

General Rules for Preparing Funds Flow Statement:

Changes in fixed (non-current) assets and fixed (non-current) liabilities affects working capital.

- Increase in current asset and increase in current liability does not affect working capital.
- Decrease in the current asset and decrease in the current liability does not affect working capital.
- Increase in a current liability will decrease (minus -) in working capital.
- Decrease in a current liability will increase (plus +) in working capital.
- Increase in a current asset will increase (plus +) in working capital.
- Decrease in a current asset will decrease (minus -) in working capital.

Format of Funds Flow Statement:

This can be prepared in statement form or 'T' form. The both the formats are as follows:

Fund Flow Statements (Statement Form)

A.	**Sources of Funds:**
	(*i*) Funds from Business Operations
	(*ii*) Sale of Fixed Asset
	(*iii*) Issue of Shares
	(*iv*) Issue of Debentures
	(*v*) Long-term borrowings
	Total Sources
B.	**Application of Funds:**
	(*i*) Loss from Business Operation
	(*ii*) Payment of Dividend
	(*iii*) Payment of Tax
	(*iv*) Purchase of Fixed Asset
	(*v*) Payment of Long-term Loans
	(*vi*) Redemption of Debentures
	(*vii*) Redemption of Preference Shares
	Total uses
	Not increase/decrease in Working Capital (Total sources minus Total uses)

Fund Flow Statements ('T' Form)

Source of Funds	₹	Application of Funds	₹
(*i*) Funds from Business Operations		(*i*) Loss from Business Operations	
(*ii*) Sale of Fixed Assets		(*ii*) Payment of Dividend	
(*iii*) Issue of Shares		(*iii*) Payment of Tax	
(*iv*) Issue of Debentures		(*iv*) Purchase of Fixed Assets	
(*v*) Long-term Borrowings		(*v*) Payment of Long-term Loans	
(*vi*) Decrease in Working Capital (If application amount is more than the sources amount)		(*vi*) Redemption of Debentures	
		(*vii*) Redemption of Preference Shares	
		(*viii*) Increase in Working Capital (if sources are more than the application amount)	
Total		Total	

Funds Flow Statement (Statement Form)

A.	**Sources of Funds:**
	(*i*) Funds from Business Operations
	(*ii*) Sale of Fixed Asset
	(*iii*) Issue of Shares
	(*iv*) Issue of Debentures
	(*v*) Long-term borrowings
	Total Sources
B.	**Application of Funds:**
	(*i*) Loss from Business Operation
	(*ii*) Payment of Dividend
	(*iii*) Payment of Tax
	(*iv*) Purchase of Fixed Asset
	(*v*) Payment of Long-term Loans
	(*vi*) Redemption of Debentures
	(*vii*) Redemption of Preference Shares
	Total uses
	Not increase/decrease in Working Capital (Total sources minus Total uses)

Funds Flow Statement ('T' Form)

Source of Funds	₹	Application of Funds	₹
(*i*) Funds from Business Operations		(*i*) Loss from Business Operations	
(*ii*) Sale of Fixed Assets		(*ii*) Payment of Dividend	
(*iii*) Issue of Shares		(*iii*) Payment of Tax	
(*iv*) Issue of Debentures		(*iv*) Purchase of Fixed Assets	
(*v*) Long-term Borrowings		(*v*) Payment of Long-term Loans	
(*vi*) Decrease in Working Capital (If application amount is more than the sources amount)		(*vi*) Redemption of Debentures	
		(*vii*) Redemption of Preference Shares	
		(*viii*) Increase in Working Capital (if sources are more than the application amount)	
Total		Total	

Year	Cash flow	PV@10%	Present Values
1	5000	0.909	4545
2	10000	0.826	8260
3	10000	0.751	7510
4	3000	0.683	2049
5	3000	0.621	1863
		PV of future	24227
		Cash flows	
		Less Initial Invest	20000
		NPV	4227

5.6 Comparative financial statements

Comparative financial statements are complete set of financial statements in which an entity issues, revealing information for more than one accounting period. The financial statements which may be included in this package are:

The income statement (which shows results for multiple periods).The balance sheet (which shows the financial position of the entity in more than one balance sheet date).

The statement of cash flows (which shows the cash flows for more than one period). There is also a nother variation on the comparative concept is to report the information for each of the twelve preceding months on a rolling basis.

Comparative financial statements are quite useful for the following reasons:

It provides a comparison of an entity's financial performance over multiple periods, so that we can determine trends (horizontal analysis). The statements may also reveal unusual spikes in the reported information which indicates the presence of accounting errors.

It provides a comparison of expenses to revenues and the proportions of the various items on the balance sheet over multiple periods (vertical analysis). This information can be useful for cost management purposes.

This is useful for predicting future performance, though we rely more on operational indicators and leading indicators than on historical performance for this type of analysis.

It is customary to issue the comparative financial statements with additional columns containing the variance between periods, as well as the percentage change between periods.

Both the comparative Profit and Loss Account and comparative Balance sheet are covered. This enables to measure the operational efficiency and financial soundness of the concern for analysis and interpretations. The comparative statements will include:

(a) the figures which is presented in the comparative statements side by side for two or more years.

(b) An absolute data in money value.

(c) The increase or Decrease between the absolute figures in money value.

(d) The changes or trend in terms of percentage.

Example 1:

From the following Profit and Loss Account ABS Ltd., for the years 2002 and 2003, prepare a Comparative Income Statement.

Statements of Profit and Loss Account

Particulars	*2002 Rs.*	*2003 Rs.*
Net sales	4,000	5,000
Less : Cost of goods sold	3,000	3,750
Gross Profit	1,000	1,250
Less : Operating Expenses		
Office and Administrative Expenses	200	250
Selling and Distribution Expenses	225	300
Total Operating Expenses	425	550
Net Profit	575	700

Statements of Profit and Loss Account

Particulars	*2002 Rs.*	*2003 Rs.*	*Increase or Decrease in 2003*	
			Absolute in 2003 Rs.	*Percentage (%)*
Net sales	4,000	5,000	+ 1,000	+ 25
Less : Cost of Goods Sold	5,000	3,750	+ 1,500	+ 25
Gross Profit	1,000	1,250	+ 250	+ 25
Less : Operating Expenses :				
Office and Administrative Expenses	200	250	+ 50	+ 25
Selling and Distribution Expenses	225	300	+ 75	+ 33.33
Total Operating Expenses	425	550	+ 125	+ 29.41
Net Profit (Gross Profit–Total Operating Expenses)	575	700	+ 125	+ 21.73

Solution:

Interpretation

It is observed that the sales has increased to the extent of 25%. The cost of goods sold and its percentage increased by 25%. The administrative and selling & distribution expenses have been increased by 25% and 33.33% respectively and the rate of net profit is also increased to the extent of 21.73%.It indicates that the overall profitability of the concern is good.

Example 2:

The Following is the Balance Sheet ABC Ltd. for the year 2002 amd 2003. Prepare Comparative Balance sheet:

Balance Sheet of ABC Ltd. for the year 2002 and 2003

Liabilities	*2002 Rs.*	*2003 Rs.*	*Assets*	*2002 Rs.*	*2003 Rs.*
Current Liabilities	37,000	50,000	Cash in Hand	3,000	5,000
Debenture	50,000	60,000	Cash at Bank	10,000	20,000
Long-Term Debts	2,00,000	2,50,000	Bills Receivable	7,000	10,000
Capital :			Sundry Debtors	10,000	15,000
Preference Share Capital	1,00,000	1,50,000	Stock	20,000	25,000
Equity Capital	1,25,000	1,60,000	Fixed Assets	4,90,000	6,25,000
General Reserve	28,000	30,000			
	5,40,000	7,00,000		5,40,000	7,00,000

Comparative Balance Sheet as on 31st Dec. 2002 & 2003

Particulars	*2002 Rs.*	*2003 Rs.*	*Increase or Decrease in 2003 Rs.*	*Percentage of Increase or Decrease in 2003 (%)*
Assets :				
Cash in Hand	3,000	5,000	+ 2000	+ 66.66
Cash at Bank	10,000	20,000	+ 10000	+ 100
Bills Receivable	7,000	10,000	+ 3000	+ 42.85
Sundry Debtors	10,000	15,000	+ 5000	+ 50
Total Liquid Assets	30,000	50,000	+ 20000	+ 66.66
Add : Stock	20,000	25,000	+ 5000	+ 25
Total Current Assets	50,000	75,000	+ 25000	+ 50

Solution:

Fixed Assets	4,90,000	6,25,000	+ 1,35,000	+ 27.55
Total Assets	5,40,000	7,00,000	+ 1,60,000	+ 29.62
Liabilities and Capital :				
Current Liabilities	37,000	50,000	+ 13,000	+ 35.13
Total Current Liabilities	37,000	50,000	+ 13,000	+ 35.13
Long-Term Liabilities :				
Debenture	50,000	60,000	+ 10,000	+ 20
Long-Term Debts	2,00,000	2,50,000	+ 50,000	+ 25
Total Long-term Liabilities	2,50,000	3,10,000	+ 60,000	+ 24
Total Liabilities	2,87,000	3,60,000	+ 73,000	+ 25.43
Capital and Reserve :				
Preference Share Capital	1,00,000	1,50,000	+ 50,000	+ 50
Equity Share Capital	1,25,000	1,60,000	+ 35,000	+ 28
General Reserves	28,000	30,000	+ 2,000	+ 7.14
Total Capital & Reserve	2,53,000	3,40,000	+ 87,000	+ 34.38
Total Liabilities & Capital	5,40,000	7,00,000	+ 1,60,000	+ 29.62

Interpretation

The total current assets of the company is increased by 50% in 2003 as compared to 2002. The current liabilities is increased only to the extent of 33.15 %. It indicates that the company will have no problem to meet the day-to-day expenses and it is also observed that the current financial position of the concern has considerably increased. The fixed assets has been increased by 29.62% compared to 2002. Simultaneously, the long-term liabilities, share capital and the reserve is also considerably increased by 34.38%. This shows that the company exapnd plans in a big way.

5.7 Analysis & Interpretation of financial statements.

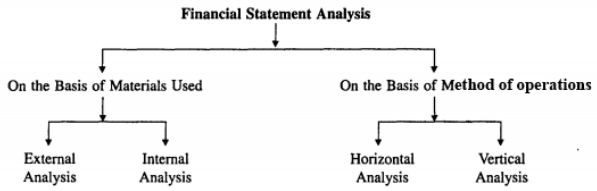
Analysis is defined as a rearrangement of the data given in the financial statements. That is, it is simplification of data by methodical classification of the data given in the financial statements.

Interpretation is a method of explaining the meaning and significance of the data so simplified. Both analysis and interpretations are inter related as they are complementary to each other. The financial statement analysis and interpretations is a process of evaluating the relationship between the component parts of a financial statement in order to obtain a better understanding of the firm's position and performance.

The facts and figures in the financial statements can be transformed into meaningful and useful figures through a process called "Analysis and Interpretations." It can also be explained where it refers to the process of establishing the meaningful relationship between the items of the two financial statements with the objective of identifying the financial and operational strengths and weaknesses.

Types of Analysis and Interpretations

The analysis and interpretation of the financial statements can be classified into two categories are as follows :



Classification of financial analysis

I. The Materials Used

On the basis of materials used the analysis and interpretations of financial statements may be classified into two are as follows:

(a) External Analysis.

(b) Internal Analysis.

External Analysis:

It is used for the outsiders of the business firm. An Outsider can be investors, creditors, suppliers, government agencies, shareholders etc. Those external people have to rely only on these published

financial statements for important decision making. It serves only a limited purpose due to non-availability of detailed information.

Internal Analysis:

This is performed by the persons who are internal to the organization. The internal people will have access to the books of accounts and the other informations related to the business. That analysis can be done for the purpose of assisting managerial personnel to take corrective action and appropriate decisions.

II. Methods of Operations

On the basis of method of operations the analysis and interpretation of financial statements may be classified into:

(a) Horizontal Analysis.

(b) Vertical Analysis.

Horizontal Analysis:

It is also termed as Dynamic Analysis. In this type of analysis, the comparison of the trend of each item in the financial statements over the number of years are reviewed or analyzed. This type of comparison will help to identify the trend in various indicators of performance. This type of analysis, the current year figures are compared with base year for figures and they are presented horizontally over a number of columns.

Vertical Analysis:

It is also termed as Static Analysis. In this type of analysis, a number of ratios is used for measuring the meaningful quantitative relationship between the items of financial statements during the particular period. Under this type of analysis is useful in comparing the efficiency, performance and profitability of many companies in the same group or divisions in the same company.

5.8 Investments

Capital budgeting

This describes how managers plan significant outlays on projects that have long-term implications say the purchase of new equipment and the introduction of new products

Capital budgeting involves investments. The company must commit funds now in order to receive a return in the future. Investment is not limited to stocks and bonds. The purchase of inventory or equipment is also an investment.

5.9 Risks and return evaluation of investment decision

Concepts of returns

Return on Investment-ROI. The performance measure is used to evaluate the efficiency of an investment or for comparing the efficiency of a number of different investments. For calculating ROI, the benefit (return) of an investment can be divided by the cost of the investments, where the result is expressed as a percentage or a ratio.

ROI = (GAIN FROM INVESTMENT - COST OF INVESTMENT)/COST OF INVESTMENT.

The return on investment is a very popular metric because of its versatility and simplicity. In other words, if an investment does not have a positive ROI or if there are other opportunities with the higher ROI, then the investment should be not be undertaken.

The calculation for return on investment is modified to suit the situation - it all depends on what we include as returns and costs. The term is the broadcast sense just attempts to measure the profitability of an investment and where there is no one “right” calculation.

For instance, a marketer can compare two different products by dividing the revenue that each product has generated by its respective expenses. However, a financial analyst may compare the same two products using an entirely different ROI calculation, where the net income of an investment is divided by the total value of all resources which is been employed to make and sell the product. Hence, this flexibility has a downside, as ROI calculation can be easily manipulate to suit the user’s purposes and the result shall be expressed in many different ways. When using this metric, make sure we understand what inputs are being used.

5.10 Average Rate of Return

The rate of return on an investment is calculated by taking the total cash inflow over the life of the investment and dividing it by the number of years in the life of the investment. The average rate of return does not guarantee that the cash inflows are the same in a given year, it simply guarantees that the return averages out to the average rate of return.

It is the profitability of the project determined as projected total net income which is divided by initial or average investment and net income is not discounted.

The average profit after tax and depreciation is calculated and then it is divided by total investment. This can be represented as,

Average rate of return= average annual profit after tax and depreciation*100/net investment

5.11 Payback Period

Payback period in capital budgeting refers to the period of time required for the return on an investment to "repay" the sum of the original investment. The payback period will often be referred to as the amount of time it will take for an investment project to pay for itself and is generally expressed in years.

It measures the time in which the initial cash flow is returned by the project. The cash flows are not discounted. Always a lower payback period is preferred. It can be represented as,

Payback period = Expected number of years required to recover a project's cost.

Example:

Project L

	Expected Net Cash Flow	
Year	Project L	Project S
0	($100)	($100)
1	10	(90)
2	60	(30)
3	80	50

Payback L = 2 + $30/$80 years

= 2.4 years.

Payback S = 1.6 years.

Weaknesses of Payback:

1.It ignores the time value of money. It can be eliminated with the discounted payback method.

2. It ignores the cash flows occurring after the payback period.

Merit of pay back period

Payback period shows the length of time required to repay the total initial investment through investment cash flows. A project is acceptable if its payback period is shorter than or equal to the cutoff period.

Merits:

1) Payback period method is simple and easy to calculate and to apply from small, repetitive investments.

2) Payback period method takes into account tax and depreciation.

Payback period in capital budgeting refers to the period of time required for the return on an investment to "repay" the sum of the original investment. For example, a Rs. 1000 investment which returned Rs. 500 per year would have a two year payback period.

The time value of money is not taken into account. Payback period intuitively measures how long something takes to "pay for itself." All else being equal, shorter payback periods are preferable to longer payback periods. Payback period is widely used because of its ease of use despite recognized limitations.

i) Pay back period method:

It means the period in which the total investment in the permanent assets pays back itself. It is based upon the concept that each of the capital expenditure pays itself back within a certain period of time. Hence, this method measures the period of time means the time taken where the cost of project is recovered from the earning of the project itself.

Pay back period = original cost of asset/ cash inflow

The investment with a shorter pay back period is accepted and the one which has a longer pay back period is rejected is said to be the decision rule for the pay back period.

Advantages of Pay back period method:

1. It saves cost.

2. The riskiness of the project can be tackled by having a shorter payback period as it may ensure guarantee against loss. Hence, easy to calculate, simple to understand.

3. A firm having less funds can select the shorter time period for pay back. That is, it can have more favorable short-run effects on earnings per share by setting up a shorter payback period.

4. As the emphasis in pay back is on the early recovery of investment, it gives an insight to the liquidity of the project.

Disadvantages of Pay back period method:

1. This fails to take in account cash inflow earned after pay back period.

2. Administrative difficulties can be faced in determining the maximum acceptable payback period.

3. It is not an appropriate method of measuring the profitability of an investment project, as it does not consider the entire cash inflows yielded by the project.

4. It does not take into account salvage value of asset.

5. It fails to consider the pattern of cash inflows such as magnitude and timing of cash inflows.

ii) Improvement to traditional approach to pay back method:

It has four method are as follows:

a) Pay back reciprocal method:

In this method, it is used to find out the internal rate of return generated by a project. This is used every year when equal cash inflow is generated . This can be represented as,

Pay back reciprocal = annual cash inflow*100/ total investment.

b) Post pay back profitability method:

The major drawback of pay back method is that it fails to take in account cash inflow earned after pay back period so true profitability of the project can not be ascertained. This method can be done only by taking into account of the return received after the pay back period. This can be represented as,

Post pay back profitability= post pay back profit *100/investment

c) Discounted pay back method:

Since the pay back method ignores the time value of money. Hence, the discounted pay back method is an improvement over this method. Here, the present value of all cash inflow and cash outflow is calculated at an appropriate discount rate. The project with the shorter time period is accepted. This can be represented as the period at which the present value of cash inflow = present value of cash outflow.

d) Post pay back period method:

The limitation of the pay back method is ignored the life of the project beyond the pay back period. Here, it takes into account the life of the project beyond the pay back period. Therefore the project which gives the greatest post pay back period is accepted.

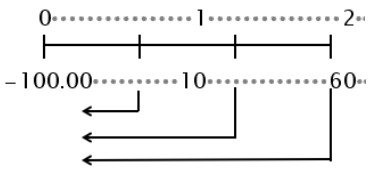
5.12 Net Present Value

This compares the present costs against the present value of benefits where the capital investment can generate through out its economic life. That is, the present value of benefits is less the present value of cost. For PVC, it is the initial cost of a capital investment. For PVB, the projected cash inflows of each year is multiplied by a minimum rate of return, generally the cost of capital, for each year of the economic life of a fixed asset. Then the PVB of all the years is being added and subtract the PVC from the sum to get the NPV. Next, select the project with a positive NPV for independent capital assets and the one with the highest NPV for mutually exclusive capital assets. It is represented as,

$$NPV = \sum_{t=0}^{n} \frac{CF_t}{(1+k)^t}$$

Example:

Project L:



9.09

49.59

60.11

NPVL = $ 18.79

NPVS = $19.98

If the projects are independent, accept both.

If the projects are mutually exclusive, accept Project S since NPVS > NPV

The Net Present Value (NPV) or net present worth of a time series of cash flows, both incoming and outgoing, is defined as the sum of the present values (PV's) of the individual cash flows of the same entity.

Each cash inflow/outflow is discounted back to its present value (PV). Then they are summed. Hence, NPV is the sum of all terms,

$$\frac{R_t}{(1+i)^t}$$

where ,

t-the time of the cash flow.

i-the discount rate (the rate of return that could be earned on an investment in the financial markets with similar risk.); the opportunity cost of capital.

Given the (period, cash flow) paris (t, R_i) where *n* is a positive integer and the total number of periods *N,* the net present value NPV is given by:

$$NPV = \sum_{t=0}^{N} \frac{R_t}{(1+i)^t}.$$

NPV is an indicator of how much value an investment or project adds to the firm. Along with a particular project, if R_t is a positive value, the project is in the status of positive cash inflow in the time of *t.* When R_t is a negative value, the project is in the status of discounted cash flow in the time of t. Hence, appropriately risked projects with positive NPV can be accepted.

When NPV > 0, the investment would add value to the firm, the project may be accepted.

When NPV < 0, the investment would subtract value from the firm, the project should be rejected.

When NPV = 0, the investment would neither gain nor lose value for the firm, we should be indifferent while taking decision whether to accept or reject the project. This project adds no monetary value. Decision should be based on other criteria. For example, strategic positioning or other factors not explicitly included in the calculation.

It takes into account the time value of money that is the return on investment which is calculated by introducing the time element and also realizes the concept that a rupee earned today will have more value than the rupee earned after five years.

The rule for NPV is, when the net present value is positive or zero then the project is accepted or it is rejected.

i.e. NPV is + accepted

NPV is zero accepted

NPV is – rejected

Therefore among various proposals, the project which has maximum positive value is accepted.

Present value = $1/ (1+r)^n$

Steps to find net present value :

• First, determine the appropriate rate of interest that is selected as minimum rate of return or discount rate.

• Second, compute the present value of cash outflow at determined discount rate.

• Then, compute the present value of cash outflow at determined discount rate.

• Finally, calculate the net present value of each project by subtracting the present value of the cash inflow from the present value of cash outflow.

Advantages of net present value method:

1. It takes into account maximum profitability.

2. It considers all cash flows over the entire life of the project in its calculations.

3. It gives better view of profitability.

4. It recognizes the time value of money.

5. It is consistent with the objective of maximizing the welfare of the owners.

Disadvantages of net present value method:

1. It is complex to understand i.e. difficult to use.

2. when the projects being compared involve different amounts of investment a satisfactory answer cannot be obtained.

3. It is complex to determine the discount rate.

4. It presupposes that the discount rate which is usually the firm's cost of capital is known. However, to understand cost of capital is quite a difficult concept in practice.

Problem based on the given information

Project X

Year	**Cash flow**	**PV@10%**	**Present Values**
1	5000	0.909	4545

2	10000	0.826	8260
3	10000	0.751	7510
4	3000	0.683	2049
5	3000	0.621	1863
		PV of future	24227
		Cash flows	
		Less Initial Invest	20000
		NPV	4227

Project Y

Year	**Cash Flow**	**PV@10%**	**Present Value**
1	20000	0.909	18180
2	10000	0.826	8260
3	5000	0.751	3755
4	3000	0.683	2049
5	4000	0.621	2484
	PV of future cash flows		34728

	Less Initial Investment		30000
		NPV	4728

Project Y should be accepted as it has a higher NPV.

5.13 Internal rate of return

The Internal Rate of Return (IRR) is the rate of return promised by an investment project over its useful life. This is some time referred to simply as yield on project. The internal rate of return is computed by finding the discount rate which equates the present value of a project's cash out flow with the present value of its cash inflow. It is also said that the internal rate of return is that discount rate that will cause the net present value of a project to be equal to zero.

It is the discount rate at which net present value of the project becomes zero. Higher IRR should be preferred. This can be represented as,

$$\text{IRR}: \sum_{t=0}^{n} \frac{CF_t}{(1+\text{IRR})^t} = \$0 = \text{NPV}.$$

It is also known as time adjusted rate of return, error method, yield method, discounted rate of return and discounted cash flow and trial . Here, the cash flow of a project is discounted at a suitable rate by hit and trial method. It is the rate where present value of cash inflow which is equal present value of cash outflow.

The rules for IRR are as follows:

IRR < minimum required rate of return than reject the proposal

IRR > minimum required rate of return than accept the proposal

IRR = minimum required rate of return than indifferent

Steps to calculate internal rate of return:

• First, determine the future net cash flow.

• Then, determine the discount rate at which cash inflow = cash outflow.

Advantages of internal rate of return method

1. It is compatible with the firm's maximizing owners' welfare.

2. This takes into account maximum profitability.

3. This will consider the cash flows over the entire life of the project.

4. It gives better view of profitability.

5. Similar to the NPV method, it considers the time value of money.

6. This will satisfy the users in terms of the rate of return on capital.

7. Unlike the NPV method, the calculation of the cost of capital is not a precondition.

Disadvantages of internal rate of return method:

1. This involves complicated computation problems.

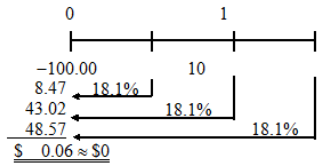
2. It is difficult to understand.

3. It may yield negative rate or multiple rates under certain circumstances. It may not give unique answer in all situations.

4. The result of NPV and IRR differs.

5. This implies that the intermediate cash inflows which is generated by the project are reinvested at the internal rate unlike at the firm's cost of capital under NPV method.

Example:



IRR_L=18.1%

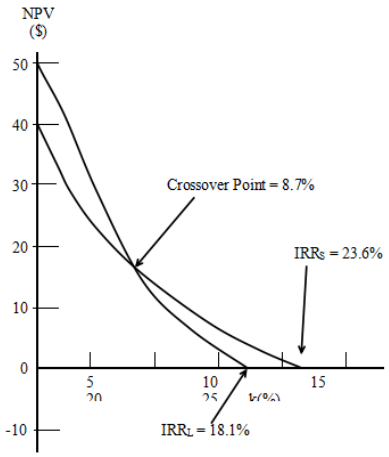
IRR_S=23.6%

When the projects are independent, accept both because IRR > k.

When the projects are mutually exclusive, accept Project S since $IRR_S > IRR_L$.

IRR is independent of the cost of capital.

k	NPV_l	NPV_s
0%	$50	$40
5	33	29
10	19	20
15	7	12
20	(4)	5



Problem based on given data

Proposal A

A.R.R = Annual Average net earnings/Original Investment × 100

$$= \frac{2,000}{10,000} = 20\%$$

$$\text{Annual Average net earnings} = \frac{3,000 + 2,500 + 500}{3}$$

$$= 2000$$

Proposal B

A.R.R = Annual Average net earnings/Original investment × 100

$$= \frac{6,250}{20,000} \times 100 = 31.25\%$$

$$\text{Annual Average net earnings} = \frac{10,000 + 7,500 + 5,000 + 2500}{4} = 6250$$

Proposal B is preferable since it has a higher ARR.